

# **Upper (North Fork) Coeur d'Alene River Subbasin Temperature Total Maximum Daily Loads**

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*Addendum to the 2001 Subbasin Assessment and Total Maximum Daily Loads  
of the North Fork Coeur d'Alene River*



**Draft**



**Idaho Department of Environmental Quality  
February 2013**

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**Upper (North Fork)  
Coeur d'Alene River Subbasin  
Temperature Total Maximum Daily Loads**

**DRAFT**

**February 2013**

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## Abbreviations, Acronyms, and Symbols

|                       |  |                       |  |
|-----------------------|--|-----------------------|--|
| <b>§303(d)</b>        | refers to section 303 subsection (d) of the Clean Water Act, or a list of impaired water bodies required by this section | <b>ICBEMP</b>         | Interior Columbia Basin Ecosystem Management Project |
| <b>AU</b>             | assessment unit  | <b>IDAPA</b>          | refers to citations of Idaho administrative rules    |
| <b>BLM</b>            | Bureau of Land Management  | <b>IDFG</b>           | Idaho Department of Fish and Game                    |
| <b>BMP</b>            | best management practice   | <b>IDL</b>            | Idaho Department of Lands                            |
| <b>BURP</b>           | Beneficial Use Reconnaissance Program  | <b>IDWR</b>           | Idaho Department of Water Resources                  |
| <b>C</b>              | Celsius  | <b>IPNF</b>           | Idaho Panhandle National Forests                     |
| <b>CFR</b>            | Code of Federal Regulations  | <b>km</b>             | kilometer  |
| <b>CGP</b>            | Stormwater Construction General Permit   | <b>kWh/d</b>          | kilowatt-hour per day                                |
| <b>cm</b>             | centimeter   | <b>LA</b>             | load allocation                                      |
| <b>CO<sub>2</sub></b> | carbon dioxide   | <b>LC</b>             | load capacity  |
| <b>CWA</b>            | Clean Water Act  | <b>LiDAR</b>          | light detection and ranging                          |
| <b>CWAL</b>           | cold water aquatic life  | <b>m</b>              | meter  |
| <b>CWE</b>            | cumulative watershed effects   | <b>MDAT</b>           | maximum daily average temperature                    |
| <b>DEQ</b>            | Idaho Department of Environmental Quality  | <b>MDMT</b>           | maximum daily maximum temperature                    |
| <b>dbh</b>            | diameter at breast height  | <b>mi</b>             | mile   |
| <b>EPA</b>            | United States Environmental Protection Agency  | <b>mi<sup>2</sup></b> | square miles   |
| <b>FPA</b>            | Idaho Forest Practices Act   | <b>MOS</b>            | margin of safety                                     |
| <b>FSA</b>            | Farm Services Agency   | <b>MS4</b>            | Municipal Separate Storm Sewer System                |
| <b>FWS</b>            | United States Fish and Wildlife Service  | <b>MSGP</b>           | Industrial Stormwater Multi-Sector General Permit    |
| <b>GIS</b>            | geographic information systems   | <b>MWMT</b>           | maximum weekly maximum temperature                   |
| <b>ha</b>             | hectare  | <b>n.a.</b>           | not applicable                                       |
| <b>HTG</b>            | habitat type group   | <b>NA</b>             | not assessed   |
| <b>HUC</b>            | hydrologic unit code   |                       |  |
| <b>I.C.</b>           | Idaho Code   |                       |  |

|                |   |
|----------------|---|
| <b>NAIP</b>    | National Agriculture Imagery Program            |
| <b>NB</b>      | natural background                              |
| <b>nd</b>      | no data (data not available)                    |
| <b>NHD</b>     | National Hydrography Dataset                    |
| <b>NPDES</b>   | National Pollutant Discharge Elimination System |
| <b>PNV</b>     | potential natural vegetation                    |
| <b>QAPP</b>    | quality assurance project plan                  |
| <b>SAP</b>     | sampling and analysis plan                      |
| <b>SBA</b>     | subbasin assessment                             |
| <b>SS</b>      | salmonid spawning                               |
| <b>STATSGO</b> | State Soil Geographic Database                  |
| <b>TIR</b>     | thermal infrared                                |
| <b>TMDL</b>    | total maximum daily load                        |
| <b>US</b>      | United States                                   |
| <b>USC</b>     | United States Code                              |
| <b>USDA</b>    | United States Department of Agriculture         |
| <b>USDI</b>    | United States Department of the Interior        |
| <b>USFS</b>    | United States Forest Service                    |
| <b>USGS</b>    | United States Geological Survey                 |
| <b>VRU</b>     | vegetation response unit                        |
| <b>WAG</b>     | watershed advisory group                        |
| <b>WLA</b>     | wasteload allocation                            |
| <b>WQLS</b>    | water quality limited segment                   |

## **Executive Summary**

This document addresses water temperature conditions in the streams and rivers of the Upper (North Fork) Coeur d'Alene River subbasin and is an addendum to the 2001 *Subbasin Assessment and Total Maximum Daily Loads of the North Fork Coeur d'Alene River*. The document includes background information about the subbasin and water temperature concerns, a pollutant source inventory, a summary of monitoring and the status of water quality improvements, and temperature total maximum daily loads (TMDLs). This TMDL analysis has been developed to comply with Idaho's TMDL requirements and quantifies pollutant sources, establishes load allocations, and assigns responsibility for load reductions needed to meet water quality standards and restore full support of beneficial uses.

The federal Clean Water Act (CWA) requires that states and tribes restore and maintain the chemical, physical, and biological integrity of the nation's waters. States and tribes, pursuant to §303 of the CWA, are to adopt water quality standards necessary to protect fish, shellfish, and wildlife while providing for recreation in and on the nation's waters whenever possible. Section 303(d) of the CWA requires states and tribes to identify and prioritize water bodies that are water quality limited (i.e., water bodies that do not meet water quality standards). States and tribes must periodically publish a priority list, also called the §303(d) list, of impaired waters. This list must be published every 2 years and is published in Idaho as the list of Category 5 waters in the Integrated Report. For waters identified on this list, states and tribes must develop a TMDL for the pollutant(s) causing impairment, set at a level to achieve water quality standards.

DEQ established temperature TMDLs for 54 assessment units (AUs) with water temperatures exceeding Idaho's water quality standards (Figure A; Table A). An AU is a segment of a water body that is treated as a single unit and given a unique alphanumeric identifier by DEQ. In the 2008 Integrated Report, 31 AUs were listed as impaired by temperature. An additional 23 AUs were listed as impaired by temperature in the 2010 Integrated Report. This document addresses the temperature conditions and TMDLs for all 54 of these AUs. For more information about the watersheds, other pollutants, and the subbasin as a whole, see the 2001 *Subbasin Assessment and Total Maximum Daily Loads of the North Fork Coeur d'Alene River*.

### **Subbasin at a Glance**

The Upper (North Fork) Coeur d'Alene River subbasin (hydrologic unit code [HUC] 17010301) is located in northern Idaho at the headwaters of the Spokane River Basin. The 895-square mile subbasin spans three counties: Kootenai, Bonner, and Shoshone. Land use within the subbasin is diverse and includes agriculture, silviculture, recreation, residential use, and mining. The US Forest Service (USFS) is the major landowner in the subbasin and manages 540,033 acres (94%) of the subbasin's land area. Private landowners, the State of Idaho, and the US Bureau of Land Management (BLM) manage the remaining 6% of land area. The subbasin contains seven major watersheds and 1,121 stream miles divided into 79 assessment units. Beneficial uses of stream surface waters include cold water aquatic life and salmonid spawning throughout the subbasin. Criteria for protection of bull trout have been applied in applicable watersheds.

|                             |  |
|-----------------------------|--|
| Subbasin                    | Upper (North Fork) Coeur d'Alene River Subbasin              |
| Hydrologic Unit Code        | 17010301   |
| Watershed Area              | 895 square miles   |
| Land Uses                   | Forestry, Agriculture, Recreation, Mining, Rural Residential |
| Pollutant Addressed         | Temperature  |
| Beneficial Uses Affected    | Cold Water Aquatic Life and Salmonid Spawning                |
| Assessment Units with TMDLs | 54   |

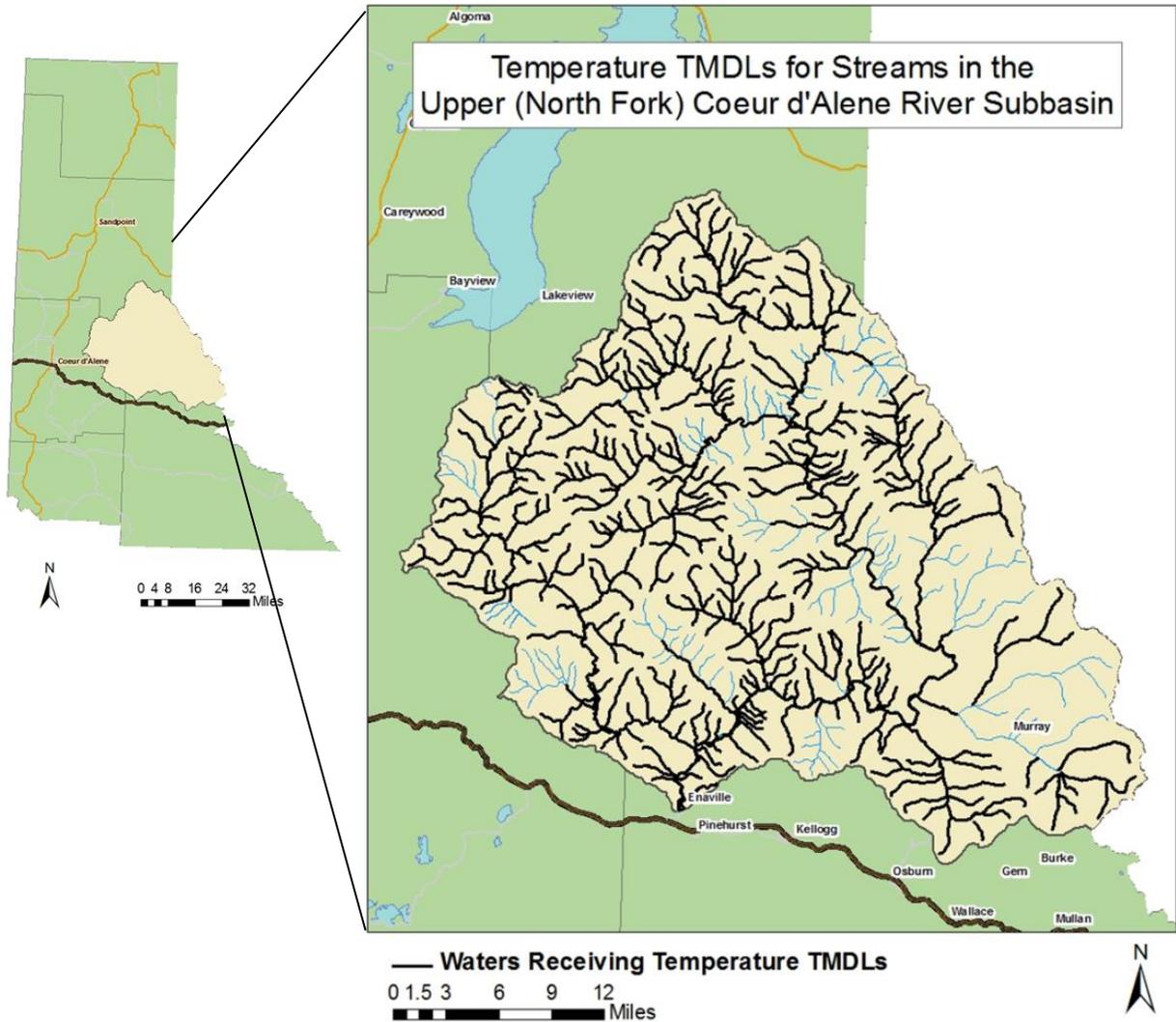


Figure A. Subbasin at a glance.

**Table A. Stream assessment units for which temperature TMDLs were developed.**

| <b>Assessment Unit Number</b> | <b>Assessment Unit Name</b>   |
|-------------------------------|---|
| ID17010301PN001_02            | North Fork Coeur d'Alene River tributaries below Prichard Creek                       |
| ID17010301PN001_05            | North Fork Coeur d'Alene River below Prichard Creek                                   |
| ID17010301PN001_05a           | North Fork Coeur d'Alene River between Yellowdog and Prichard Creeks                  |
| ID17010301PN002_03            | Graham Creek below Deceitful Gulch  |
| ID17010301PN003_02            | Beaver Creek headwaters and tributaries   |
| ID17010301PN003_03            | Beaver Creek below White Creek  |
| ID17010301PN004_04            | Prichard Creek below Eagle Creek  |
| ID17010301PN005_02            | Prichard Creek headwaters and tributaries above Butte Gulch                           |
| ID17010301PN008_02            | West Fork Eagle Creek and tributaries   |
| ID17010301PN009_03            | Lost Creek below East Fork Lost Creek   |
| ID17010301PN010_03            | Shoshone Creek below Falls Creek  |
| ID17010301PN011_02            | Falls Creek and tributaries   |
| ID17010301PN012_02            | Shoshone Creek headwaters and tributaries above Falls Creek                           |
| ID17010301PN012_03            | Shoshone Creek between Little Lost Fork and Falls Creek                               |
| ID17010301PN013_02            | North Fork Coeur d'Alene River tributaries between Tepee and Yellowdog Creeks         |
| ID17010301PN013_04            | North Fork Coeur d'Alene River between Jordan and Tepee Creeks                        |
| ID17010301PN013_05            | North Fork Coeur d'Alene River between Tepee and Yellowdog Creeks                     |
| ID17010301PN014_03            | Jordan Creek and Lower Lost Fork  |
| ID17010301PN015_02            | North Fork Coeur d'Alene River, upper, headwaters, and tributaries                    |
| ID17010301PN015_03            | North Fork Coeur d'Alene River, upper, and lower Buckskin Creek                       |
| ID17010301PN015_04            | North Fork Coeur d'Alene River between Buckskin and Jordan Creeks                     |
| ID17010301PN016_02            | West Elk Creek and Cataract Creek   |
| ID17010301PN017_04            | Tepee Creek between Trail Creek and Independence Creek                                |
| ID17010301PN017_05            | Tepee Creek below Independence Creek  |
| ID17010301PN018_02            | Independence Creek headwaters and tributaries   |
| ID17010301PN018_03a           | Declaration Creek, lower  |
| ID17010301PN018_03b           | Snow Creek, lower   |
| ID17010301PN018_04            | Independence Creek below Declaration Creek  |
| ID17010301PN019_02            | Trail Creek headwaters and tributaries  |
| ID17010301PN019_03            | Trail Creek below Stewart Creek   |
| ID17010301PN020_02            | Tepee Creek headwaters and tributaries  |
| ID17010301PN020_03            | Tepee Creek between Short Creek and Trail Creek                                       |
| ID17010301PN021_02            | Brett Creek and tributaries   |
| ID17010301PN022_02            | Miners Creek and tributaries  |
| ID17010301PN023_03            | Flat Creek, lower   |
| ID17010301PN024_02            | Yellowdog Creek and tributaries   |
| ID17010301PN026_02            | Brown Creek and tributaries   |
| ID17010301PN028_02            | Steamboat Creek headwaters and tributaries  |
| ID17010301PN028_03            | Steamboat Creek and West Fork Steamboat Creek below Comfy Creek                       |
| ID17010301PN029_03            | Cougar Gulch below East Fork Cougar Gulch   |
| ID17010301PN030_02a           | Little North Fork Coeur d'Alene River tributaries above Iron Creek                    |
| ID17010301PN030_02c           | Little North Fork Coeur d'Alene River tributaries between Hudlow and Deception Creeks |
| ID17010301PN030_02d           | Little North Fork Coeur d'Alene River tributaries below Skookum Creek                 |
| ID17010301PN030_03            | Little North Fork Coeur d'Alene River between Solitaire and Skookum Creeks            |
| ID17010301PN030_04            | Little North Fork Coeur d'Alene River below Skookum Creek                             |
| ID17010301PN031_02            | Bumblebee Creek and tributaries   |
| ID17010301PN032_02            | Laverne Creek and tributaries   |
| ID17010301PN033_02            | Leiberg Creek and tributaries   |
| ID17010301PN034_02            | Bootjack Creek and tributaries  |
| ID17010301PN035_02            | Iron Creek and tributaries  |
| ID17010301PN036_02            | Burnt Cabin Creek and tributaries   |
| ID17010301PN037_02            | Deception Creek and tributaries   |
| ID17010301PN038_03            | Skookum Creek, lower  |
| ID17010301PN039_03            | Copper Creek, lower   |

Water temperature strongly affects the life cycles of fish and other aquatic species, and different water temperature regimes determine whether a warm, cool, or coldwater aquatic community is present in a water body. Temperatures outside the natural range of variability can be harmful to fish at all life stages, especially if occurring in combination with other stressors. High water temperatures can have damaging chronic (long-term) and acute (short-term) effects to coldwater aquatic life. For adult fish, chronic exposure to high water temperatures can result in reduced body weight, reduced oxygen exchange, increased susceptibility to disease, and reduced reproductive capacity. Acute exposure to high water temperatures can be lethal if fish are unable to seek refuge in cooler water. Water temperatures also affect embryonic development of fish, juvenile growth and survival, and aquatic invertebrates, amphibians, and mollusks.

### **Key Findings**

- Streams in the subbasin have high water temperatures in the summer that are harmful to fish and other aquatic life. The highest observed water temperatures are generally in the main stem North Fork Coeur d'Alene River and lower reaches of the largest tributaries. Smaller tributaries, springs, and side channel areas are often sources of cooler water and offer cool water refugia for fish.
- Stream temperature data from DEQ and the US Forest Service were available for 54 of the 79 stream AUs in the subbasin.
- Each of the 54 stream AUs analyzed exceeded one or more water quality criteria for temperature and were listed as impaired in the 2010 Integrated Report:
  - 6 stream AUs exceeded Idaho's water quality criteria for protection of cold water aquatic life.
  - All 54 stream AUs evaluated exceeded Idaho's water quality criteria for protection of salmonid spawning.
  - 3 stream AUs are included in the federal water quality criteria for protection of bull trout, and all 3 exceeded those criteria.
- Lack of riparian shade is the likely cause of excess water temperatures, and improvements in shade should reduce water temperatures and allow full support of cold water aquatic life.
- Temperature TMDLs were developed for 54 stream AUs using the potential natural vegetation method that establishes shade and solar load targets for the watersheds analyzed.

The 1998 §303(d) list of impaired waters originally included Prichard Creek from Barton Gulch to the North Fork Coeur d'Alene River as the only stream listed as impaired due to temperature, but Steamboat Creek was added to Idaho's 1998 §303(d) list by the Environmental Protection Agency (EPA) as exceeding Idaho's temperature criteria. As more data became available, many streams were added to the Idaho §303(d) list of impaired waters after 2000 due to temperature.

The 2008 Integrated Report included 31 AUs listed as temperature-impaired. In 2009, DEQ completed a full temperature assessment to analyze all water temperature data available in the subbasin. Of 79 total AUs in the subbasin, all 54 AUs with temperature data exceeded at least one portion of the Idaho water quality criteria for temperature. The 2009 assessment also found that three of the AUs listed as temperature-impaired in 2008 did not have any water temperature

data available. For the 2010 Integrated Report, DEQ removed temperature as a pollutant causing impairment of these three units. The 54 AUs listed in the 2010 Integrated Report with temperature impairments received temperature TMDLs in this document. An additional 25 AUs that are not listed as temperature impaired have been included in this analysis for informational purposes only (Table B). This TMDL is built upon the results of the 2009 subbasin assessment for temperature and the 2010 Integrated Report.

**Table B. Summary of temperature assessment outcomes for all 79 assessment units in the subbasin.**

| Assessment Unit Number | Assessment Unit Name   | TMDL(s) Completed | Recommended Changes to §303(d) List             | Justification  |
|------------------------|--|-------------------|---|--|
| ID17010301PN001_02     | North Fork Coeur d'Alene River tributaries below Prichard Creek                  | Yes               | Listed Category 5 in 2010. Move to Category 4a. | USFS data exceeded SS criteria. Excess solar load from lack of shade.          |
| ID17010301PN001_02a    | North Fork Coeur d'Alene River tributaries between Yellowdog and Prichard Creeks | No                | Temperature not assessed.                       | No temperature data available.   |
| ID17010301PN001_05     | North Fork Coeur d'Alene River below Prichard Creek                              | Yes               | Move to Category 4a.                            | USFS data exceeded SS and CWAL criteria. Excess solar load from lack of shade. |
| ID17010301PN001_05a    | North Fork Coeur d'Alene River between Yellowdog and Prichard Creeks             | Yes               | Move to Category 4a.                            | USFS data exceeded SS and CWAL criteria. Excess solar load from lack of shade. |
| ID17010301PN002_02     | Graham Creek headwaters and tributaries  | No                | Temperature not assessed.                       | No temperature data available.   |
| ID17010301PN002_03     | Graham Creek below Deceitful Gulch   | Yes               | Move to Category 4a.                            | DEQ data exceeded SS criteria. Excess solar load from lack of shade.           |
| ID17010301PN003_02     | Beaver Creek headwaters and tributaries  | Yes               | Move to Category 4a.                            | USFS data exceeded SS criteria. Excess solar load from lack of shade.          |
| ID17010301PN003_03     | Beaver Creek below White Creek   | Yes               | Move to Category 4a.                            | DEQ and USFS data exceeded SS criteria. Excess solar load from lack of shade.  |
| ID17010301PN004_02     | Prichard Creek tributaries between Butte Gulch and Eagle Creek                   | No                | Temperature not assessed.                       | No temperature data available.   |
| ID17010301PN004_03     | Prichard Creek between Butte Gulch and Eagle Creek                               | No                | Delisted in 2010. Temperature not assessed.     | No temperature data available.   |
| ID17010301PN004_04     | Prichard Creek below Eagle Creek   | Yes               | Move to Category 4a.                            | DEQ and USFS data exceeded SS criteria. Excess solar load from lack of shade.  |
| ID17010301PN005_02     | Prichard Creek headwaters and tributaries above Butte Gulch                      | Yes               | Move to Category 4a.                            | DEQ and USFS data exceeded SS criteria. Excess solar load from lack of shade.  |
| ID17010301PN005_03     | Prichard Creek between Barton Gulch and Butte Gulch                              | No                | Delisted in 2010. Temperature not assessed.     | No temperature data available.   |

Upper (North Fork) Coeur d'Alene River Temperature TMDL Addendum

| Assessment Unit Number | Assessment Unit Name  | TMDL(s) Completed | Recommended Changes to §303(d) List             | Justification  |
|------------------------|---|-------------------|---|--|
| ID17010301PN006_02     | Butte Gulch   | No                | Temperature not assessed.                       | No temperature data available.   |
| ID17010301PN007_02     | East Fork Eagle Creek and tributaries   | No                | Temperature not assessed.                       | No temperature data available.   |
| ID17010301PN007_03     | Eagle Creek   | No                | Temperature not assessed.                       | No temperature data available.   |
| ID17010301PN008_02     | West Fork Eagle Creek and tributaries   | Yes               | Move to Category 4a.                            | DEQ and USFS data exceeded SS criteria. Excess solar load from lack of shade.    |
| ID17010301PN009_02     | Lost Creek headwaters and tributaries   | No                | Temperature not assessed.                       | No temperature data available.   |
| ID17010301PN009_03     | Lost Creek below East Fork Lost Creek   | Yes               | Move to Category 4a.                            | DEQ data exceeded SS criteria. Excess solar load from lack of shade.             |
| ID17010301PN010_02     | Shoshone Creek tributaries below Falls Creek                                  | No                | Temperature not assessed.                       | No temperature data available.   |
| ID17010301PN010_03     | Shoshone Creek below Falls Creek  | Yes               | Listed Category 5 in 2010. Move to Category 4a. | USFS data exceeded SS and CWAL criteria. Excess solar load from lack of shade.   |
| ID17010301PN011_02     | Falls Creek and tributaries   | Yes               | Listed Category 5 in 2010. Move to Category 4a. | USFS data exceeded SS and EPA BT criteria. Excess solar load from lack of shade. |
| ID17010301PN012_02     | Shoshone Creek headwaters and tributaries above Falls Creek                   | Yes               | Listed Category 5 in 2010. Move to Category 4a. | USFS data exceeded SS criteria. Excess solar load from lack of shade.            |
| ID17010301PN012_03     | Shoshone Creek between Little Lost Fork and Falls Creek                       | Yes               | Listed Category 5 in 2010. Move to Category 4a. | USFS data exceeded SS and EPA BT criteria. Excess solar load from lack of shade. |
| ID17010301PN013_02     | North Fork Coeur d'Alene River tributaries between Tepee and Yellowdog Creeks | Yes               | Listed Category 5 in 2010. Move to Category 4a. | USFS data exceeded SS and EPA BT criteria. Excess solar load from lack of shade. |
| ID17010301PN013_02a    | North Fork Coeur d'Alene River tributaries between Jordan and Tepee Creeks    | No                | Temperature not assessed.                       | No temperature data available.   |
| ID17010301PN013_04     | North Fork Coeur d'Alene River between Jordan and Tepee Creeks                | Yes               | Listed Category 5 in 2010. Move to Category 4a. | USFS data exceeded SS and EPA BT criteria. Excess solar load from lack of shade. |
| ID17010301PN013_05     | North Fork Coeur d'Alene River between Tepee and Yellowdog Creeks             | Yes               | Move to Category 4a.                            | USFS data exceeded SS criteria. Excess solar load from lack of shade.            |
| ID17010301PN014_02     | Jordan Creek headwaters and tributaries                                       | No                | Temperature not assessed.                       | No temperature data available.   |
| ID17010301PN014_02a    | Cub Creek   | No                | Temperature not assessed.                       | No temperature data available.   |
| ID17010301PN014_02b    | Calamity Creek  | No                | Temperature not assessed.                       | No temperature data available.   |

Upper (North Fork) Coeur d'Alene River Temperature TMDL Addendum

| Assessment Unit Number | Assessment Unit Name  | TMDL(s) Completed | Recommended Changes to §303(d) List                | Justification   |
|------------------------|---|-------------------|--|---|
| ID17010301PN014_03     | Jordan Creek and Lower Lost Fork                                  | Yes               | Listed Category 5 in 2010.<br>Move to Category 4a. | USFS data exceeded SS criteria.<br>Excess solar load from lack of shade.          |
| ID17010301PN015_02     | North Fork Coeur d'Alene River, upper, headwaters and tributaries | Yes               | Move to Category 4a.                               | DEQ and USFS data exceeded SS criteria.<br>Excess solar load from lack of shade.  |
| ID17010301PN015_03     | North Fork Coeur d'Alene River, upper, and lower Buckskin Creek   | Yes               | Move to Category 4a.                               | DEQ and USFS data exceeded SS criteria.<br>Excess solar load from lack of shade.  |
| ID17010301PN015_04     | North Fork Coeur d'Alene River between Buckskin and Jordan Creeks | Yes               | Move to Category 4a.                               | USFS data exceeded SS criteria.<br>Excess solar load from lack of shade.          |
| ID17010301PN016_02     | West Elk Creek and Cataract Creek                                 | Yes               | Listed Category 5 in 2010.<br>Move to Category 4a. | USFS data exceeded SS criteria.<br>Excess solar load from lack of shade.          |
| ID17010301PN017_02     | Tepee Creek tributaries below Trail Creek                         | No                | Temperature not assessed.                          | No temperature data available.  |
| ID17010301PN017_04     | Tepee Creek between Trail Creek and Independence Creek            | Yes               | Move to Category 4a.                               | USFS data exceeded SS criteria.<br>Excess solar load from lack of shade.          |
| ID17010301PN017_05     | Tepee Creek below Independence Creek                              | Yes               | Move to Category 4a.                               | USFS data exceeded SS criteria.<br>Excess solar load from lack of shade.          |
| ID17010301PN018_02     | Independence Creek headwaters and tributaries                     | Yes               | Listed Category 5 in 2010.<br>Move to Category 4a. | USFS data exceeded SS criteria.<br>Excess solar load from lack of shade.          |
| ID17010301PN018_03     | Independence Creek between Ellis and Declaration Creeks           | No                | Delisted in 2010.<br>Temperature not assessed.     | No temperature data available.  |
| ID17010301PN018_03a    | Declaration Creek, lower  | Yes               | Move to Category 4a.                               | USFS data exceeded SS criteria.<br>Excess solar load from lack of shade.          |
| ID17010301PN018_03b    | Snow Creek, lower   | Yes               | Move to Category 4a.                               | USFS data exceeded SS criteria.<br>Excess solar load from lack of shade.          |
| ID17010301PN018_04     | Independence Creek below Declaration Creek                        | Yes               | Listed Category 5 in 2010.<br>Move to Category 4a. | USFS data exceeded SS and CWAL criteria.<br>Excess solar load from lack of shade. |
| ID17010301PN019_02     | Trail Creek headwaters and tributaries                            | Yes               | Listed Category 5 in 2010.<br>Move to Category 4a. | USFS data exceeded SS criteria.<br>Excess solar load from lack of shade.          |
| ID17010301PN019_03     | Trail Creek below Stewart Creek                                   | Yes               | Move to Category 4a.                               | DEQ and USFS data exceeded SS criteria.<br>Excess solar load from lack of shade.  |

Upper (North Fork) Coeur d'Alene River Temperature TMDL Addendum

| Assessment Unit Number | Assessment Unit Name   | TMDL(s) Completed | Recommended Changes to §303(d) List                | Justification   |
|------------------------|--|-------------------|--|---|
| ID17010301PN020_02     | Tepee Creek headwaters and tributaries                               | Yes               | Listed Category 5 in 2010.<br>Move to Category 4a. | USFS data exceeded SS criteria.<br>Excess solar load from lack of shade.            |
| ID17010301PN020_03     | Tepee Creek between Short Creek and Trail Creek                      | Yes               | Move to Category 4a.                               | DEQ and USFS data exceeded SS criteria.<br>Excess solar load from lack of shade.    |
| ID17010301PN021_02     | Brett Creek and tributaries  | Yes               | Listed Category 5 in 2010.<br>Move to Category 4a. | USFS data exceeded SS criteria.<br>Excess solar load from lack of shade.            |
| ID17010301PN022_02     | Miners Creek and tributaries   | Yes               | Listed Category 5 in 2010.<br>Move to Category 4a. | USFS data exceeded SS criteria.<br>Excess solar load from lack of shade.            |
| ID17010301PN023_02     | Flat Creek headwaters and tributaries                                | No                | Temperature not assessed.                          | No temperature data available.  |
| ID17010301PN023_03     | Flat Creek, lower  | Yes               | Listed Category 5 in 2010.<br>Move to Category 4a. | USFS data exceeded SS criteria.<br>Excess solar load from lack of shade.            |
| ID17010301PN024_02     | Yellowdog Creek and tributaries                                      | Yes               | Listed Category 5 in 2010.<br>Move to Category 4a. | USFS data exceeded SS criteria.<br>Excess solar load from lack of shade.            |
| ID17010301PN025_02     | Downey Creek headwaters and tributaries                              | No                | Temperature not assessed.                          | No temperature data available.  |
| ID17010301PN025_03     | Downey Creek, lower  | No                | Temperature not assessed.                          | No temperature data available.  |
| ID17010301PN026_02     | Brown Creek and tributaries  | Yes               | Listed Category 5 in 2010.<br>Move to Category 4a. | USFS data exceeded SS and EPA BT criteria.<br>Excess solar load from lack of shade. |
| ID17010301PN027_03     | Grizzly Creek, below Dewey Creek                                     | No                | Temperature not assessed.                          | No temperature data available.  |
| ID17010301PN028_02     | Steamboat Creek headwaters and tributaries                           | Yes               | Listed Category 5 in 2010.<br>Move to Category 4a. | USFS data exceeded SS criteria.<br>Excess solar load from lack of shade.            |
| ID17010301PN028_03     | Steamboat Creek and West Fork Steamboat Creek below Comfy Creek      | Yes               | Move to Category 4a.                               | DEQ and USFS data exceeded SS criteria.<br>Excess solar load from lack of shade.    |
| ID17010301PN029_02     | Cougar Gulch headwaters and tributaries                              | No                | Temperature not assessed.                          | No temperature data available.  |
| ID17010301PN029_03     | Cougar Gulch below East Fork Cougar Gulch                            | Yes               | List Category 5 in 2010.<br>Move to Category 4a.   | USFS data exceeded SS criteria.<br>Excess solar load from lack of shade.            |
| ID17010301PN030_02     | Little North Fork Coeur d'Alene River tributaries to Solitaire Creek | No                | Temperature not assessed.                          | No temperature data available.  |
| ID17010301PN030_02a    | Little North Fork Coeur d'Alene River tributaries above Iron Creek   | Yes               | Listed Category 5 in 2010.<br>Move to Category 4a. | USFS data exceeded SS criteria.<br>Excess solar load from lack of shade.            |

| Assessment Unit Number | Assessment Unit Name  | TMDL(s) Completed | Recommended Changes to §303(d) List                | Justification   |
|------------------------|---|-------------------|--|---|
| ID17010301PN030_02b    | Hudlow Creek and tributaries  | No                | Temperature not assessed.                          | No temperature data available.  |
| ID17010301PN030_02c    | Little North Fork Coeur d'Alene River tributaries between Hudlow and Deception Creeks | Yes               | Move to Category 4a.                               | DEQ data exceeded SS criteria.<br>Excess solar load from lack of shade.           |
| ID17010301PN030_02d    | Little North Fork Coeur d'Alene River tributaries below Skookum                       | Yes               | Move to Category 4a.                               | DEQ data exceeded SS criteria.<br>Excess solar load from lack of shade.           |
| ID17010301PN030_03     | Little North Fork Coeur d'Alene River between Solitaire and Skookum Creeks            | Yes               | Move to Category 4a.                               | USFS data exceeded SS criteria.<br>Excess solar load from lack of shade.          |
| ID17010301PN030_04     | Little North Fork Coeur d'Alene River below Skookum Creek                             | Yes               | Move to Category 4a.                               | USFS data exceeded SS and CWAL criteria.<br>Excess solar load from lack of shade. |
| ID17010301PN031_02     | Bumblebee Creek and tributaries   | Yes               | Move to Category 4a.                               | DEQ data exceeded SS criteria.<br>Excess solar load from lack of shade.           |
| ID17010301PN032_02     | Laverne Creek and tributaries   | Yes               | Move to Category 4a.                               | DEQ and USFS data exceeded SS criteria.<br>Excess solar load from lack of shade.  |
| ID17010301PN033_02     | Leiberg Creek and tributaries   | Yes               | Move to Category 4a.                               | DEQ data exceeded SS criteria.<br>Excess solar load from lack of shade.           |
| ID17010301PN034_02     | Bootjack Creek and tributaries  | Yes               | Move to Category 4a.                               | DEQ data exceeded SS criteria.<br>Excess solar load from lack of shade.           |
| ID17010301PN035_02     | Iron Creek and tributaries  | Yes               | Listed Category 5 in 2010.<br>Move to Category 4a. | USFS data exceeded SS criteria.<br>Excess solar load from lack of shade.          |
| ID17010301PN036_02     | Burnt Cabin Creek and tributaries   | Yes               | Move to Category 4a.                               | DEQ and USFS data exceeded SS criteria.<br>Excess solar load from lack of shade.  |
| ID17010301PN037_02     | Deception Creek and tributaries   | Yes               | Move to Category 4a.                               | DEQ data exceeded SS criteria.<br>Excess solar load from lack of shade.           |
| ID17010301PN038_02     | Skookum Creek headwaters and tributaries  | No                | Temperature not assessed.                          | No temperature data available.  |
| ID17010301PN038_03     | Skookum Creek, lower  | Yes               | Listed Category 5 in 2010.<br>Move to Category 4a. | DEQ data exceeded SS criteria.<br>Excess solar load from lack of shade.           |
| ID17010301PN039_02     | Copper Creek headwaters and tributaries   | No                | Temperature not assessed.                          | No temperature data available.  |
| ID17010301PN039_03     | Copper Creek, lower   | Yes               | Move to Category 4a.                               | DEQ data exceeded SS criteria.<br>Excess solar load from lack of shade.           |

*Note:* US Forest Service (USFS); salmonid spawning (SS); cold water aquatic life (CWAL); US Environmental Protection Agency (EPA); bull trout (BT)

These temperature TMDLs were developed using the potential natural vegetation (PNV) method described by Shumar and De Varona (2009). Estimates were calculated for shade and solar loads under existing and target (potential) conditions in order to establish the temperature TMDL load allocations and the necessary load reductions to obtain temperatures at natural background conditions.

Estimated shade conditions and solar loads were variable among the streams evaluated. Most stream segments were within 20% of target shade conditions. Three assessment units had existing solar loads lower than the estimated target and load allocation: Graham Creek below Deceitful Gulch (ID17010301PN002\_03), Lost Creek below East Fork Lost Creek (ID17010301PN009\_03), and Steamboat Creek and West Fork Steamboat Creek below Comfy Creek (ID17010301PN028\_03) The highest solar load reductions needed were in the lower portions of larger streams including the middle and lower North Fork Coeur d'Alene River, the lower Little North Fork Coeur d'Alene River, lower Trail Creek, and lower Tepee Creek. Areas with shade deficits over 50% include the lower North Fork Coeur d'Alene River, stretches of upper Beaver Creek, portions of Falls Creek, lower Trail Creek (tributary to Tepee Creek), and portions of middle Tepee Creek. These areas should be considered priorities for TMDL implementation.

## Introduction

The Clean Water Act (CWA) mandates that the chemical, physical, and biological integrity of the nation's waters be restored and maintained. In accordance with this mandate, the State of Idaho has adopted water quality standards to protect fish and wildlife while providing for recreation in and on the water, whenever attainable. As required by §303(d) of the CWA, the state must identify and prioritize water bodies that do not meet water quality standards and whose beneficial uses are not fully supported by water quality. This list of water bodies is called the §303(d) list and is published every 2 years as the list of Category 5 waters in DEQ's Integrated Report of statewide water quality status. The most recent US Environmental Protection Agency (EPA)-approved list of impaired water bodies is the Idaho Department of Environmental Quality's (DEQ's) 2010 Integrated Report (DEQ 2011). Waters identified as impaired must be addressed with total maximum daily loads (TMDLs) to bring them into compliance with water quality standards and full support of beneficial uses.

In 2001, DEQ completed a subbasin assessment and developed TMDLs to address sediment and metals (cadmium, lead, and zinc) impairments in the Upper (North Fork) Coeur d'Alene River subbasin (hydrologic unit code [HUC] 17010301). That document, the *Subbasin Assessment and Total Maximum Daily Loads of the North Fork Coeur d'Alene River* (DEQ 2001), contains a full subbasin assessment and details on water quality conditions focused on sediment and metals.

This addendum contains updated information on temperature conditions in streams of the subbasin. Once DEQ identified temperature impairments, loading analyses were performed to determine existing loads, load capacities, natural background conditions, and load allocations. In general, streams of this subbasin provide relatively high-quality habitat for trout and other coldwater species. However, water quality problems related to sediment and temperature continue to affect these organisms and prevent full support of the cold water aquatic life community. Through the implementation of the existing TMDLs for sediment and metals (DEQ 2001), and implementation of these TMDLs for temperature, water quality and habitat should improve and full support of coldwater aquatic life can be restored.

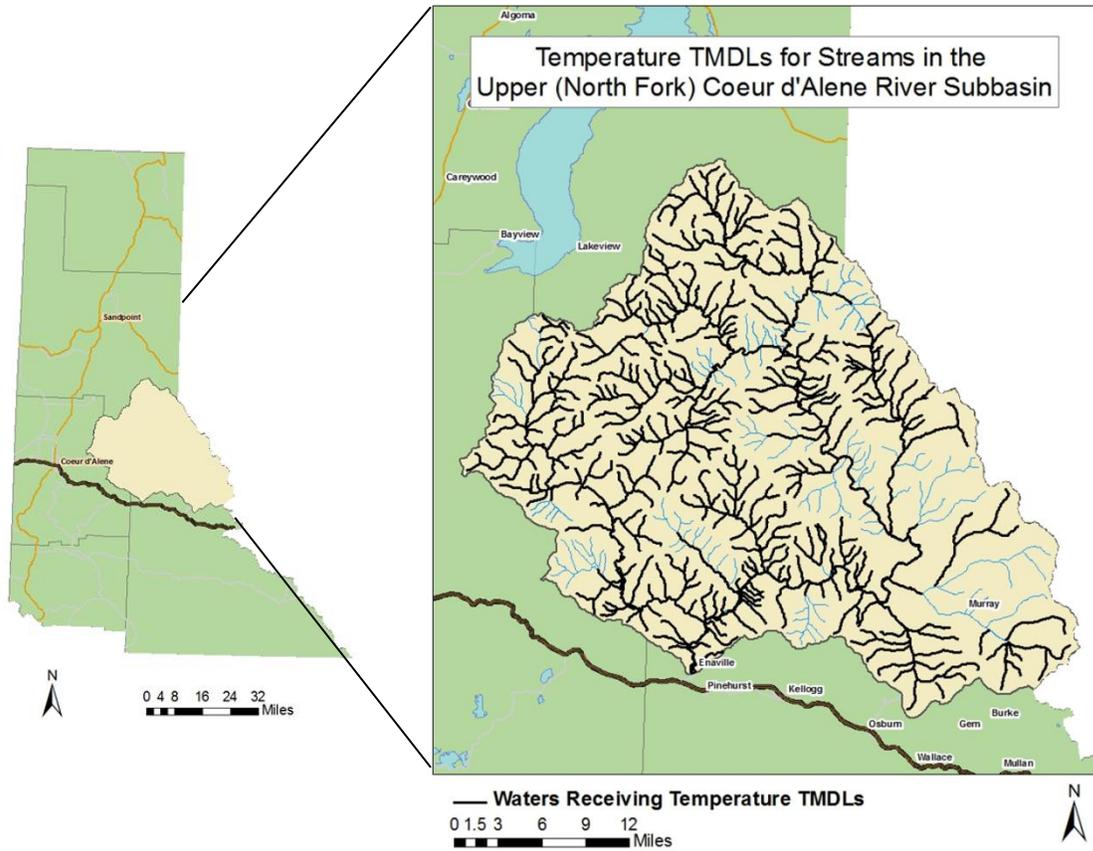
This document contains detailed information on the temperature TMDLs and loading analyses as well as information about the subbasin, beneficial uses and support status, pollutant sources, pollution control strategies, and recommendations for improving water temperatures and mitigating the effects of elevated temperatures in this subbasin. DEQ's primary goal with respect to these temperature TMDLs is to improve riparian conditions, thereby increasing shade and reducing stream temperatures for the benefit of coldwater organisms.

## 1 Subbasin Assessment—Watershed Characterization

The Upper (North Fork) Coeur d'Alene River subbasin is located in northern Idaho at the headwaters of the Spokane River Basin (Figure 1). The 895-square mile subbasin spans three counties: Kootenai, Bonner, and Shoshone.<sup>1</sup>

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<sup>1</sup> See Appendix A for a unit conversion chart.



**Figure 1. Upper (North Fork) Coeur d'Alene River subbasin in northern Idaho.**

Currently, all streams in the subbasin that are part of the 1:100,000 national hydrography dataset (NHD) are divided by DEQ into 79 assessment units (AUs) for tracking, assessment, and management. Each AU receives an identification number (e.g., ID17010301PN003\_02), and these are used to track and report the status of stream segments and lakes. AUs are groups of similar streams with similar land-use practices, ownership, or land management. Stream order and watershed boundaries are the main basis for determining AUs. Streams with similar stream orders are grouped together, and AUs are usually split when stream order changes or when crossing a major watershed boundary.

### **1.1 Physical and Biological Characteristics**

A detailed discussion of the physical and biological characteristics of the Upper (North Fork) Coeur d'Alene River subbasin is provided in the *Subbasin Assessment and Total Maximum Daily Loads of the North Fork Coeur d'Alene River* (DEQ 2001).

Water temperature is an integral factor in determining the biological characteristics in a water body. Water temperature strongly influences the life cycles of fish and other aquatic species, and different water temperature regimes dictate whether a warm, cool, or coldwater aquatic community is present. Many factors, natural and anthropogenic, affect stream temperatures. Natural factors that affect water temperature include air temperature, elevation, aspect, climate, riparian vegetation, and channel morphology (e.g., width and depth). Humans influence water

temperature through activities including heated discharges from point sources and alteration of riparian vegetation, stream channel dimensions, and flow.

Water temperatures outside the natural background range of variability can be harmful to fish at all life stages, especially if they occur in combination with other stressors like low dissolved oxygen, disease, or poor food supply. Fish vary in how well they tolerate temperature variations. Some species may tolerate wide ranges in temperature conditions and high water temperatures. Other species survive only in a relatively narrow range of temperatures and cannot tolerate high water temperatures. In Idaho, coldwater species like trout and salmon are the least tolerant of high water temperatures.

High water temperatures can be damaging to coldwater aquatic life as both a chronic (long-term) and an acute (short-term) stressor. For adult fish, chronic exposure to high water temperatures can result in reduced body weight, reduced oxygen exchange, increased susceptibility to disease, and reduced reproductive capacity. Acute exposure to high water temperatures can be lethal if fish are unable to seek refuge in cooler water. Water temperatures can create thermal migration barriers as fish avoid high temperatures. Juvenile fish are more sensitive to temperature variations than adult fish and can experience negative impacts, like lower growth rates, at lower temperatures than those that adversely affect adults. Water temperatures also affect embryonic development of fish and may affect aquatic invertebrates, amphibians, and mollusks.

The beneficial use of cold water aquatic life applies throughout the subbasin. The cold water aquatic life community consists of both native and nonnative coldwater species. The native complement of species includes westslope cutthroat trout (Figure 2), mountain whitefish, and bull trout (now thought to be extirpated in the subbasin). Nonnative coldwater species include rainbow trout, eastern brook trout, and Chinook salmon. Together, these species support a popular sport fishery. Other components of the coldwater aquatic community include amphibians, such as Pacific giant salamanders, and diverse invertebrates. High water temperatures can be harmful to coldwater aquatic life and may especially affect sensitive species.



**Figure 2. Westslope cutthroat trout in the North Fork Coeur d'Alene River (Photo courtesy Ed Lider).**

## 1.2 Cultural Characteristics

A detailed discussion of the cultural characteristics of the Upper (North Fork) Coeur d'Alene River subbasin is provided in the *Subbasin Assessment and Total Maximum Daily Loads of the North Fork Coeur d'Alene River* (DEQ 2001).

Land use within the subbasin is diverse and includes agriculture, silviculture, recreation (Figure 3), residential use, and mining.



**Figure 3. Floating at the confluence of the North Fork Coeur d'Alene and Little North Fork Coeur d'Alene Rivers on a summer day.**

The US Forest Service (USFS) is the major landowner in the subbasin, managing 540,033 acres (94%) of the subbasin's land area (Figure 4). Private landowners, the State of Idaho, and the US Bureau of Land Management (BLM) manage the remaining 6% of the land area. The subbasin contains seven major watersheds and 1,121 stream miles divided into 79 AUs.

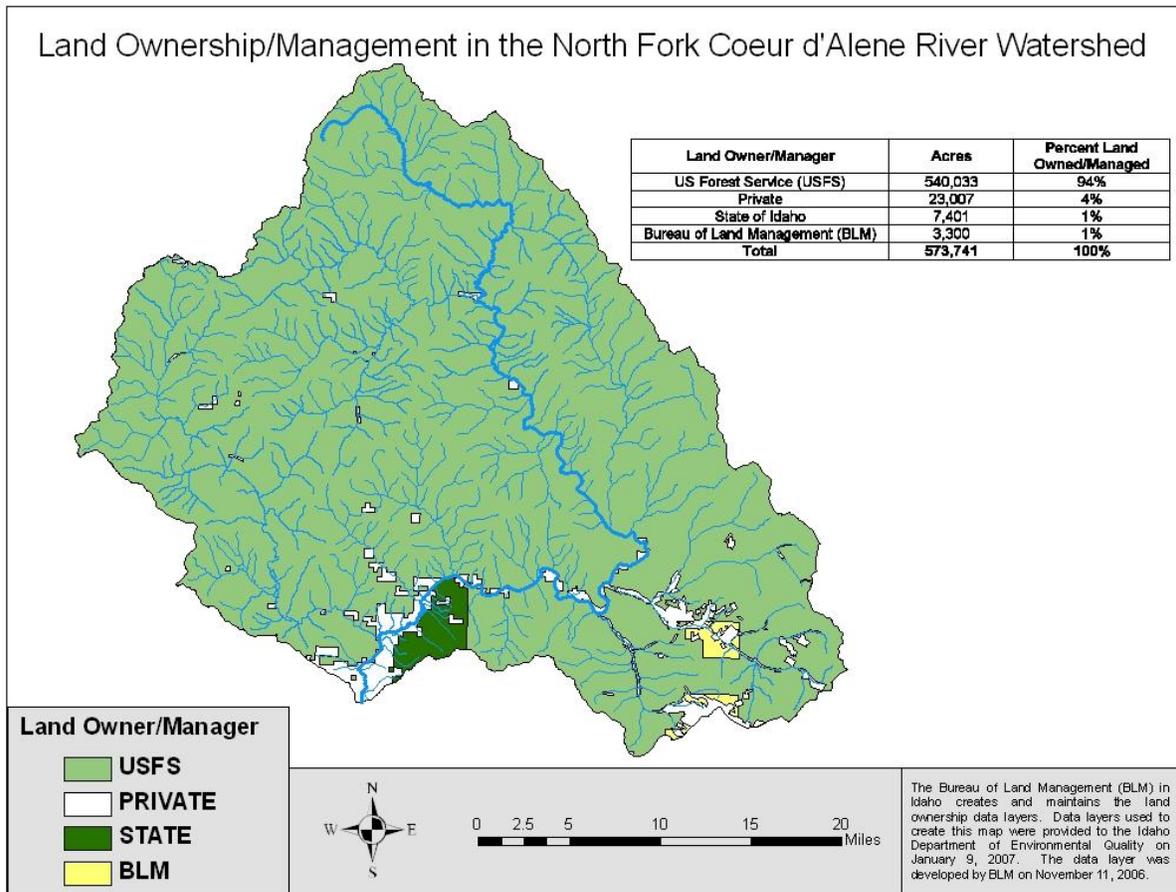


Figure 4. Patterns of landownership in the Upper (North Fork) Coeur d'Alene River subbasin.

## 2 Subbasin Assessment—Water Quality Concerns and Status

### 2.1 Water Quality Limited Assessment Units Occurring in the Subbasin

Section 303(d) of the CWA states that waters that are unable to support their beneficial uses and that do not meet water quality standards must be listed as water quality limited waters. Subsequently, these waters are required to have TMDLs developed to bring them into compliance with water quality standards.

In 1994, the US Environmental Protection Agency (EPA) identified Prichard Creek from Barton Gulch to the North Fork Coeur d'Alene River as impaired due to temperature. The full 1998 §303(d) list of impaired waters with additions from EPA included Prichard Creek and Steamboat Creek from its headwaters to the North Fork Coeur d'Alene River. These listings encompassed three current AUs for Prichard Creek (ID17010301PN004\_03, ID17010301PN004\_04, and ID17010301PN005\_03) and two AUs for Steamboat Creek (ID17010301PN028\_02 and ID17010301PN028\_03). As more data became available, more streams were added to the Idaho §303(d) list of impaired waters in 2002, 2008, and 2010 related to water temperature.

The streams of the Upper (North Fork) Coeur d'Alene River subbasin were divided into 67 AUs for the 2002 Integrated Report (DEQ 2005b). In the 2002 Integrated Report, 27 AUs were considered water quality impaired due to excess water temperature. In the 2008 Integrated Report (DEQ 2009), the total stream length in the subbasin remained the same, but the total number of AUs increased from 67 to 76 due to AU splits. The 2008 Integrated Report included 31 AUs listed as temperature-impaired. The increasing number of identified temperature-related impairments more likely reflects a growing temperature data set rather than changes in water temperatures during that time.

In 2009, DEQ completed a full temperature assessment to analyze all water temperature data available in the subbasin. Data for 1997 and 1999 from 31 DEQ temperature recorders in 21 AUs indicated exceedances of Idaho's criteria for salmonid spawning. At the request of watershed advisory group (WAG) members, these data were supplemented by more extensive and current USFS temperature data sets. The USFS data included 252 temperature recorders from 44 AUs from 1998 to 2008. With these two data sources combined, only 25 of 79 AUs from the subbasin did not have any temperature data for evaluation. All 54 AUs with temperature data exceeded at least one portion of the Idaho water quality criteria for temperature.

The temperature assessment completed in 2009 found that 3 of the AUs listed as temperature-impaired in 2008 did not have any water temperature data available. For the 2010 Integrated Report, DEQ removed temperature as a pollutant causing impairment of these 3 AUs. The temperature assessment completed in 2009 also found exceedances of Idaho water quality criteria for temperature for another 23 AUs. These additional waters were listed in 2010 as temperature-impaired. In total, 54 assessment units were listed in 2010 with temperature impairments and received temperature TMDLs in this document (Figure 5; Table 1). This TMDL is built upon the results of the 2009 subbasin assessment for temperature and the 2010 Integrated Report (DEQ 2011).

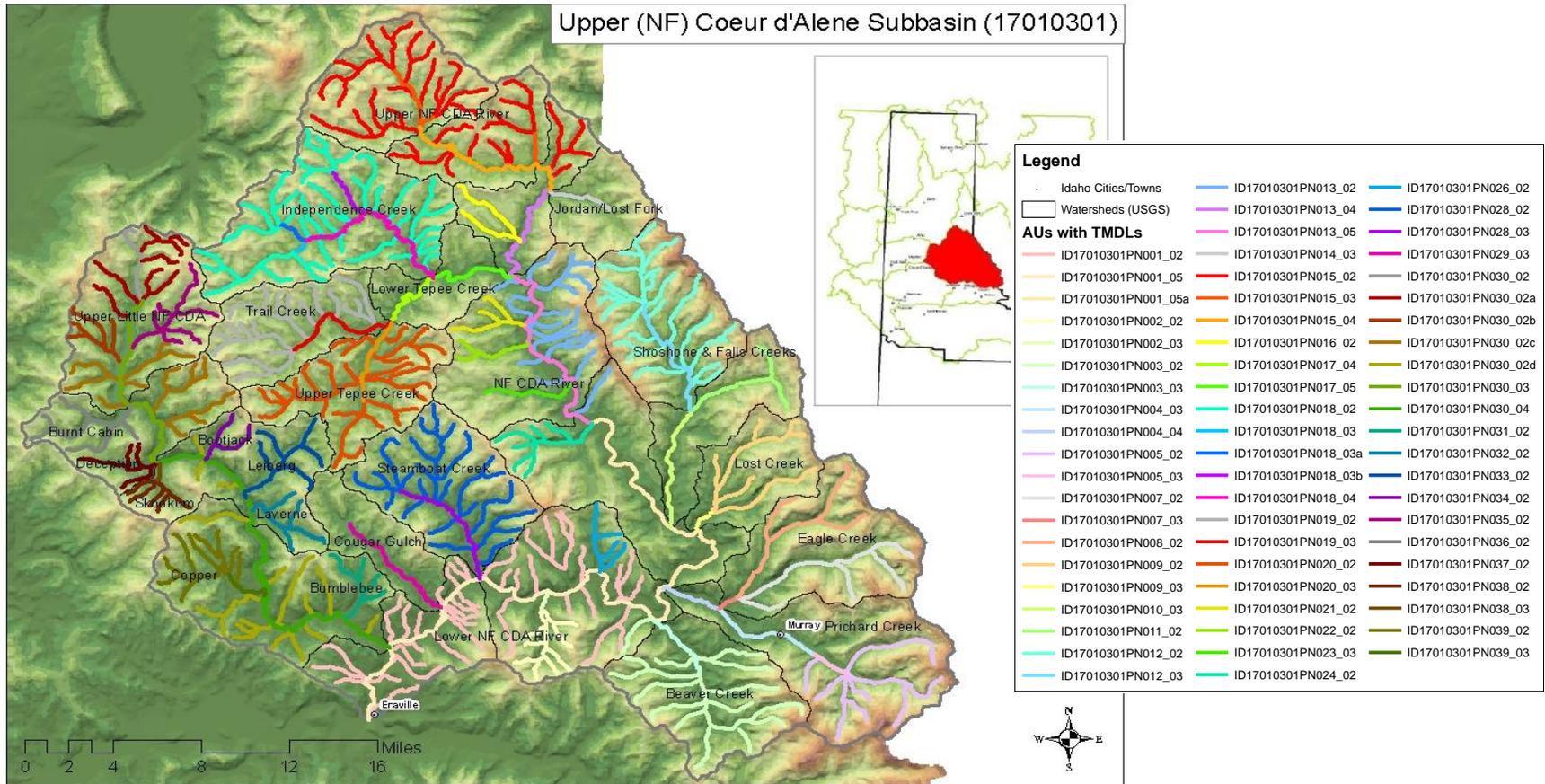


Figure 5. Upper (North Fork) Coeur d'Alene River subbasin streams included in temperature TMDL analysis with color-coded identification of stream assessment units.

**Table 1. Stream assessment units listed as temperature impaired for which temperature TMDLs were developed.**

| <b>Assessment Unit Number</b> | <b>Assessment Unit Name</b>   |
|-------------------------------|---|
| ID17010301PN001_02            | North Fork Coeur d'Alene River tributaries below Prichard Creek               |
| ID17010301PN001_05            | North Fork Coeur d'Alene River below Prichard Creek                           |
| ID17010301PN001_05a           | North Fork Coeur d'Alene River between Yellowdog and Prichard Creeks          |
| ID17010301PN002_03            | Graham Creek below Deceitful Gulch  |
| ID17010301PN003_02            | Beaver Creek headwaters and tributaries                                       |
| ID17010301PN003_03            | Beaver Creek below White Creek  |
| ID17010301PN004_04            | Prichard Creek below Eagle Creek  |
| ID17010301PN005_02            | Prichard Creek headwaters and tributaries above Butte Gulch                   |
| ID17010301PN008_02            | West Fork Eagle Creek and tributaries   |
| ID17010301PN009_03            | Lost Creek below East Fork Lost Creek   |
| ID17010301PN010_03            | Shoshone Creek below Falls Creek  |
| ID17010301PN011_02            | Falls Creek and tributaries   |
| ID17010301PN012_02            | Shoshone Creek headwaters and tributaries above Falls Creek                   |
| ID17010301PN012_03            | Shoshone Creek between Little Lost Fork and Falls Creek                       |
| ID17010301PN013_02            | North Fork Coeur d'Alene River tributaries between Tepee and Yellowdog Creeks |
| ID17010301PN013_04            | North Fork Coeur d'Alene River between Jordan and Tepee Creeks                |
| ID17010301PN013_05            | North Fork Coeur d'Alene River between Tepee and Yellowdog Creeks             |
| ID17010301PN014_03            | Jordan Creek and Lower Lost Fork  |
| ID17010301PN015_02            | North Fork Coeur d'Alene River, upper, headwaters, and tributaries            |
| ID17010301PN015_03            | North Fork Coeur d'Alene River, upper, and lower Buckskin Creek               |
| ID17010301PN015_04            | North Fork Coeur d'Alene River between Buckskin and Jordan Creeks             |
| ID17010301PN016_02            | West Elk Creek and Cataract Creek   |
| ID17010301PN017_04            | Tepee Creek between Trail Creek and Independence Creek                        |
| ID17010301PN017_05            | Tepee Creek below Independence Creek  |
| ID17010301PN018_02            | Independence Creek headwaters and tributaries                                 |
| ID17010301PN018_03a           | Declaration Creek, lower  |
| ID17010301PN018_03b           | Snow Creek, lower   |
| ID17010301PN018_04            | Independence Creek below Declaration Creek                                    |
| ID17010301PN019_02            | Trail Creek headwaters and tributaries  |
| ID17010301PN019_03            | Trail Creek below Stewart Creek   |
| ID17010301PN020_02            | Tepee Creek headwaters and tributaries  |
| ID17010301PN020_03            | Tepee Creek between Short Creek and Trail Creek                               |
| ID17010301PN021_02            | Brett Creek and tributaries   |
| ID17010301PN022_02            | Miners Creek and tributaries  |
| ID17010301PN023_03            | Flat Creek, lower   |
| ID17010301PN024_02            | Yellowdog Creek and tributaries   |
| ID17010301PN026_02            | Brown Creek and tributaries   |
| ID17010301PN028_02            | Steamboat Creek headwaters and tributaries                                    |
| ID17010301PN028_03            | Steamboat Creek and West Fork Steamboat Creek below Comfy Creek               |
| ID17010301PN029_03            | Cougar Gulch below East Fork Cougar Gulch                                     |

| Assessment Unit Number | Assessment Unit Name  |
|------------------------|---|
| ID17010301PN030_02a    | Little North Fork Coeur d'Alene River tributaries above Iron Creek                    |
| ID17010301PN030_02c    | Little North Fork Coeur d'Alene River tributaries between Hudlow and Deception Creeks |
| ID17010301PN030_02d    | Little North Fork Coeur d'Alene River tributaries below Skookum Creek                 |
| ID17010301PN030_03     | Little North Fork Coeur d'Alene River between Solitaire and Skookum Creeks            |
| ID17010301PN030_04     | Little North Fork Coeur d'Alene River below Skookum Creek                             |
| ID17010301PN031_02     | Bumblebee Creek and tributaries   |
| ID17010301PN032_02     | Laverne Creek and tributaries   |
| ID17010301PN033_02     | Leiberg Creek and tributaries   |
| ID17010301PN034_02     | Bootjack Creek and tributaries  |
| ID17010301PN035_02     | Iron Creek and tributaries  |
| ID17010301PN036_02     | Burnt Cabin Creek and tributaries   |
| ID17010301PN037_02     | Deception Creek and tributaries   |
| ID17010301PN038_03     | Skookum Creek, lower  |
| ID17010301PN039_03     | Copper Creek, lower   |

Solar loading analyses were also completed for portions of some AUs without temperature data that are *not* §303(d) listed or known to be temperature impaired. This analysis is included to provide information about contributing loads and does not establish TMDLs for those streams (Table 2).

**Table 2. Stream assessment units *not* listed as impaired by temperature but for which solar loading analyses were performed over at least portions of the water body. The information does not establish a TMDL and no load allocations are prescribed for these water bodies.**

| Assessment Unit Number | Assessment Unit Name   |
|------------------------|--|
| ID17010301PN001_02a    | North Fork Coeur d'Alene River tributaries between Yellowdog and Prichard Creeks |
| ID17010301PN002_02     | Graham Creek, headwaters and tributaries   |
| ID17010301PN004_02     | Prichard Creek tributaries between Butte Gulch and Eagle Creek                   |
| ID17010301PN004_03     | Prichard Creek, between Butte Gulch and Eagle Creek                              |
| ID17010301PN005_03     | Prichard Creek, between Barton Creek and Butte Gulch                             |
| ID17010301PN006_02     | Butte Gulch  |
| ID17010301PN007_02     | East Fork Eagle Creek and tributaries  |
| ID17010301PN007_03     | Eagle Creek  |
| ID17010301PN009_02     | Lost Creek, headwaters and tributaries   |
| ID17010301PN010_02     | Shoshone Creek tributaries below Falls Creek                                     |
| ID17010301PN013_02a    | North Fork Coeur d'Alene River tributaries between Jordan Creek and Tepee Creek  |
| ID17010301PN014_02     | Jordan Creek, headwaters and tributaries   |
| ID17010301PN014_02a    | Cub Creek  |
| ID17010301PN014_02b    | Calamity Creek   |
| ID17010301PN017_02     | Tepee Creek tributaries, below Trail Creek                                       |
| ID17010301PN018_03     | Independence Creek, between Ellis Creek and Declaration Creek                    |
| ID17010301PN023_02     | Flat Creek, headwaters and tributaries   |
| ID17010301PN025_02     | Downey Creek, headwaters and tributaries   |
| ID17010301PN025_03     | Downey Creek, lower  |

| Assessment Unit Number | Assessment Unit Name   |
|------------------------|--|
| ID17010301PN027_03     | Grizzly Creek, below Dewey Creek   |
| ID17010301PN029_02     | Cougar Gulch, headwaters and tributaries   |
| ID17010301PN030_02     | Little North Fork Coeur d'Alene River tributaries, headwaters to Solitaire Creek |
| ID17010301PN030_02b    | Hudlow Creek, headwaters and tributaries   |
| ID17010301PN038_02     | Skookum Creek, headwaters and tributaries  |
| ID17010301PN039_02     | Copper Creek, headwaters and tributaries   |

## 2.2 Applicable Water Quality Standards and Beneficial Uses

Idaho water quality standards require that surface waters of the state be protected for beneficial uses, wherever attainable (IDAPA 58.01.02.050.02). These beneficial uses fulfill CWA goals for “swimmable and fishable waters” and are categorized as existing uses, designated uses, and presumed uses. Refer to Idaho water quality standards, Section 3 of the *Water Body Assessment Guidance* (Grafe et al. 2002), and Appendix B of this document for additional detail regarding the identification of beneficial uses.

DEQ conducts water body assessments to determine if water quality is supporting beneficial uses of surface waters and whether water quality is exceeding water quality standards. The procedure to determine whether a water body fully supports its beneficial uses is outlined in IDAPA 58.01.02.054. The procedure relies heavily upon biological parameters and is detailed in the *Water Body Assessment Guidance* (Grafe et al. 2002). This guidance requires use of available relevant data to make beneficial use support status determinations. To complete water body assessments, beneficial uses must be determined, applicable water quality criteria must be identified, and data must be compiled and evaluated. The outcome of these assessments is used to develop the Integrated Report, which includes the CWA status of surface waters statewide.

Beneficial uses for waters in the North Fork Coeur d'Alene River subbasin include cold water aquatic life, salmonid spawning, primary contact recreation, secondary contact recreation, domestic water supply, special resource waters, agricultural water supply, industrial water supply, wildlife habitats, and aesthetics. Beneficial uses of stream surface waters relevant to these temperature TMDLs include cold water aquatic life and salmonid spawning throughout the subbasin and bull trout in designated watersheds.

## 2.3 Criteria to Support Beneficial Uses

Beneficial uses are protected by a set of criteria, which include narrative criteria for pollutants such as sediment and nutrients, and numeric criteria for pollutants such as bacteria, dissolved oxygen, pH, ammonia, temperature, and turbidity (IDAPA 58.01.02.250).

State and federal temperature criteria apply to waters in the Upper (North Fork) Coeur d'Alene River subbasin (Table 3). For these water body assessments and TMDLs, temperature criteria for protection of cold water aquatic life and salmonid spawning have been applied throughout the subbasin. Timing for the application of salmonid spawning criteria was determined based on recommendations from IDFG. For more information on water temperature criteria and their application in these TMDLs, refer to Appendix B. Criteria for protection of bull trout have been applied in applicable watersheds as defined by federal and state criteria (Table 3). Idaho water quality standards establish temperature criteria for bull trout in key watersheds (IDAPA

58.01.02.250.02.g), and federal criteria for bull trout protection have been promulgated by EPA in 40 CFR 131.33.

**Table 3. Summary of applicable state and federal temperature criteria.**

| Type   | Location  | Criteria <sup>a</sup>                            | Dates   |                                       |
|--|---|--|---|---------------------------------------|
| Cold Water Aquatic Life Criteria               | Applies to entire subbasin  | 22 °C (71.6 °F)<br>Maximum Instantaneous (MDMT)  | Applies entire year                                   |                                       |
|  |   | 19 °C (66.2 °F)<br>Maximum Daily Average (MDAT)  |   |                                       |
| Salmonid Spawning Criteria                     | Applies to North Fork Coeur d'Alene River (headwaters to mouth), Prichard Creek (headwaters to mouth), and all other tributaries                              | 13 °C (55.4 °F)<br>Maximum Instantaneous (MDMT)  | <b>Spring Spawning</b><br>>4,000 ft<br>June 1–July 31 | <b>Fall Spawning</b><br>Aug 15–Nov 15 |
|  |   | 9 °C (48.2 °F)<br>Maximum Daily Average (MDAT)   | 3,000–4,000 ft<br>May 15–July 15                      |                                       |
|  |   |  | <3,000 ft<br>May 1–July 1                             |                                       |
| Current Idaho Bull Trout Criteria <sup>b</sup> | Applies to entire subbasin except 5th-order streams (Tepee Creek below Independence Creek, and North Fork Coeur d'Alene River below Tepee Creek) <sup>c</sup> | 13 °C (55.4 °F)<br>Maximum Weekly Maximum (MWMT) | <b>Rearing</b><br>June 1–Aug 31                       | n.a.                                  |
|  |   | 9 °C (48.2 °F)<br>Maximum Daily Average (MDAT)   | n.a.  | <b>Spawning</b><br>Sep 1–Oct 31       |
| 1998 Idaho Bull Trout Criteria                 | Applies to entire subbasin except 5th-order streams (Tepee Creek below Independence Creek, and North Fork Coeur d'Alene River below Tepee Creek) <sup>c</sup> | 12 °C (55.4 °F)<br>Maximum Daily Average (MDAT)  | <b>Rearing</b><br>June 1–Aug 31                       | n.a.                                  |
|  |   | 9 °C (48.2 °F)<br>Maximum Daily Average (MDAT)   | n.a.  | <b>Spawning</b><br>Sep 1–Oct 31       |
| EPA Bull Trout Criteria                        | Applies to Brown Creek, Falls Creek, and Graham Creek   | 10 °C (50 °F)<br>Maximum Weekly Maximum (MWMT)   | June 1–Sep 30   |                                       |

<sup>a</sup> MDMT = Maximum Daily Maximum Temperature; MDAT = Maximum Daily Average Temperature; MWMT = Maximum Weekly Maximum Temperature

<sup>b</sup> Current Idaho temperature criteria for bull trout have not been approved or disapproved by EPA and therefore, the criteria adopted in 1998 are CWA-effective. See Appendix C for discussion.

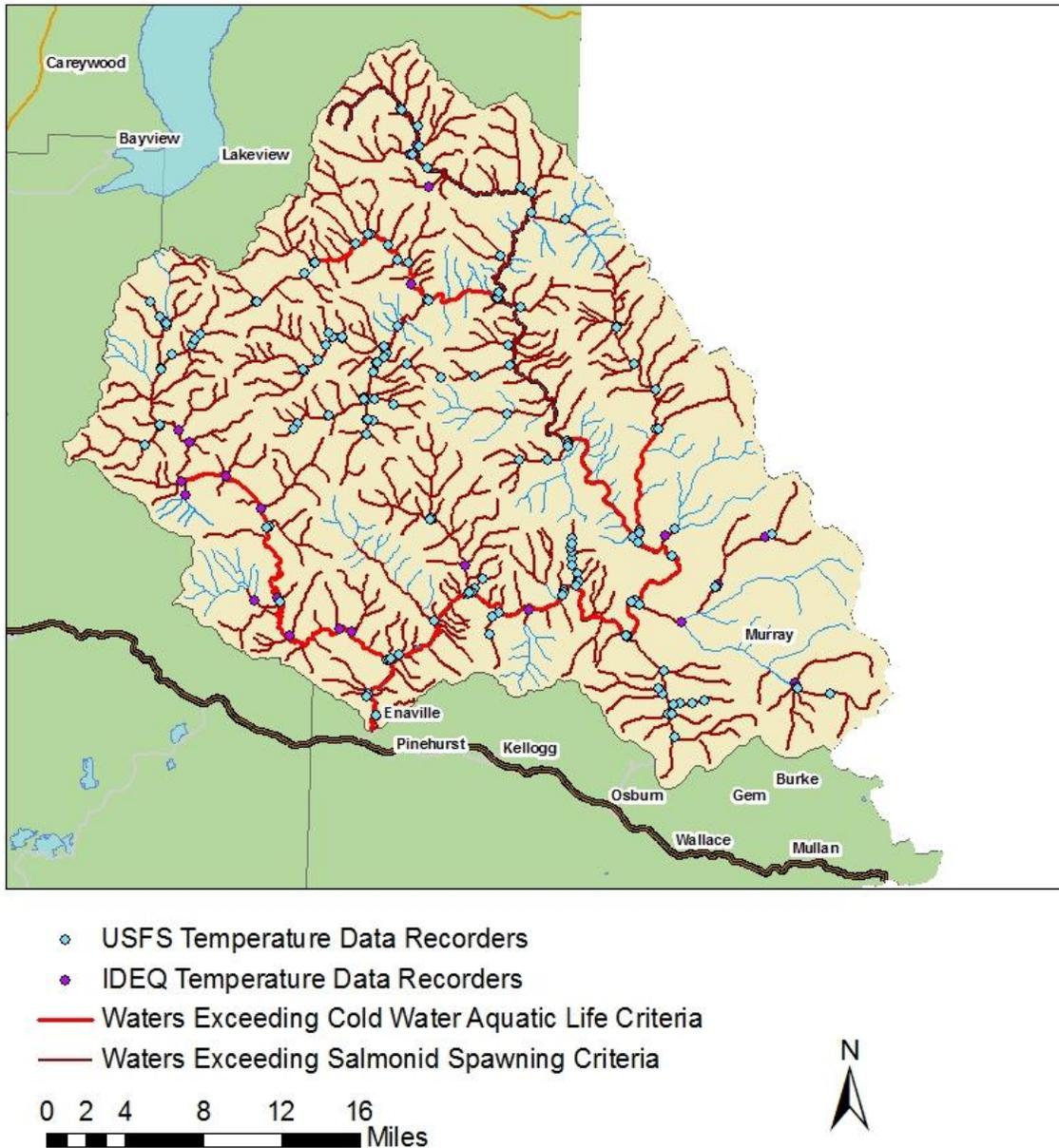
<sup>c</sup> There are inconsistencies in the 1996 Bull Trout Conservation Plan (Batt 1996) identification of key watersheds referred to in IDAPA 58.01.02. See Appendix C for discussion.

## 2.4 Summary and Analysis of Existing Water Quality Data

A detailed summary and analysis of existing water quality data for the Upper (North Fork) Coeur d'Alene River subbasin is provided in the *Subbasin Assessment and Total Maximum Daily Loads of the North Fork Coeur d'Alene River* (DEQ 2001).

Numerous sources of water quality data were used in these water body assessments and temperature TMDLs (see Appendix D). DEQ monitoring data, primarily Beneficial Use Reconnaissance Program (BURP), were used as the baseline information about beneficial use support. Other data were obtained from multiple federal, state, and local entities. Watershed Professionals Network reports also include helpful compilations and analyses of water quality data in the subbasin.

In 2009, DEQ completed a full temperature assessment to analyze all water temperature data available in the subbasin. Data from 1997 and 1999 from 31 DEQ temperature recorders in 21 AUs exceeded Idaho's criteria for salmonid spawning (Figure 6). At the request of North Fork Coeur d'Alene River WAG members, these data were supplemented by more extensive and current USFS temperature data sets. The USFS data sets included data collected by 252 temperature recorders from 44 AUs from 1998 to 2008. With DEQ and USFS data combined, only 25 of 79 AUs from the subbasin did not have any temperature data available for evaluation.



**Figure 6. Temperature logger locations and assessment results for streams included in the DEQ temperature assessment for the Upper (North Fork) Coeur d'Alene River subbasin.**

Assessments found widespread exceedances of Idaho numeric water temperature criteria, particularly for salmonid spawning. All of the 54 AUs with temperature data exceeded at least one portion of the Idaho water quality criteria for temperature (Table 3). All 54 AUs exceeded

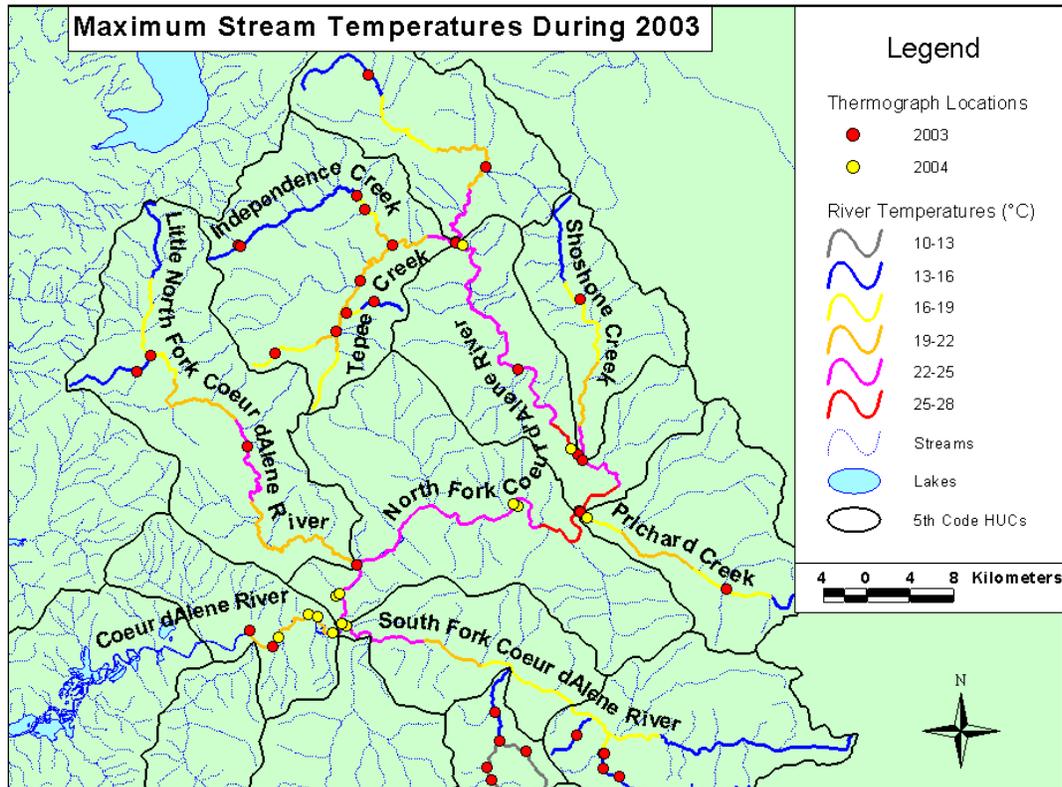
the salmonid spawning criteria in at least one portion of the year, 3 AUs exceeded the federal bull trout criteria (see Appendices B and C), and 6 AUs exceeded Idaho's warmest criteria for cold water aquatic life (Table 3).

Water temperatures in the main stem North Fork Coeur d'Alene River and its larger tributaries reached temperatures greater than 22 degrees Celsius (°C), exceeded the numeric criteria for cold water aquatic life, and exhibited conditions that could be harmful to trout and other coldwater species (Table 4).

**Table 4. Streams exceeding criteria for cold water aquatic life.**

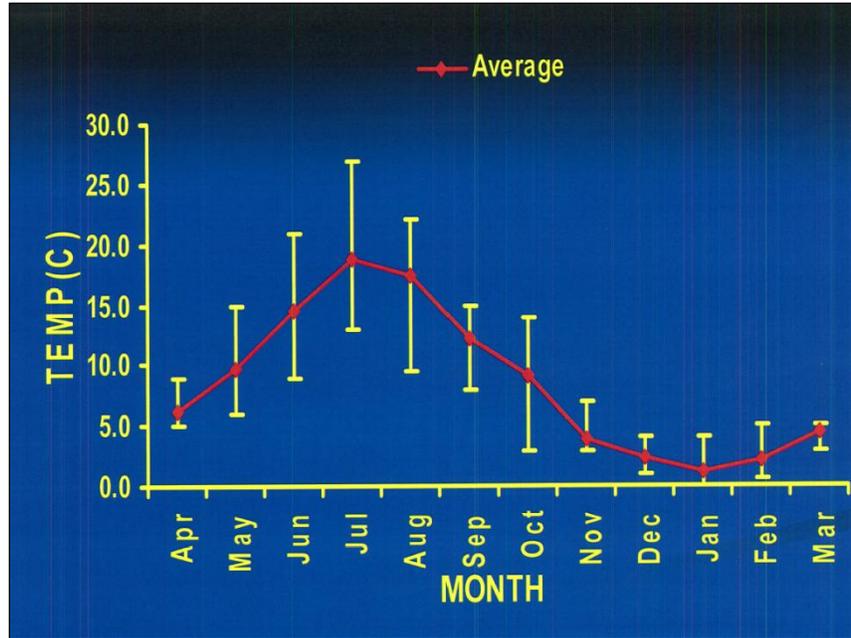
| <b>Assessment Unit Number</b> | <b>Assessment Unit Name</b>  |
|-------------------------------|--|
| ID17010301PN001_05            | North Fork Coeur d'Alene River below Prichard Creek                  |
| ID17010301PN001_05a           | North Fork Coeur d'Alene River between Yellowdog and Prichard Creeks |
| ID17010301PN010_03            | Shoshone Creek below Falls Creek                                     |
| ID17010301PN017_05            | Tepee Creek below Independence Creek                                 |
| ID17010301PN018_04            | Independence Creek below Declaration Creek                           |
| ID17010301PN030_04            | Little North Fork Coeur d'Alene River below Skookum Creek            |

The spatial patterns observed during the temperature assessments for this TMDL were similar to patterns observed during IDFG and USFS cooperative studies (Dupont et al. 2008). In addition to ongoing fisheries studies in the subbasin, IDFG and USFS biologists studied stream temperatures, habitat quality, and cutthroat trout movement and mortality intensively during 2003 and 2004. They found that maximum water temperatures in the North Fork Coeur d'Alene River were warmer than 22 °C nearly the entire length from Tepee Creek to the mouth. They also found that the warmest water temperatures in the subbasin occurred in the middle reaches of the North Fork Coeur d'Alene River from approximately 5 kilometers (km) above Shoshone Creek to approximately 8 km below Prichard Creek (Figure 7). Downstream of this area, temperatures tend to cool. Temperatures are also cooler in tributaries.



**Figure 7. Stream temperature patterns observed during 2003 in Idaho Department of Fish and Game and US Forest Service cooperative study (Dupont et al. 2008).**

The temporal patterns observed during the assessments for these TMDLs were also similar to patterns observed during other studies. For example, average maximum temperatures for the North Fork Coeur d'Alene River were highest in July and August (Figure 8). During these studies, biologists found summer afternoon temperatures in the North Fork Coeur d'Alene River above Shoshone Creek greater than 26 °C (Dupont et al. 2008). Trout located in these areas during snorkel surveys were observed lying on the river bottom and gasping. These signs of stress were attributed to the high water temperatures. They also found that trout utilizing these areas in the summer rather than migrating to cooler waters seemed to lose weight over the course of the summer and be in poorer condition than fish using cold water refugia. They also observed dead rainbow trout, mountain whitefish, and torrent sculpin believed to have died from temperature-related stress.



**Figure 8. Average temperatures in North Fork Coeur d'Alene River in 2003 reflecting a typical pattern of warming for the river with peak temperatures in July and August. (Figure courtesy USFS.)**

Cutthroat trout were thought to survive these high water temperatures due to the daily cycles of stream cooling and by moving into areas of cooler water when temperatures in the main river exceeded their thermal tolerance (Dupont et al. 2008). These areas of cooler water, known as refugia, were often associated with cooler tributaries of various sizes, springs, and side-channel habitats. Radio telemetry and snorkel surveys were paired with temperature studies and other data to evaluate these relationships.

In August 2007, an aerial thermal infrared survey of the North Fork Coeur d'Alene River was conducted. Funded by EPA and the USFS, this survey covered 31 miles from the confluence with the South Fork Coeur d'Alene River upstream to just above Shoshone Creek (Watershed Sciences 2007; Stevens and Dupont 2007). This survey identified temperatures of springs and tributary inflows and patterns in the main river temperature (Figure 9 and Figure 10). These studies identified biological effects of high water temperatures and suggested important activities that can mitigate these effects among coldwater aquatic life, particularly westslope cutthroat trout.

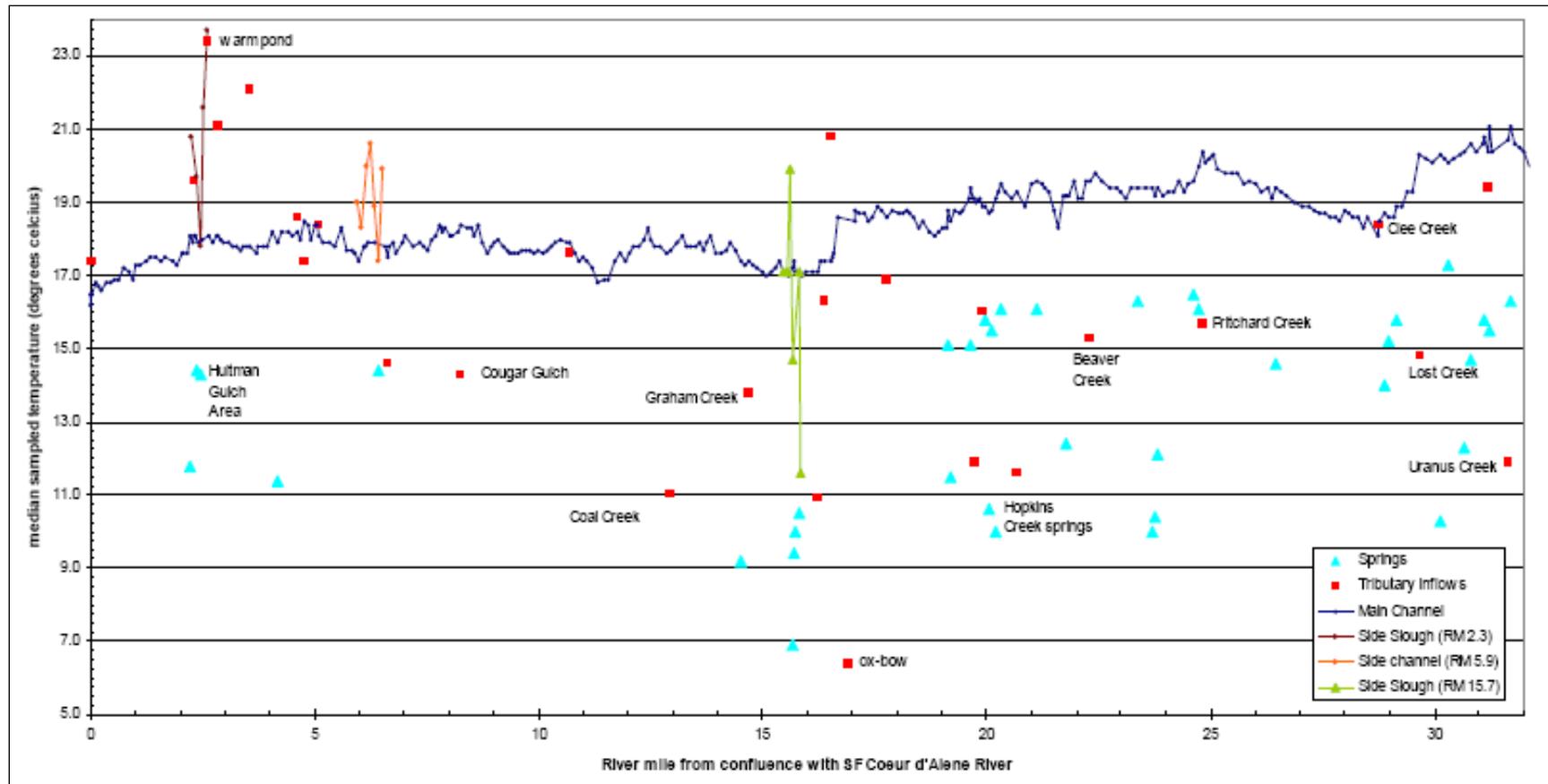
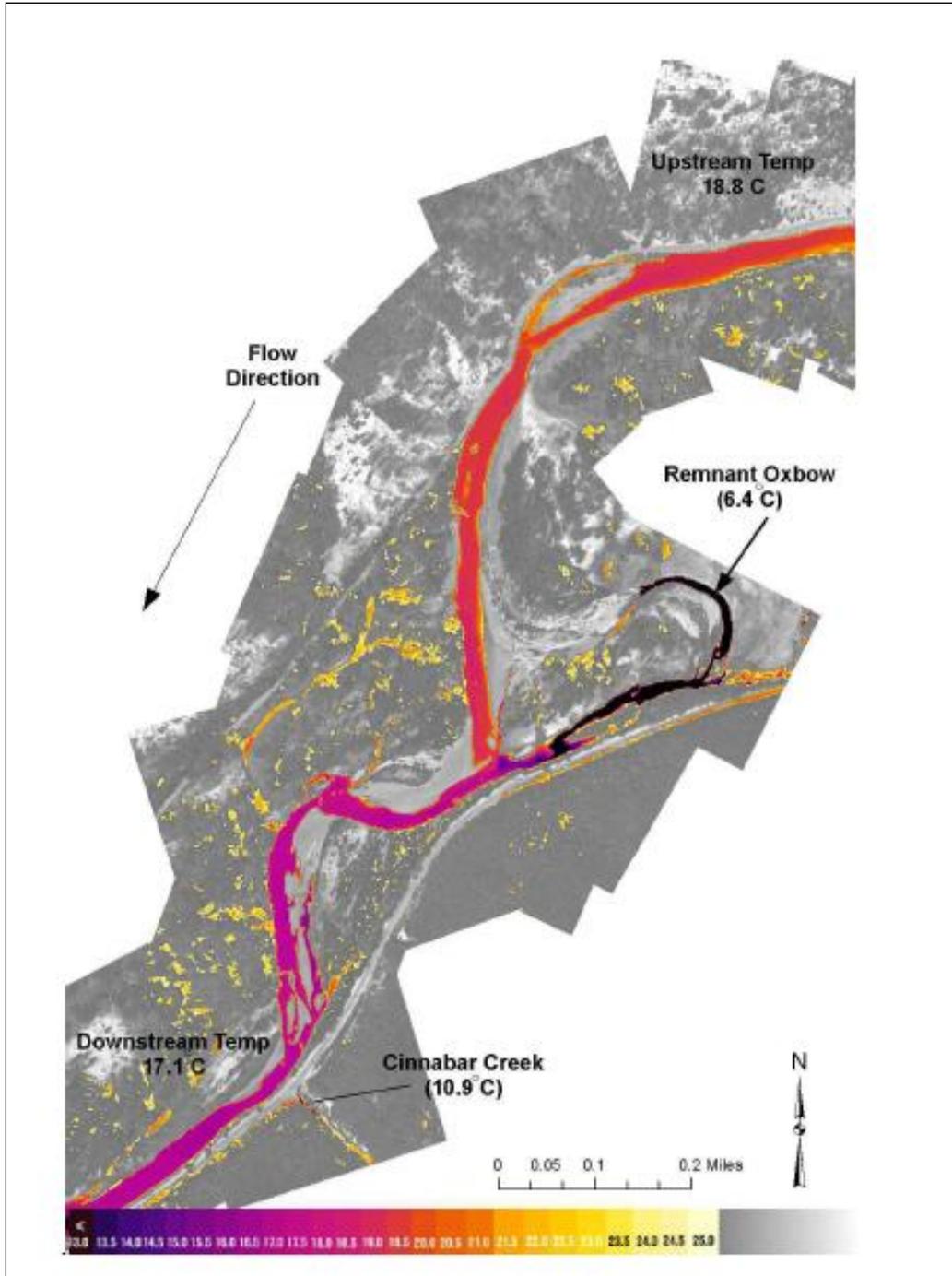


Figure 9. Median channel temperatures in the North Fork Coeur d'Alene River with locations of surface inflows (Watershed Sciences 2007).



**Figure 10. Example of coldwater side-channel habitat in a remnant oxbow of the North Fork Coeur d'Alene River showing the cooling effect of ground water influence (Watershed Sciences 2007).**

The possible effects of climate change are also considered in this TMDL. Substantial scientific evidence indicates that air temperatures are rising across much of the earth, including the American West, and that most of this warming is due to increasing concentrations of carbon dioxide (CO<sub>2</sub>) and other heat-trapping gases in the atmosphere (NRC 2010). While climate naturally varies in short-term and long-term patterns, research suggests that human activities are

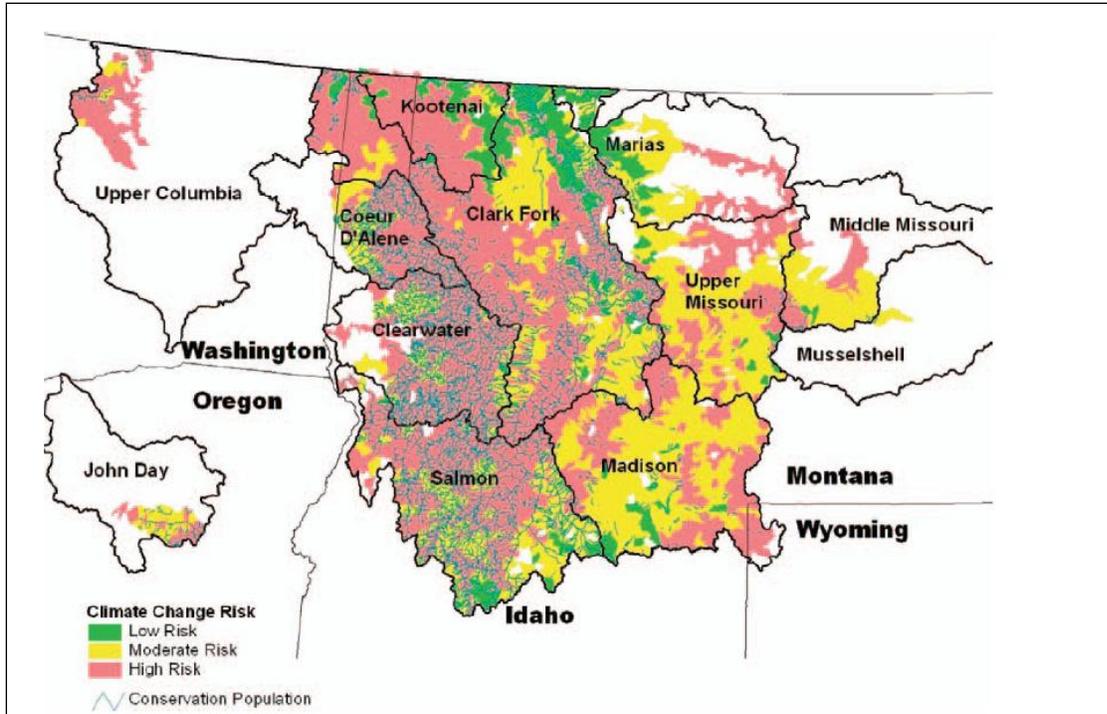
increasing greenhouse gases and causing air temperature changes far outside the natural range of variability (NRC 2010).

If predictions about the future climate are accurate, these changes pose economic and environmental threats to many parts of the world, including Idaho. Water resources and aquatic life are particularly at risk. Many possible impacts to water quality and aquatic life in the Pacific Northwest are presented by Hamlet et al. (2005); Karl et al. (2009); Mote and Salathé (2009); the National Research Council (2010); and Isaak, Luce, et al. (2010) and can be summarized as follows:

- Increasingly warm air temperatures—Average Pacific Northwest air temperatures have increased approximately 1.5 °F over the past century and are projected to rise another 3–10 °F during this century.
- Amplified precipitation variability with decreased summer precipitation and increased winter precipitation—Scientists expect more winter precipitation to fall as rain, resulting in decreased snowpack and increased winter flooding.
- Increased insect outbreaks, wildfire activity, and altered stream hydrologies—There may be more extensive seasonal dewatering, reduced summer streamflow, and increased channel disturbance from flooding, postfire landslides, and debris flows.
- Altered vegetation conditions—Forests are predicted to change in the future with altered species composition adapted to the most recent climate conditions. In some cases, forests may not return to their predisturbance condition following wildfire if the climate is dramatically different from historic conditions.
- Warming water temperatures in streams and rivers—Increasing air temperatures are already linked to warming water temperatures in the Columbia, Fraser, and Klamath Rivers.

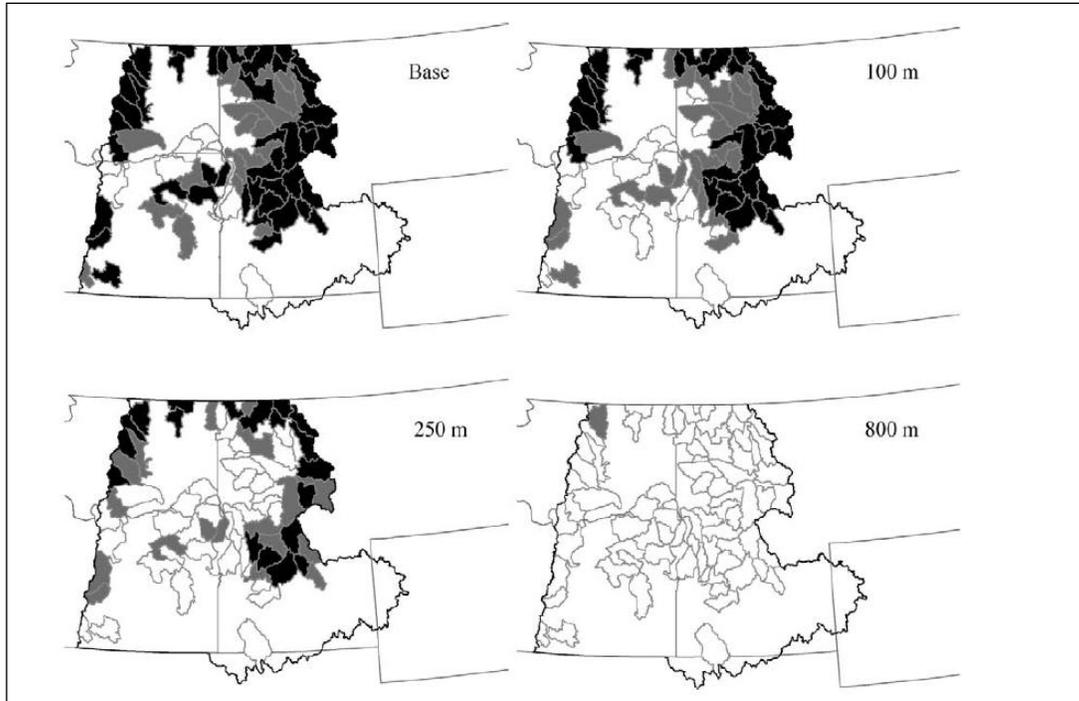
The effects of water temperature on fish and other organisms have been described earlier in this document. Water temperature is a primary factor determining what types of aquatic life are present in a water body. The condition of aquatic life may be affected acutely and chronically by changes in temperature. Trout are particularly sensitive to water temperature, and temperature can be a limiting factor for the survival and distribution of various trout species. While trout may have the ability to adapt to changing water temperature conditions over time, rapid or extreme changes combined with multiple stressors may render some habitat unsuitable for these sensitive species.

Two native trout species are focal management species in this subbasin: westslope cutthroat trout and bull trout. Scientists evaluated the risk posed to westslope cutthroat trout by predicting increased summer temperatures, uncharacteristic winter flooding, and increased wildfires. They determined that 65% of habitat occupied by westslope cutthroat trout will be at high risk from one or more of these factors (Williams et al. 2009). Nearly all of the westslope cutthroat trout habitat within the North Fork Coeur d'Alene River subbasin was predicted to be at high risk from these factors, particularly winter flooding (Figure 11).



**Figure 11. Composite climate change risk for watersheds within the historic range of westslope cutthroat trout. (Figure courtesy Williams et al. 2009.)**

Other research has evaluated possible risk to bull trout from a changing climate. Researchers found that predicted warming could result in losses of 18–92% of thermally suitable spawning and rearing habitat areas and an even greater proportion of large (>10,000 hectares [ha]) habitat patches (Rieman et al. 2007). Rieman et al. modeled suitable habitat for bull trout in the North Fork Coeur d'Alene River subbasin under current conditions—though bull trout are thought to be locally extirpated—and found that current bull trout habitat is relatively vulnerable to even 100-meter (m) increases in the lower elevation limits for the species (Figure 12). In addition, stream temperature increases associated with a changing climate may allow nonnative species such as eastern brook trout, rainbow trout, and smallmouth bass to invade further upstream and potentially threaten the persistence of native trout (Fausch et al. 2006; Rieman et al. 2006; Rahel and Olden 2008; Isaak, Luce, et al. 2010).



**Figure 12. Risk of bull trout extirpation in interior Columbia River Basin subbasins assuming 100-, 250-, and 800-m increases in the lower elevation limits for this species as a result of climate warming. Risk was considered high (no shading), moderate (gray shading), or low (black shading) depending on the number of medium or large habitat patches remaining in each scenario. (Figure courtesy Rieman et al. 2007.)**

These temperature TMDLs are designed to ensure water quality compliance with Idaho water quality standards based on current and historic climatic conditions. If predictions are correct, future changes in stream temperature related to warming air temperatures and changing climate may warrant further investigation. This information also suggests that efforts to protect and restore water quality are all the more important. Shade can provide cooling effects to the stream fairly independent of climate and can help to insulate the stream from increasing air temperatures. Considerations for climate change are incorporated into the TMDL implementation strategies portion of this document.

### **3 Subbasin Assessment—Pollutant Source Inventory**

For a detailed discussion of pollutant sources in the subbasin, see the *Subbasin Assessment and Total Maximum Daily Loads of the North Fork Coeur d'Alene River* (DEQ 2001).

#### **3.1 Point Sources**

Point sources are sources of pollution from known discharge locations. There are no known National Pollutant Discharge Elimination System (NPDES)-permitted point sources in the subbasin.

#### **3.2 Nonpoint Sources**

Lack of riparian shade is the likely cause of excess water temperatures. Riparian shade loss has been caused by historic events and activities in the subbasin similar to those that have caused

sediment loads. Roads, fires, and floods have affected riparian areas extensively. In addition, many riparian areas were heavily logged in the early days of timber harvest. Large cedar stumps are still clearly visible along the lower river corridor today, indicating the historic forest that once stood (Figure 13). Channel morphology changes have also affected solar loading, as many stream segments have become wider and shallower than they were under natural background conditions. Channels and shade conditions in most watersheds are recovering as management has changed over time to protect riparian zones.



**Figure 13. Stumps can be observed along the North Fork Coeur d'Alene River where large trees were harvested during the early days of development in the subbasin.**

Present-day anthropogenic riparian shade losses are caused primarily by roads and residential and recreational development along streams. Many riparian roads have been removed and reclaimed in recent decades. However, most of the main travel routes in the subbasin are located near streams and on floodplains (Figure 14), especially along the lower North Fork Coeur d'Alene River where riparian roads parallel both sides of the river. In this area, residential and recreational development has affected riparian shade, as many trees have been cleared to make space for trailers and reduce obstructed views of the river (Figure 15). Planting trees in riparian areas can help restore shade and other water quality benefits of healthy riparian vegetation (Figure 16).



**Figure 14. Roads in riparian zones inhibit growth of healthy riparian vegetation and affect the solar load reaching streams.**



**Figure 15. Riparian vegetation has been largely removed along many recreational river lots, resulting in increased solar loads and erosion of unstable banks.**



**Figure 16. Planting trees along streams can help restore shade and other water quality benefits provided by healthy riparian vegetation.**

## **4 Monitoring and Status of Water Quality Improvements**

DEQ is currently completing a Five Year Review of the 2001 Subbasin Assessment and TMDLs of the North Fork Coeur d'Alene River. This report will summarize the monitoring and status of water quality improvements since the 2001 TMDL with a focus on improvements in sediment loads.

## **5 Total Maximum Daily Loads**

A TMDL prescribes an upper limit (i.e., load capacity) on the discharge of a pollutant from all sources to ensure water quality standards are met. It allocates this load capacity among the various sources of the pollutant. Pollutant sources fall into two broad classes: point sources, each of which receives a wasteload allocation, and nonpoint sources, each of which receives a load allocation. Natural background sources of the pollutant, when present, are considered part of the load allocation but may be identified separately because they represent a part of the load not subject to control. Because of uncertainties regarding load quantification and the relation of specific loads to attaining water quality standards, the rules regarding TMDLs (40 CFR Part 130) require a margin of safety as part of the TMDL. Practically, the margin of safety is a reduction in the load capacity available for allocation to pollutant sources. The natural background load is also effectively a reduction in the load capacity available for allocation to anthropogenic pollutant sources. Load capacity can be summarized by the following equation:

$$LC = MOS + NB + LA + WLA = TMDL$$

Where:

- LC = load capacity
- MOS = margin of safety
- NB = natural background
- LA = load allocation
- WLA = wasteload allocation

The equation is written in this order because it represents the logical order in which a loading analysis is conducted. First, the load capacity is determined. Then, the load capacity is broken down into its components. The load capacity allocated to anthropogenic pollutant sources can be calculated by subtracting the margin of safety then the natural background. When the load analysis and allocation are complete, the TMDL must equal the load capacity.

Another step in a load analysis is quantifying current pollutant loads by sources. This step allows for the specification of load reductions as percentages of current conditions, considers equities in load reduction responsibility, and is necessary for pollutant trading to occur. The load capacity must be based on critical conditions (i.e., the conditions when water quality standards are most likely to be violated). Because both load capacity and pollutant loads can be highly variable, determining critical conditions can be quite complicated.

A pollutant load is fundamentally a quantity of pollutant discharged over some period of time and is generally the product of concentration and flow. Due to the diverse nature of various pollutants and the difficulty addressing pollutant loads, federal rules allow for “other appropriate measures” to be used when necessary. These “other measures” must be quantifiable and relate to water quality standards, but they allow flexibility to deal with pollutant loading in practical and tangible ways. The rules also recognize the particular difficulty of quantifying nonpoint source loads and allow “gross allotment” as a load allocation where available data or appropriate predictive techniques limit more accurate estimates. For certain pollutants with long-term effects, such as sediment and nutrients, EPA allows for seasonal or annual loads. This document analyzes solar loads measured as kilowatt-hours per day (kWh/d) during the 6-month period from April through September, the most critical period for temperature impairments.

### ***5.1 Instream Water Quality Targets***

The Upper (North Fork) Coeur d'Alene River subbasin temperature TMDLs were developed using a PNV approach. The Idaho water quality standards include a provision stating that if natural background conditions exceed numeric water quality criteria, this exceedance is not considered a violation of water quality standards (IDAPA 58.01.02.200.09). In these situations, natural background conditions become the water quality standard, and the natural background solar load (estimated from potential shade and natural bank-full width) becomes the target of the TMDL. The instream temperature that results from attaining natural background conditions is consistent with the water quality standards even if it exceeds numeric temperature criteria. Appendix B contains further discussion of water quality standards and the natural background provisions. The PNV approach for temperature TMDL development is summarized below and is described in detail in Shumar and De Varona (2009).

## Potential Natural Vegetation for Temperature TMDLs

The PNV method is used when excess temperature loads to streams are due to solar radiation as a nonpoint source of pollution, solar radiation loads have increased as a result of riparian shade loss from human activities, and maximum shading under PNV will result in natural background stream temperatures. PNV along a stream is the riparian plant community that could grow to an overall mature state, although some level of natural disturbance within a historic range of variability is included in our development and use of shade targets. The riparian plant community is considered mature when the vegetation community is mature and undisturbed by anthropogenic sources and when vegetation height and density are at or near the potential expected for the given plant community.

Ground water temperature, air temperature, and direct solar radiation are all important heat contributors to streams (Poole and Berman 2001). Solar radiation is a primary factor in stream heat budgets (Johnson 2003; Caissie 2006) and is the source of heat most likely to be affected by land and resource management. Human activities causing excess solar loads include vegetation removal and road encroachment in riparian zones. The amount of solar radiation delivered to the stream is determined by factors including shade and stream morphology. Surrounding vegetation and other physical features such as hillsides, canyon walls, terraces, and high banks all provide shade. The prevailing aspect of the watershed is another important factor in determining shade levels. Stream morphology, including stream width and depth, affects the amount of solar radiation delivered to the stream and its effects on water temperature. Streamside vegetation and channel morphology are factors affecting shade and solar loading that may have been altered by human activities and may be most readily addressed by implementing a TMDL.

Riparian vegetation can be affected by natural events (e.g., wildlife grazing, disease, and wildfire) or by anthropogenic activities (e.g., livestock grazing, vegetation removal, and roads). Decreased shade could result in increased heating of the stream due to increased solar loads. Natural disturbances such as wildfires and floods are vitally important to maintaining biodiversity and forest health. Forest communities have evolved with adaptations to these natural disturbance patterns and continue to undergo succession towards PNV. Streams disturbed by natural disturbances are likely to have riparian vegetation less than PNV but would likely recover naturally over time without human intervention. Streams disturbed by human activity may require active restoration in addition to natural recovery.

Using the PNV approach, estimates are calculated for shade and solar loads under existing and potential (target) conditions in order to establish the temperature TMDL load allocations and the necessary load reductions to obtain temperatures at natural background conditions. Existing shade was estimated from visual evaluation of aerial photographs then partially field-verified with Solar Pathfinder data. Existing effective shade can be measured using a Solar Pathfinder or with other optical equipment similar to a fish-eye lens on a camera. The Solar Pathfinder is a device that can be used to estimate shade and solar loading to streams and is the recommended equipment for measuring riparian effective shade. Originally developed for solar power applications, the device consists of a convex lens and solar path chart mounted on a tripod. It is relatively affordable, lightweight, accurate, and simple to use. The device is placed in the middle of the stream at approximately bank-full water level, oriented to true south, and made level. Then a digital photograph is taken directly above the device to record the effective shade on the solar path chart. Once field sampling is completed, the photographs are analyzed using Solar

Pathfinder software to quantify shade and solar loads over the 6-month critical time period (April through September).

Effective shade is the amount of shade provided by all objects that intercept solar radiation as the sun makes its way across the sky. Effective shade can be estimated from aerial photographs or by using a model with detailed information about riparian plants, topography, and stream aspect or measured using a Solar Pathfinder. Canopy cover is a measure related to shade and is the amount of vegetation directly over the stream. Canopy cover can be measured using a spherical densiometer and can be estimated visually on site or from aerial photographs. Canopy cover, or canopy closure, is the percentage of water covered by shade from the outermost perimeter of the natural spread of foliage from plants (Armantrout 1998). This measure is related to shade but is not synonymous, and several tools are available to determine canopy cover. The DEQ BURP program for wadeable streams measures canopy cover using a spherical concave densiometer modified with tape to show only 17 grid intersections (Bauer and Burton 1993; DEQ 2007b). This tool measures the vegetative canopy overhead in a view that is narrower than the Solar Pathfinder. The BURP protocol includes densiometer readings facing upstream and downstream from the stream center and facing the left and right banks at each location to characterize canopy cover. There are also other types of densimeters available including a spherical convex model.

We can estimate PNV, and therefore target shade, from models of plant community structure. Potential (target) shade was estimated using USFS vegetation information, bank-full width estimates, and shade curves for various vegetation types, aspects, and channel widths (discussed in more detail in Appendix E). The shade and solar loads observed at PNV result in natural background stream temperature and are the TMDL targets based on natural background provisions of the Idaho water quality standards (IDAPA 58.01.02.200.09) rather than numeric temperature criteria.

Comparing existing to potential shade reveals the shade deficit or amount of excess solar load received by the stream and the necessary solar load reduction. Existing and potential shade values were converted to solar load estimates. These conversions used solar load values supplied by the nearest National Renewable Energy Laboratory (NREL) in Missoula, Montana. At the NREL, solar load is recorded on flat-plate collectors.

Effective shade and solar loads at PNV conditions are assumed to be the natural background condition of the water body if no point sources or other anthropogenic sources of heat exist in the watershed. Therefore, stream temperatures under these conditions are assumed to be natural and consistent with the Idaho water quality standards even if they exceed numeric criteria. The solar load at these conditions is established as the load capacity and the target of these TMDLs. When the existing solar load is greater than the potential solar load, the difference is the load reduction needed for the stream to meet water quality standards.

## **Design Conditions and Target Selection**

Idaho water quality standards contain numeric water quality criteria for stream temperatures to support cold water aquatic life (Appendix B). Compliance with the numeric criteria for water temperature is one possible target for this TMDL. From a regulatory perspective, it would be ideal for stream temperatures in this subbasin to be below these numeric criteria; however, it is possible that natural background temperatures may exceed numeric criteria and still provide full support for cold water aquatic life. Natural background temperatures are not known for this subbasin, and this information is very difficult to obtain. Scientific evidence shows that solar

radiation and shade are the primary determinants of stream thermal loading that are affected by human activities (Amaranthus et al. 1989; Cafferata 1990; Steedman et al. 1998; Poole and Berman 2001; Teti 2003; Rutherford et al. 2004; Thompson 2005). See also Shumar and De Varona (2009) for further discussion. Based on these relationships, this TMDL analysis asserts that natural background stream temperatures can be obtained under natural background riparian conditions with PNV. The shade provided by PNV and natural bank-full widths, and the associated solar load, is the primary target of this TMDL.

### **Determining Potential Solar Loads**

To determine potential solar loads, the following components are required: solar radiation data, the estimated stream surface area under natural conditions, and estimates of shade under PNV.

The load analysis can be expressed as follows:

$$\text{potential solar load (kWh/d)} = \text{solar radiation (kWh/m}^2\text{/d)} \times \text{natural background stream surface area (m}^2\text{)} \times \text{potential shade factor (\% of potential solar load not blocked by shade).}$$

Each AU was divided into intervals based on estimated existing shade during aerial photo interpretation. Estimates of potential solar load were made for each stream interval, recorded in a load analysis table, and then summed for the entire AU. For detailed information on each parameter, refer to the load analysis tables in Appendix F.

### ***Estimates of Solar Radiation***

The data used to estimate the amount of solar radiation that could potentially be delivered to the stream surface under natural background conditions were the same data used to estimate existing solar loads. These data were obtained from the nearest NREL in Missoula, Montana. Flat-plate collectors are used to determine the amount of solar energy reaching the ground under full sun at these sites. This solar radiation information was used to calculate a 6-month average solar load of 5.5 kWh/m<sup>2</sup>/d. The 6-month period of April through September is the critical time period when increasing air and water temperatures impact cold water aquatic life.

### ***Estimates of Stream Surface Area under Natural Background Conditions***

The stream surface area was estimated for each stream interval under natural background conditions. The length of the stream interval was estimated using geographic information system (GIS) software and aerial photos, and the same stream intervals were used for existing conditions. This information was combined with estimates of natural bank-full width to determine stream surface area.

Bank-full width is generally the width of the stream at the stage just before flooding begins and water overtops the banks into the floodplain. Bank-full width and discharge are common measures used to characterize streams, are associated with channel-forming flow events, and have a typical return interval of 1.5 years (Dunne and Leopold 1978; Rosgen 1996). Field indicators of bank-full width include perennial vegetation, changes in bank slope, and height of point bars. However, existing bank-full width may not be discernible from aerial photo interpretation and may not reflect natural bank-full widths. Bank-full width under natural conditions is estimated based on a regional curve relating the upstream drainage area to bank-full width. The curve was developed from US Geological Survey (USGS) gage discharge data compiled by Diane Hopster of the Idaho Department of Lands (IDL). For this TMDL, the

Clearwater River Basin regional curve bank-full width estimate was applied with the following equation:

$$\text{Bank-full width} = 5.64 \times \text{Drainage area}^{0.52}.$$

The Clearwater River Basin curve (Figure 17) was selected because the basin is considered the least disturbed by human activities in northern Idaho and best approximates the natural background condition of the Upper (North Fork) Coeur d'Alene River subbasin. See Appendix D for more information on bank-full width.

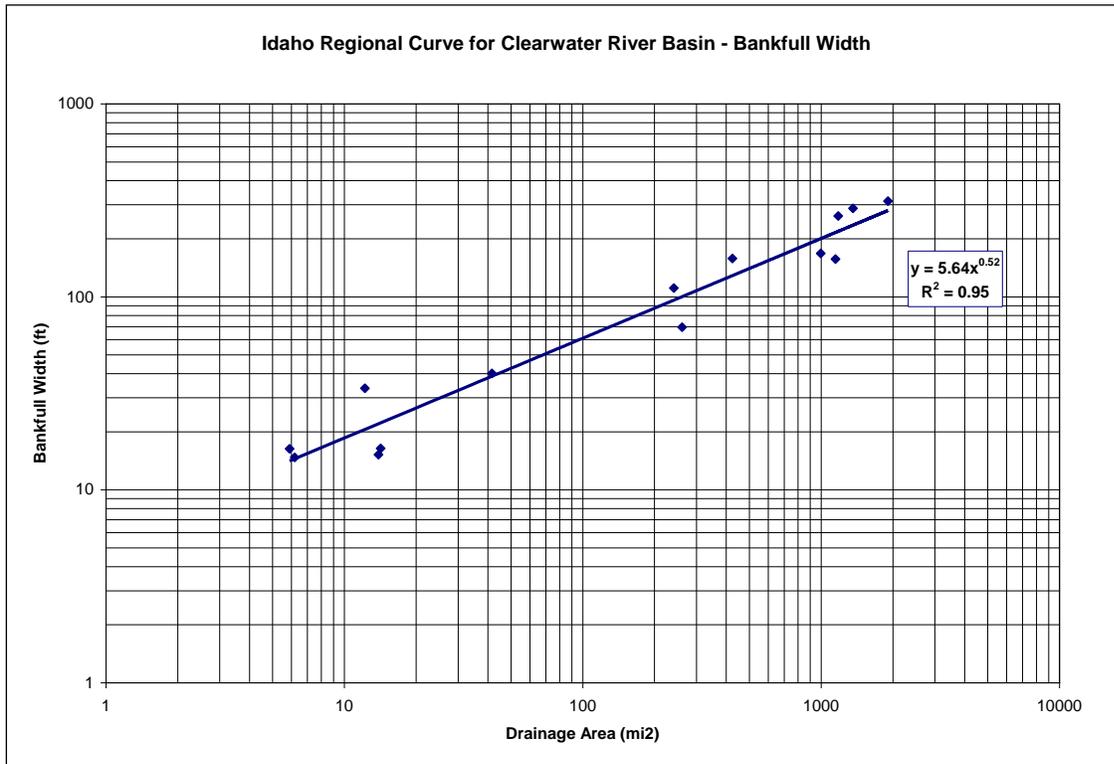


Figure 17. Bank-full width as a function of drainage area for the Clearwater River Basin.

### ***Estimates of Shade under Potential Natural Vegetation***

To estimate shade under PNV, riparian areas must first be classified based on stream order, gradient, and plant community characteristics. Determining stream order is a simple step based on the 1:100,000 NHD and the degree of branching. A 1st-order stream is not branched. Two 1st-order streams flow together to form a 2nd-order stream, two 2nd-order streams combine to make a 3rd-order stream, and so on. Streams in the Upper (North Fork) Coeur d'Alene River subbasin range from 1st to 5th order (Figure 18). Most streams are 3rd order or smaller, but sections of the larger streams are 4th and 5th order.

Stream gradient is a measure of the slope of the streambed and is determined from a digital elevation model from GIS programs. Streams in the Upper (North Fork) Coeur d'Alene River subbasin were classified into three categories: less than 3%, 3–10%, and greater than 10% (Figure 19).

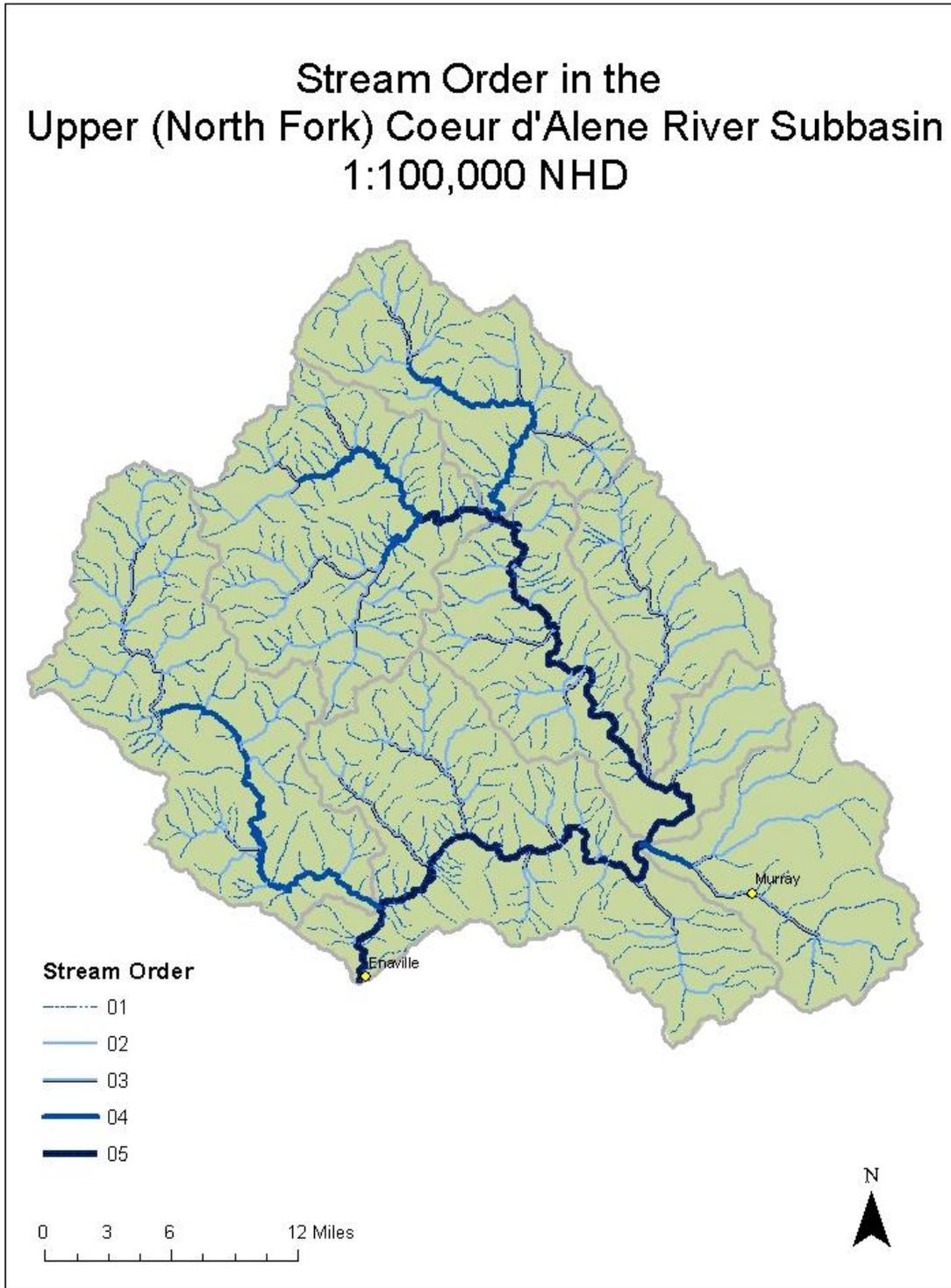
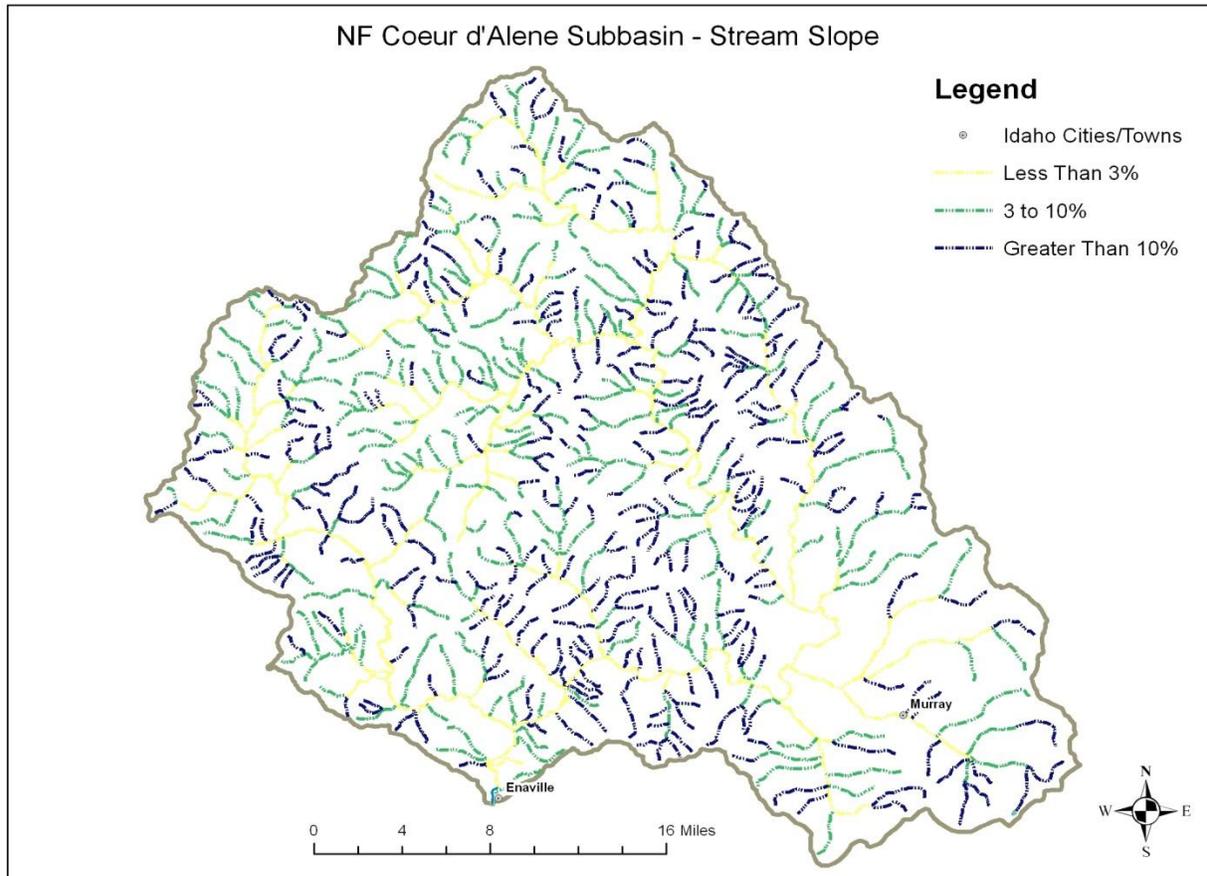


Figure 18. Stream order in the Upper (North Fork) Coeur d'Alene River subbasin.



**Figure 19. Stream gradient (slope) in the Upper (North Fork) Coeur d'Alene River subbasin.**

The riparian plant community characteristics used to model shade at PNV were determined using a number of sources. Vegetation classifications and descriptions available from the Interior Columbia Basin Ecosystem Management Project (ICBEMP), USFS, and BLM were used to develop forest type classifications for this analysis. Additional information from EPA was used to develop “non-forest” type classifications applied to mixed hardwood and conifer forests found at lower elevations and wider floodplains.

The ICBEMP identified a number of PNV groups for the Columbia Basin that were mapped and included in the project’s final environmental impact statement (USFS and BLM 2000). The ICBEMP identified the Upper (North Fork) Coeur d’Alene River subbasin as “moist forest.” Many national forests further expanded on the ICBEMP vegetation classifications and now represent information as habitat type groups (HTGs) and vegetation response units (VRUs) for their planning areas. HTGs described by Cooper et al. (1991) summarize vegetation conditions and are based on potential climax vegetation. Though climax plant communities typically occupy a relatively small land area, these communities are considered the most meaningful index of environmental factors affecting vegetation and are used as a standard reference (Cooper et al. 1991).

Based on HTGs, national forests have also developed VRUs to describe and define the structure, composition, and function of forest ecosystems (USFS 1999, 2005). The VRUs are described as aggregations of land having similar capabilities and potentials for management. These ecological

units have similar patterns in potential natural communities; soils; hydrologic function; landform and topography; lithology; climate; air quality; and natural processes (nutrient and biomass cycling, succession, productivity, and fire regimes). The Idaho Panhandle National Forests (IPNF) described approximately 11 VRUs based on 11 HTGs (Table 5).

In the BLM's *Coeur d'Alene Resource Management Plan and Final Environmental Impact Statement*, there is a comparison of terms used by various agencies to describe vegetation groups. The "moist forest" of the ICBEMP corresponds with the "moist" VRU group of the IPNF and the "wet/warm conifer" cover type of the BLM Coeur d'Alene Field Office (BLM 2006). The Idaho Gap Analysis Program of USGS designates this area as containing western redcedar, western hemlock, western redcedar/grand fir, and western redcedar/western hemlock cover types (BLM 2006).

**Table 5. Idaho Panhandle National Forests vegetation response units (VRUs) (USFS 1999, 2005).**

| <b>VRU</b>      | <b>Habitat Setting</b>             | <b>Description</b>  |
|-----------------|------------------------------------|---|
| VRU 1           | Warm and Dry                       | Generally, this VRU is characterized by large ponderosa pine with an open, grassy understory and occasional shrubs. Fire regime is an important determining factor.   |
| VRU 2           | Moderately Warm and Dry            | This VRU is often a transitional setting that includes warm, dry grasslands and moderately cool and dry upland sites. Douglas-fir habitat types are common mixed with ponderosa pine, western larch, and lodgepole pine.  |
| VRU 3           | Moderately Warm and Moderately Dry | This is a transitional setting between the drier, warmer Douglas-fir dominated sites (VRU 1 and VRU 2) and the warmer, moister sites featuring western redcedar and hemlock (VRU 5).  |
| VRU 4           | Moderately Warm and Moist          | This VRU occupies some lower slopes and valley bottoms. It contains diverse vegetation and may be dominated by grand fir, Douglas-fir, and western larch. Spruce, pine, and birch may also occur sparingly.   |
| VRU 5           | Moderately Cool and Moist          | This VRU has a mixed severity fire regime that results in varied vegetation. Western redcedar and western hemlock are likely climax species. Western larch, Douglas-fir, and occasionally Engelmann spruce may be dominant. Understory vegetation is diverse and depends on canopy closure.   |
| VRU 6 and VRU 8 | Cool and Wet Riparian              | These VRUs are described together due to ecological similarities and limited extent. These VRUs are less influenced by fire due to their wet nature and long fire return interval. VRU 6 generally occurs at lower elevations and is dominated by western redcedar with a diverse understory. A mix of conifers and hardwoods may also be found. VRU 8 is less dominated by western redcedar due to the temperature tolerance of the species. Engelmann spruce and subalpine fir are more common. |
| VRU 7           | Cool and Moist                     | This VRU is typically found on mid to upper slopes but is also found within alluvial fans and stream floodplains. It occupies a broad subalpine zone with stands of western larch, lodgepole pine, and Douglas-fir with Engelmann spruce. Older stands are dominated by grand fir and subalpine fir.  |
| VRU 9           | Cool and Moderately Dry            | This VRU is generally found on upper slopes and experiences moderate solar inputs, a short growing season, and early summer frosts. Lodgepole pine generally dominates.   |
| VRU 10          | Cold and Moderately Dry            | This is a transition zone at high elevations between the forest and alpine tundra. Subalpine fir habitats dominate. Mountain hemlock, lodgepole pine, whitebark pine, and spruce may also occur.  |
| VRU 11          | Cold                               | These are high-elevation, cold sites near timberline. There is a short growing season, low solar input, and early summer frosts. Whitebark pine and subalpine fir habitat types dominate.   |

The IPNF VRUs were used as the basis for developing shade curves used to set target shade levels for these temperature TMDLs. For this analysis, the 11 IPNF VRUs for this subbasin have been combined into four PNV groups (Table 6). See Shumar and De Varona (2009 Appendix A.1) for detailed information on the development of these classifications and shade curves. Some streams examined in this analysis have headwaters in the warm/dry forests of Forest Group A (VRUs 1, 2, and 3); the cool, wet to moist forests of Forest Group C (VRUs 7 and 8); or the cold forests of Forest Group D (VRUs 9, 10, and 11). Most of the streams analyzed were in the moderately warm and moderately cool/moist assemblage of forests in Forest Group B (VRUs 4, 5, and 6). Streams were classified into PNV groups according to stream order, gradient, and applicable VRUs.

In addition to these forest groups, shade curves were developed for two hardwood-conifer mix forests that occur at lower elevations with wider floodplains. Although identified as Non-Forest Groups 1 and 2, the labels are perhaps misnomers because they are a mix of both coniferous and hardwood species and have a substantial tree component. Peter Leinenbach of EPA developed a process to use stream order and stream gradient to assign one of two hardwood shade curves for northern Idaho nonconiferous forest riparian areas (i.e., non-forest groups). This process is described in detail in Shumar and De Varona (2009) Appendix A.2.

In summary, streams less than 5th order with gradients 3% or greater were assigned to forest groups based on local VRUs. All streams smaller than 5th order and with gradients less than 3% were assigned to Non-Forest Group 1. All streams 5th order or larger were assigned to Non-Forest Group 2.

**Table 6. Summary descriptions of potential natural vegetation (PNV) groups.**

| PNV Group          | Streams Included                                   | Description   |
|--------------------|--|---|
| Forest Group A     | < 5th order<br>Gradient ≥ 3%<br>VRUs 1, 2, and 3   | <b>Warm/Dry:</b> This setting includes the warmest and driest forest sites that support forest vegetation, usually at low elevations or mid-elevations on southerly aspects.  |
| Forest Group B     | < 5th order<br>Gradient ≥ 3%<br>VRUs 4, 5, and 6   | <b>Moist:</b> This setting includes moist forest sites, usually low to mid-elevation, and includes stream bottoms and adjacent benches and toe slopes. This setting is the most productive, with favorable soil moisture and temperature regimes that favor abundant plant growth.  |
| Forest Group C     | < 5th order<br>Gradient ≥ 3%<br>VRUs 7 and 8       | <b>Subalpine:</b> These settings include the moist, lower subalpine forest to the cool or cold dry sites between forest and alpine tundra. The moist end of this setting is common on northwest to east-facing slopes, riparian sites, and poorly drained subalpine sites. The cool to cold dry sites occur at higher elevations and typically have a short growing season. |
| Forest Group D     | < 5th order<br>Gradient ≥ 3%<br>VRUs 9, 10, and 11 |   |
| Non-Forest Group 1 | < 5th order<br>Gradient < 3%                       | This group includes diverse plant communities, including late successional cedar-hemlock, black cottonwood, mixed conifer, and shrubs.  |
| Non-Forest Group 2 | ≥ 5th order  | In this group, black cottonwoods, shrubs, and grasses are common; conifers are rare.  |

The higher-elevation headwater portions of the streams in this subbasin are most often associated with coniferous forest types and were generally in VRUs 5 and 6 (Forest Group B) on north-facing slopes and VRU 2 (Forest Group A) on south-facing slopes. Vegetation on north-facing slopes was moderately cool and moist/wet forests. South-facing slopes were characterized by warm, dry forests of ponderosa pine, grand fir, Douglas-fir, and lodgepole pine. Only one stream interval, Spion Kop Creek, was classified as Forest Group D. As streams transitioned into lower elevations and larger floodplains, vegetation was classified as Forest Groups B and C (VRUs 6 and 8) or non-forest groups.

Once the PNV of the riparian area was classified, the associated shade was determined (Figure 20). This determination used the most current shade curves based on local information as developed by Peter Leinenbach of EPA (Appendix E). These curves relate effective shade to channel width at various aspects for each of the six PNV groups. In this analysis, the average shade value over all stream aspects was used.

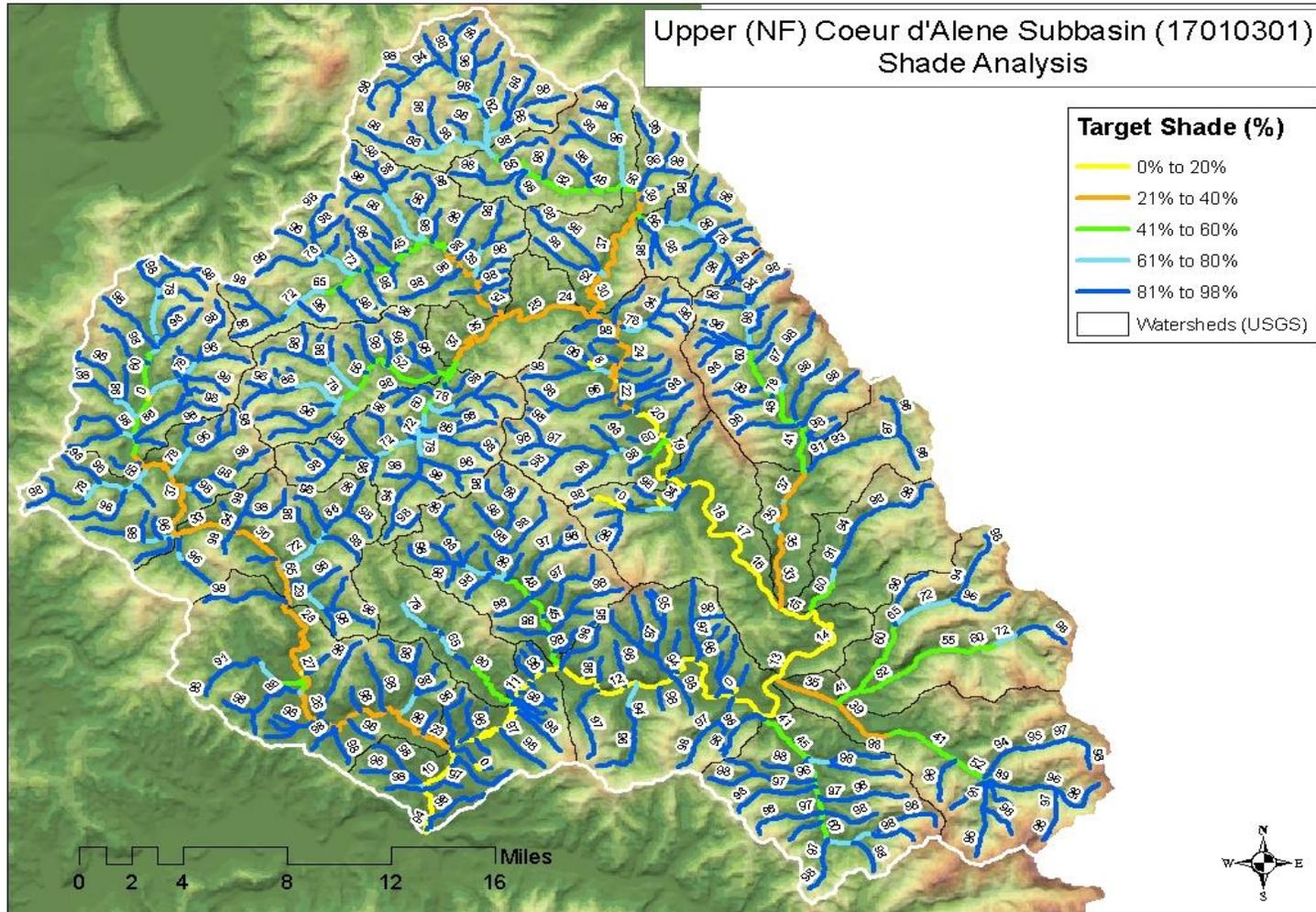


Figure 20. Target shade under potential natural vegetation conditions for the Upper (North Fork) Coeur d'Alene River subbasin.

### ***Estimates of Potential Solar Loads***

Once necessary data were compiled for solar radiation and stream surface area, vegetation was classified and shade estimates were developed for PNV. These data were used to calculate the estimated potential solar load using the following equation:

$$\text{potential solar load (kWh/d)} = \text{solar radiation (kWh/m}^2\text{/d)} \times \text{natural background stream surface area (m}^2\text{)} \times \text{potential shade factor (\% of solar load not blocked at potential shade).}$$

Estimated potential (target) shade for the subbasin is presented in Figure 20 and estimated potential solar loads are presented in tables in Appendix F. The shade provided by PNV is the primary target of this TMDL, and the associated solar loads are the load capacity. Estimates of potential solar load were made for each stream interval, recorded in a load analysis table, and then summed for the entire AU. For detailed information on each parameter, refer to the load analysis tables in Appendix F.

### **Monitoring Points**

Monitoring for TMDL compliance should include measurements of stream temperature, bank-full width, and shade, along with biological monitoring through programs such as BURP. Since shade at PNV is the primary target of this TMDL, DEQ suggests that monitoring emphasize shade measurements using the Solar Pathfinder. The Solar Pathfinder can be used to verify estimates of existing shade and to determine progress toward meeting TMDL targets. Shade targets have been established for multiple stream intervals within each AU depending on vegetation. Monitoring recommendations include collecting Solar Pathfinder photographs at 10 equally spaced sites within each interval to adequately characterize shade for that interval and for the AU overall. These methods are described in further detail in section 5.5 under monitoring strategy.

### ***5.2 Load Capacity***

The load capacity of a water body is the upper limit on discharge of a pollutant from all sources allowable while ensuring the water body still meets water quality standards and supports beneficial uses. This PNV temperature TMDL analysis assumes that excess temperature loads to streams are due to solar radiation as a nonpoint source of pollution; that solar radiation loads have increased as a result of riparian shade loss; and that maximum shading under PNV results in natural background stream temperatures. Following this method, the natural background solar load is the load capacity (i.e., the upper limit of solar radiation to the stream that preserves natural background stream temperatures as the water quality criteria). In TMDLs using the PNV method, the load capacity, natural background load, potential solar load, and load allocation are all equivalent. Solar loads are measured as kilowatt-hours per day during the 6-month period from April through September, the most critical period for temperature impairments.

### ***5.3 Estimates of Existing Pollutant Loads***

The PNV method assesses excess temperature loads to streams due to solar radiation as a nonpoint source of pollution. Because there are no permitted point sources of thermal loading to streams in this subbasin, the estimates of existing pollutant loads focus on solar radiation as the source of excess thermal loading to the streams from nonpoint sources. Existing pollutant loads

are expressed as solar radiation in kilowatt-hours reaching the stream surface on a daily basis (kilowatt-hours per day) during the 6-month critical time period, April–September.

Regulations allow for load estimates that “...may range from reasonably accurate estimates to gross allotments, depending on the availability of data and appropriate techniques for predicting the loading” (40 CFR 130.2(I)). An estimate must be made for existing pollutant loads from each point source, but no permitted point sources of thermal loading exist in this subbasin. Estimates of existing loads from nonpoint sources are typically based on land use and area. To the extent possible, natural background pollutant loads should be distinguished from human-caused nonpoint sources of pollution.

Existing solar loads are calculated from the following components: solar radiation information, the estimated existing stream surface area, and estimates of existing shade. The load analysis can be expressed as follows:

$$\text{existing solar load (kWh/d)} = \text{solar radiation (kWh/m}^2\text{/d)} \times \text{existing stream surface area (m}^2\text{)} \times \text{existing shade factor (\% of solar load not blocked by existing shade).}$$

Estimates of existing solar load were made for each stream interval, recorded in a load analysis table, and then summed for the entire AU. For detailed information on each parameter, refer to the load analysis tables in Appendix F.

#### ***Estimates of Existing Solar Radiation***

The amount of solar radiation potentially delivered to the stream surface was obtained from the nearest NREL at Missoula, Montana. Flat-plate collectors are used to measure the amount of solar energy reaching the ground under full sun at these sites. This solar radiation information was obtained to calculate a 6-month average solar load of 5.5 kWh/m<sup>2</sup>/d.

#### ***Estimates of Existing Stream Surface Area***

The stream surface area was estimated for each stream interval. The length of the stream interval was determined using GIS software and varies depending on the land use or landscape that has affected shade in a particular area. This information was combined with estimates of existing bank-full width to determine stream surface area. Bank-full width is measured in the field during DEQ BURP monitoring, USFS surveys, and DEQ field monitoring of shade using Solar Pathfinders. Bank-full width is very difficult to estimate accurately from aerial photographs. For this TMDL analysis, data from DEQ and USFS were used to estimate existing bank-full width (Appendix D). When existing data were not available, the Clearwater River Basin regional curve bank-full width estimate was applied (see Figure 17).

#### ***Estimates of Existing Shade***

Existing shade was determined from visual interpretation of aerial photographs using GIS analysis. Existing shade ranged from 0% to 90% with the greatest amount of shading observed in 1st- and 2nd-order streams (Figure 21). Visual estimates are made by a trained and experienced technician and some are field-verified using a Solar Pathfinder. The most recent digital orthophotography was obtained from the National Agriculture Imagery Program (NAIP) produced by the US Department of Agriculture (USDA) Farm Services Agency. The photographs are used as a base layer in a GIS program to reveal the landscape in the area of interest. For streams identified as temperature-impaired in the 2010 Integrated Report, the 2009 NAIP imagery was used for this analysis. For streams identified as temperature-impaired in the

2008 Integrated Report, the 2004 NAIP imagery was used. A stream map based on the 1:100,000 NHD and marked with DEQ AU numbers was used to identify stream segments on the aerial photographs.

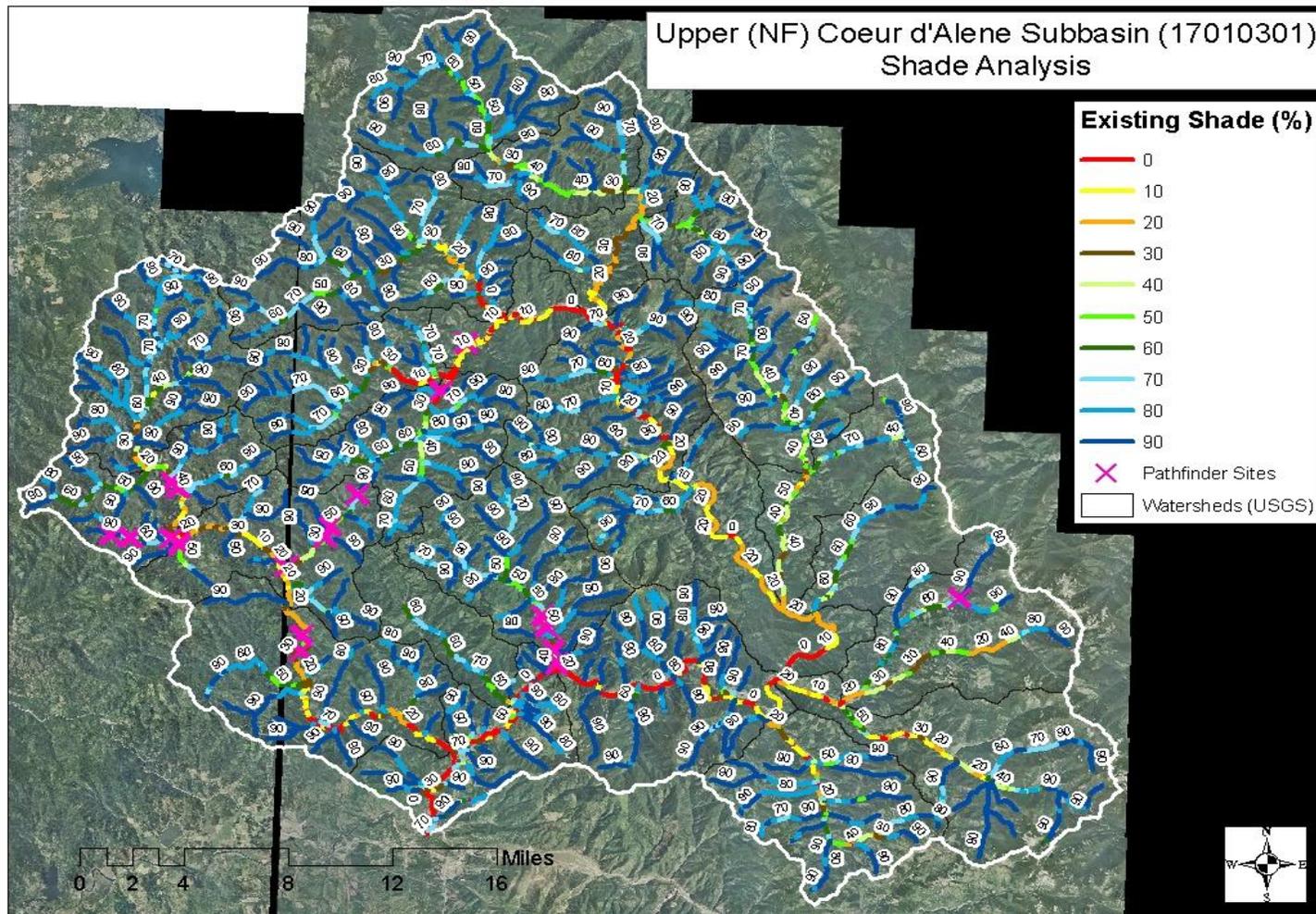


Figure 21. Estimated existing shade for streams of the Upper (North Fork) Coeur d'Alene River subbasin.

Streams were divided into intervals based on AU number and natural breaks in vegetation density. Intervals typically ranged from 50 to 2,200 m long. Estimates of existing shade were classified into 10% class intervals starting with shade class 0, representing shade levels from 0 to 9.9%, and proceeding through shade class 90 (i.e., shade levels from 90 to 100%). This method was adapted from the Idaho cumulative watershed effects (CWE) process (IDL 2000). For example, if the shade estimate for a stream interval was somewhere between 50% and 59.9% shade, the value of 50% shade was assigned to that interval. Shade estimates were based on general observations about the kind of vegetation present, vegetation density, and stream width and are an estimate of the amount of solar radiation blocked from reaching the stream surface. Streams with banks and water clearly visible in aerial photographs are usually in low shade classes of 10, 20, or 30% shade. Streams with dense forest or heavy brush with no portion of the water surface visible in aerial photographs are in high shade classes of 70, 80, or 90%.

Visual estimates of shade made from aerial photos can be strongly influenced by canopy cover and do not always accurately account for topography and landform. However, Oregon Department of Environmental Quality research concluded that shade and canopy cover measurements were remarkably similar (OWEB 2001). Solar Pathfinder field measurements of shade provide the most accurate estimates and are valuable as field verification. Methods for Solar Pathfinder measurements and field-verification are described in Shumar and De Varona (2009) and in the monitoring strategy discussion of this document. For this TMDL, the Solar Pathfinder was used at 20 sites on streams of varying shade classes to field-verify and calibrate the visual estimates of shade made from photographs. In 2007, Solar Pathfinder measurements were collected on Beaver Creek, Deception Creek, Leiberg Creek, Little North Fork Coeur d'Alene River, Skookum Creek, Steamboat Creek, Tepee Creek, and West Fork Eagle Creek (see Figure 21 for Solar Pathfinder sites). Differences between measured shade and visual estimates resulted in the visual estimates being adjusted. These data are included in Appendix G.

#### **5.4 Load Allocation**

The temperature TMDLs were developed using the potential natural vegetation (PNV) method described by Shumar and De Varona (2009). This method evaluated existing effective shade to the streams, potential effective shade, and the amount of shade needed to reach potential effective shade and thus, natural background water temperatures. The shade and solar loading observed at potential natural vegetation provide natural background stream temperature and are the TMDLs target rather than numeric temperature criteria based on natural background provisions of the Idaho water quality standards (IDAPA 58.01.02.200.09).

Because these TMDLs are based on PNV, which is equivalent to background conditions, the load allocation essentially expresses the desire to achieve background conditions. To reach that objective, load allocations are assigned to nonpoint source activities that have affected or may affect riparian vegetation and shade as a whole. Therefore, load allocations are reach specific and are dependent upon the target load for a given reach. The tables in Appendix F show the potential (target) shade levels and the associated potential summer load. The potential summer solar load is the load capacity of the stream, and it is necessary to achieve background conditions. There is no opportunity to further remove shade from the stream by any activity without exceeding its load capacity. Additionally, because these TMDLs are dependent upon background conditions for achieving water quality standards, all tributaries to the waters examined here need to be in natural conditions to prevent excess heat loads to the system.

Estimated shade conditions and solar loads were variable among the streams evaluated (Figure 22; Table 7). Most stream segments were within 20% of target shade conditions. Three AUs had existing solar loads lower than the estimated target and load allocation: Graham Creek below Deceitful Gulch (ID17010301PN002\_03), Lost Creek below East Fork Lost Creek (ID17010301PN009\_03), and Steamboat Creek and West Fork Steamboat Creek below Comfy Creek (ID17010301PN028\_03). While the overall existing solar loads of these AUs may be less than the estimated load allocation when added over the entire unit, there are reach-specific targets identified in Appendix F that should also be met to ensure water temperature protection. These streams should be evaluated as possibly attaining PNV shade targets and natural background temperatures.

The highest solar load reductions needed were in the lower portions of larger streams, including the middle and lower North Fork Coeur d'Alene River, the lower Little North Fork Coeur d'Alene River, lower Trail Creek, and lower Tepee Creek. Areas with shade deficits over 50% include the lower North Fork Coeur d'Alene River, stretches of upper Beaver Creek, portions of Falls Creek, lower Trail Creek (tributary to Tepee Creek), and portions of middle Tepee Creek. These areas should be considered as priorities for TMDL implementation.

The highest stream temperature values were observed in the main stem North Fork Coeur d'Alene River and larger tributaries. The warmest locations were in the North Fork Coeur d'Alene River near Shoshone Creek during July. Coldwater refugia have been identified as important mitigation for these warm water temperatures by allowing trout to persist despite temperatures outside their normal tolerance range. These concepts should be considered when setting priorities for TMDL implementation.

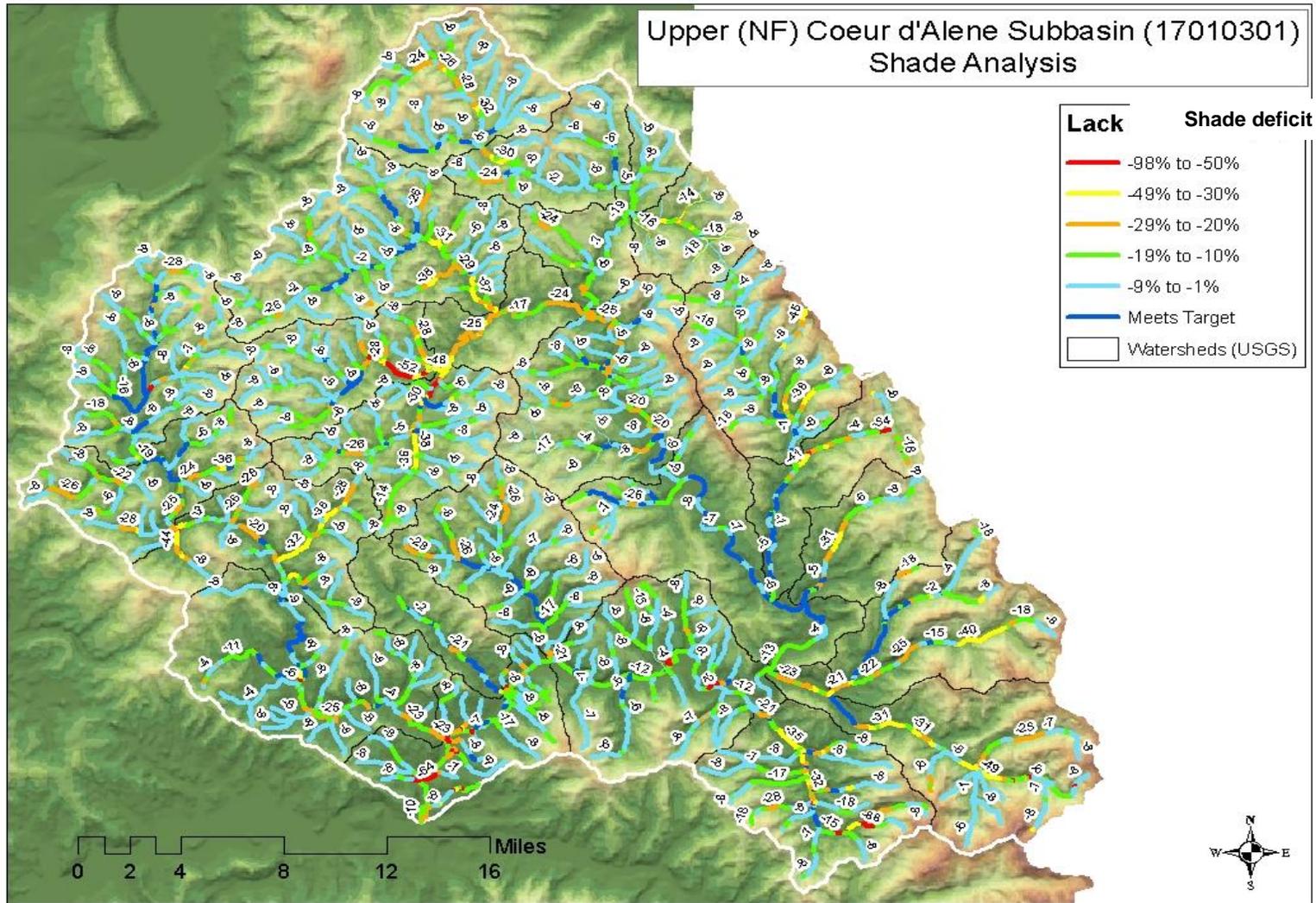


Figure 22. Shade deficits (difference between existing and potential shade) for the Upper (North Fork) Coeur d'Alene River subbasin.

**Table 7. Summary of existing solar loads, temperature TMDL load allocations, and load reductions needed for the 54 assessment units (AUs) with temperature TMDLs. This table summarizes loads over entire assessment units. Within each assessment unit, there are reach-specific shade targets and solar load allocations provided in Appendix F.**

| Assessment Unit Number | Assessment Unit Name  | Existing Load (kWh/day) | Load Allocation (kWh/day) | Load Reduction Needed (kWh/Day)               | Percent Reduction Needed |
|------------------------|---|-------------------------|---------------------------|---|--------------------------|
| ID17010301PN001_02     | North Fork Coeur d'Alene River tributaries below Prichard Creek               | 192,643                 | 37,263                    | 155,380                                       | 81                       |
| ID17010301PN001_05     | North Fork Coeur d'Alene River below Prichard Creek                           | 10,739,949              | 9,746,358                 | 993,591                                       | 9                        |
| ID17010301PN001_05a    | North Fork Coeur d'Alene River between Yellowdog and Prichard Creeks          | 4,956,331               | 4,105,591                 | 850,739                                       | 17                       |
| ID17010301PN002_03     | Graham Creek below Deceitful Gulch  | 14,163                  | 17,094                    | Existing shade > potential shade <sup>a</sup> | n/a                      |
| ID17010301PN003_02     | Beaver Creek headwaters and tributaries                                       | 436,783                 | 147,154                   | 289,629                                       | 66                       |
| ID17010301PN003_03     | Beaver Creek below White Creek  | 419,095                 | 213,717                   | 205,378                                       | 49                       |
| ID17010301PN004_04     | Prichard Creek below Eagle Creek  | 342,320                 | 239,642                   | 102,678                                       | 30                       |
| ID17010301PN005_02     | Prichard Creek headwaters and tributaries above Butte Gulch                   | 173,492                 | 30,495                    | 142,997                                       | 82                       |
| ID17010301PN008_02     | West Fork Eagle Creek and tributaries   | 169,438                 | 143,683                   | 25,755  | 15                       |
| ID17010301PN009_03     | Lost Creek below East Fork Lost Creek   | 37,263                  | 44,955                    | Existing shade > potential shade <sup>a</sup> | n/a                      |
| ID17010301PN010_03     | Shoshone Creek below Falls Creek  | 571,857                 | 561,789                   | 10,068  | 2                        |
| ID17010301PN011_02     | Falls Creek and tributaries   | 88,390                  | 18,729                    | 69,661  | 79                       |
| ID17010301PN012_02     | Shoshone Creek headwaters and tributaries above Falls Creek                   | 135,977                 | 41,402                    | 94,575  | 70                       |
| ID17010301PN012_03     | Shoshone Creek between Little Lost Fork and Falls Creek                       | 356,879                 | 336,361                   | 20,518  | 6                        |
| ID17010301PN013_02     | North Fork Coeur d'Alene River tributaries between Tepee and Yellowdog Creeks | 64,377                  | 21,145                    | 43,232  | 67                       |
| ID17010301PN013_04     | North Fork Coeur d'Alene River between Jordan and Tepee Creeks                | 913,699                 | 753,106                   | 160,593                                       | 18                       |
| ID17010301PN013_05     | North Fork Coeur d'Alene River between Tepee and Yellowdog Creeks             | 2,672,334               | 2,130,373                 | 541,961                                       | 20                       |
| ID17010301PN014_03     | Jordan Creek and Lower Lost Fork  | 93,545                  | 64,147                    | 29,398  | 31                       |
| ID17010301PN015_02     | North Fork Coeur d'Alene River, upper, headwaters and tributaries             | 213,488                 | 100,419                   | 113,069                                       | 53                       |
| ID17010301PN015_03     | North Fork Coeur d'Alene River, upper, and lower Buckskin Creek               | 111,408                 | 80,684                    | 30,724  | 28                       |
| ID17010301PN015_04     | North Fork Coeur d'Alene River between Buckskin and Jordan Creeks             | 385,913                 | 317,951                   | 67,962  | 18                       |
| ID17010301PN016_02     | West Elk Creek and Cataract Creek   | 30,838                  | 6,390                     | 24,448  | 79                       |

| Assessment Unit Number | Assessment Unit Name  | Existing Load (kWh/day) | Load Allocation (kWh/day) | Load Reduction Needed (kWh/Day)               | Percent Reduction Needed |
|------------------------|---|-------------------------|---------------------------|---|--------------------------|
| ID17010301PN017_04     | Tepee Creek between Trail Creek and Independence Creek                                | 539,660                 | 336,372                   | 203,288                                       | 38                       |
| ID17010301PN017_05     | Tepee Creek below Independence Creek  | 889,043                 | 305,883                   | 583,160                                       | 66                       |
| ID17010301PN018_02     | Independence Creek headwaters and tributaries   | 227,436                 | 87,944                    | 139,492                                       | 61                       |
| ID17010301PN018_03a    | Declaration Creek, lower  | 23,320                  | 18,942                    | 4,378   | 19                       |
| ID17010301PN018_03b    | Snow Creek, lower   | 35,728                  | 27,887                    | 7,841   | 22                       |
| ID17010301PN018_04     | Independence Creek below Declaration Creek  | 1,007,633               | 619,733                   | 387,900                                       | 38                       |
| ID17010301PN019_02     | Trail Creek headwaters and tributaries  | 123,189                 | 49,699                    | 73,490  | 60                       |
| ID17010301PN019_03     | Trail Creek below Stewart Creek   | 664,576                 | 221,495                   | 443,081                                       | 67                       |
| ID17010301PN020_02     | Tepee Creek headwaters and tributaries  | 170,149                 | 76,257                    | 93,892  | 55                       |
| ID17010301PN020_03     | Tepee Creek between Short Creek and Trail Creek                                       | 301,477                 | 138,916                   | 162,561                                       | 54                       |
| ID17010301PN021_02     | Brett Creek and tributaries   | 25,680                  | 10,506                    | 15,174  | 59                       |
| ID17010301PN022_02     | Miners Creek and tributaries  | 17,781                  | 3,621                     | 14,160  | 80                       |
| ID17010301PN023_03     | Flat Creek, lower   | 83,506                  | 66,100                    | 17,406  | 21                       |
| ID17010301PN024_02     | Yellowdog Creek and tributaries   | 45,639                  | 16,139                    | 29,500  | 65                       |
| ID17010301PN026_02     | Brown Creek and tributaries   | 19,767                  | 3,605                     | 16,162  | 82                       |
| ID17010301PN028_02     | Steamboat Creek headwaters and tributaries  | 159,182                 | 51,585                    | 107,597                                       | 68                       |
| ID17010301PN028_03     | Steamboat Creek and West Fork Steamboat Creek below Comfy Creek                       | 307,522                 | 310,253                   | Existing shade > potential shade <sup>a</sup> | n/a                      |
| ID17010301PN029_03     | Cougar Gulch below East Fork Cougar Gulch   | 135,581                 | 118,357                   | 17,224  | 13                       |
| ID17010301PN030_02a    | Little North Fork Coeur d'Alene River tributaries above Iron Creek                    | 38,302                  | 9,220                     | 29,082  | 76                       |
| ID17010301PN030_02c    | Little North Fork Coeur d'Alene River tributaries between Hudlow and Deception Creeks | 84,260                  | 34,125                    | 50,135  | 60                       |
| ID17010301PN030_02d    | Little North Fork Coeur d'Alene River tributaries below Skookum                       | 38,626                  | 8,527                     | 30,099  | 78                       |
| ID17010301PN030_03     | Little North Fork Coeur d'Alene River between Solitaire and Skookum Creeks            | 751,113                 | 661,829                   | 89,284  | 12                       |
| ID17010301PN030_04     | Little North Fork Coeur d'Alene River below Skookum Creek                             | 4,021,028               | 2,955,648                 | 1,065,380                                     | 26                       |
| ID17010301PN031_02     | Bumblebee Creek and tributaries   | 40,816                  | 11,886                    | 28,930  | 71                       |
| ID17010301PN032_02     | Laverne Creek and tributaries   | 50,012                  | 14,287                    | 35,725  | 71                       |
| ID17010301PN033_02     | Leiberg Creek and tributaries   | 178,189                 | 42,119                    | 136,070                                       | 76                       |
| ID17010301PN034_02     | Bootjack Creek and tributaries  | 17,297                  | 2,819                     | 14,478  | 84                       |

| Assessment Unit Number | Assessment Unit Name              | Existing Load (kWh/day) | Load Allocation (kWh/day) | Load Reduction Needed (kWh/Day) | Percent Reduction Needed |
|------------------------|-----------------------------------|-------------------------|---------------------------|---------------------------------|--------------------------|
| ID17010301PN035_02     | Iron Creek and tributaries        | 73,744                  | 37,936                    | 35,808                          | 49                       |
| ID17010301PN036_02     | Burnt Cabin Creek and tributaries | 113,075                 | 54,206                    | 58,869                          | 52                       |
| ID17010301PN037_02     | Deception Creek and tributaries   | 29,640                  | 13,111                    | 16,529                          | 56                       |
| ID17010301PN038_03     | Skookum Creek, lower              | 28,479                  | 2,046                     | 26,433                          | 93                       |
| ID17010301PN039_03     | Copper Creek, lower               | 89,584                  | 60,676                    | 28,908                          | 32                       |

<sup>a</sup> The loads included in this table are added over the entire stream assessment unit. While the assessment unit's overall existing solar load may be less than the estimated load allocation over the entire unit, there are reach-specific targets identified in Appendix F that should also be met to ensure water temperature protection.

PNV solar loading analysis was completed for portions of some stream AUs without temperature data that are not §303(d) listed or known to be temperature impaired. This analysis is included to provide information about contributing loads and does not establish TMDLs for those streams (Table 8).

**Table 8. Summary of existing solar loads, estimated loads at potential natural vegetation (PNV) conditions, and load reductions recommended on tributaries *not* listed for excess temperature based on this analysis. Some load estimates may be for only portions of assessment units.**

| Assessment Unit Number | Assessment Unit Name   | Existing Load (kWh/day) | Estimated Load at PNV (kWh/day) | Load Reduction Recommended (kWh/Day)        |
|------------------------|--|-------------------------|---------------------------------|---|
| ID17010301PN001_02a    | North Fork Coeur d'Alene River tributaries between Yellowdog and Prichard Creeks | nd <sup>a</sup>         | nd                              | nd  |
| ID17010301PN002_02     | Graham Creek, headwaters and tributaries   | 9,235                   | 3,247                           | 5,988                                       |
| ID17010301PN004_02     | Prichard Creek tributaries between Butte Gulch and Eagle Creek                   | nd                      | nd                              | nd  |
| ID17010301PN004_03     | Prichard Creek, between Butte Gulch and Eagle Creek                              | 507,975                 | 364,472                         | 143,503                                     |
| ID17010301PN005_03     | Prichard Creek, between Barton Creek and Butte Gulch                             | 156,492                 | 79,533                          | 76,959                                      |
| ID17010301PN006_02     | Butte Gulch  | nd                      | nd                              | nd  |
| ID17010301PN007_02     | East Fork Eagle Creek and tributaries  | 471,526                 | 212,411                         | 259,115                                     |
| ID17010301PN007_03     | Eagle Creek  | 158,928                 | 63,862                          | 95,066                                      |
| ID17010301PN009_02     | Lost Creek, headwaters and tributaries   | 67,155                  | 32,693                          | 34,462                                      |
| ID17010301PN010_02     | Shoshone Creek tributaries below Falls Creek                                     | nd                      | nd                              | nd  |
| ID17010301PN013_02a    | North Fork Coeur d'Alene River tributaries between Jordan Creek and Tepee Creek  | nd                      | nd                              | nd  |
| ID17010301PN014_02     | Jordan Creek, headwaters and tributaries   | 30,855                  | 10,188                          | 20,667                                      |
| ID17010301PN014_02a    | Cub Creek  | nd                      | nd                              | nd  |
| ID17010301PN014_02b    | Calamity Creek   | nd                      | nd                              | nd  |
| ID17010301PN017_02     | Tepee Creek tributaries, below Trail Cr.   | nd                      | nd                              | nd  |
| ID17010301PN018_03     | Independence Creek, between Ellis Creek and Declaration Creek                    | 61,380                  | 42,966                          | 18,414                                      |
| ID17010301PN023_02     | Flat Creek, headwaters and tributaries   | 28,083                  | 4,430                           | 23,653                                      |
| ID17010301PN025_02     | Downey Creek, headwaters and tributaries   | nd                      | nd                              | nd  |
| ID17010301PN025_03     | Downey Creek, lower  | nd                      | nd                              | nd  |
| ID17010301PN027_03     | Grizzly Creek, below Dewey Creek   | 7,288                   | 2,987                           | 4,301                                       |
| ID17010301PN029_02     | Cougar Gulch, headwaters and tributaries   | nd                      | nd                              | nd  |
| ID17010301PN030_02     | Little North Fork Coeur d'Alene River tributaries, headwaters to Solitaire Cr.   | 24,332                  | 26,487                          | Existing load < Potential load <sup>b</sup> |
| ID17010301PN030_02b    | Hudlow Creek, headwaters and tributaries   | 42,268                  | 20,015                          | 22,253                                      |
| ID17010301PN038_02     | Skookum Creek, headwaters and tributaries  | 14,427                  | 3,484                           | 10,943                                      |
| ID17010301PN039_02     | Copper Creek, headwaters and tributaries   | 21,494                  | 9,442                           | 12,052                                      |

<sup>a</sup> No data (nd) are reported in this table for stream assessment units that are not identified as temperature impaired and did not have any PNV analysis performed during development of these TMDLs. There is a presumption that these streams are shaded under PNV conditions unless data show otherwise.

<sup>b</sup> The loads included in this table are added over the entire portion of stream assessment unit analyzed. While the assessment unit's overall existing solar load may be less than the estimated load allocation over the entire unit, there are reach-specific targets identified in Appendix F that should also be met to ensure water temperature protection.

Implementation of these temperature TMDLs should incorporate the needed solar load reductions and target shade conditions using strategies that maximize shade from riparian vegetation. Managers can utilize this analysis to identify locations with high excess solar loads and the largest differences between existing and target shade. Within the overall load allocation for each AU, these TMDLs establish reach-specific allocations for solar loading at PNV conditions. Some reaches are probably already reaching their target shade and solar loading rates. Other reaches have estimated shade deficits ranging from 2 to 88%. These locations can be prioritized for implementation activities including tree planting.

Implementation of these TMDLs should improve water quality conditions in streams of the Upper (North Fork) Coeur d'Alene River subbasin and enable full support of cold water aquatic life and salmonid spawning beneficial uses. The tables in Appendix F provide detailed reach-specific loading analyses, and maps in Appendix H identify locations with significant shade deficits and excess solar loads.

### **Wasteload Allocation**

There are no known existing or proposed National Pollutant Discharge Elimination System (NPDES)-permitted point sources of temperature loading in this subbasin. Additionally, no excess thermal load is available for allocation since the load capacity is set at natural background for these TMDLs. Therefore, no wasteload allocations for temperature are provided in these TMDLs.

### ***Stormwater and NPDES Permitting***

Stormwater discharges are generated by runoff from land and impervious areas such as roads, parking lots, and rooftops during precipitation events. Stormwater can be a significant source of pollutants, including sediment, pathogens, nutrients, and metals. In 1987, Congress amended the CWA to require regulation of certain stormwater discharges as point sources through the NPDES program. In the past, stormwater was treated as a nonpoint source of pollutants. However, because stormwater can be managed on site through management practices or when discharged through a discrete conveyance such as a storm sewer, it now requires an NPDES permit.

NPDES permitting authorities now issue permits to control stormwater discharges from Municipal Separate Storm Sewer Systems (MS4s), industrial activities, and construction activities. In Idaho, EPA is the NPDES permitting authority. The agency has issued general NPDES permits for stormwater and these have received Idaho water quality certification under CWA §401. These include the Multi-Sector General Permit for Stormwater Discharges Associated with Industrial Activity (MSGP) and the Stormwater Construction General Permit (CGP). An individual NPDES permit must be obtained for MS4 stormwater discharge. The MS4 discharges are generally public storm sewer systems that are not part of a combined sewer (i.e., storm and sanitary sewers combined).

When an Idaho stream is identified as water quality impaired and has a TMDL developed, DEQ may incorporate a gross wasteload allocation for stormwater from anticipated activities. Past TMDLs did not always include this wasteload allocation for stormwater discharges; however, future activities may be considered in compliance with the TMDL if the appropriate NPDES permits are obtained, state certification requirements are followed, appropriate best management practices (BMPs) are employed, and local requirements are met, if applicable.

### **Construction Stormwater**

Under EPA regulations, operators of construction sites are required to obtain NPDES permit coverage to discharge stormwater to a water body or municipal storm sewer. If a construction project disturbs more than 1 acre of land (or is part of a larger common development that will disturb more than 1 acre), the operator is required to apply for permit coverage from EPA after developing a site-specific Stormwater Pollution Prevention Plan, which is required to obtain the CGP. The operator must document the erosion, sediment, and pollution controls they intend to use; inspect the controls periodically; and maintain BMPs through the life of the project. The application of specific BMPs from Idaho's *Catalog of Stormwater Best Management Practices for Idaho Cities and Counties* (DEQ 2005a) is generally sufficient to meet the standards and requirements of the CGP, unless local ordinances have more stringent and site-specific standards that are applicable.

### **Margin of Safety**

The margin of safety in these TMDLs is considered implicit in the design. The target of the TMDLs is natural background temperature conditions associated with PNV shading. It is unrealistic to set shade targets at higher or more conservative levels than the system PNV. Additionally, existing shade estimates are rounded down into 10% class intervals, which likely underestimates actual shade in the loading analysis. Although the load analysis used in these TMDLs involves gross estimations that are likely to have large variances, load allocations can be adjusted as more information is gathered.

### **Seasonal Variation**

These temperature TMDLs are based on average spring/summer loads and consider seasonal variation in water temperature and the seasonal nature of temperature impacts to biota. All loads have been calculated for the 6-month critical time period from April through September. This period represents the time when the combination of increasing air and water temperatures coincides with increasing solar inputs and vegetative shade. The period also incorporates the timing of spring and fall salmonid spawning and the occurrence of maximum water temperatures. Water temperature is not known to exceed water quality standards or harm beneficial uses outside of this time period because of cooler weather and lower sun angle.

## **5.5 Implementation Strategies**

Upon adoption of these TMDLs, implementation and evaluation should begin immediately using an adaptive management framework. The TMDL implementation timeline, strategic approach, responsible parties, and monitoring strategy are briefly summarized here. A discussion about pollutant trading is also included in this section. A TMDL implementation plan for this subbasin should be developed including more detailed recommendations for restoration and monitoring. Implementation strategies should be modified if monitoring shows that the TMDL goals are not being met or significant progress is not being made toward achieving the goals.

Implementation of these temperature TMDLs should incorporate the needed solar load reductions and target shade conditions using strategies that maximize shade from riparian vegetation. Land managers can utilize this analysis to identify stream segments with high excess solar loads and the largest shade deficits. Channel width also affects the amount of solar load that reaches the stream and could be addressed during TMDL implementation.

Within the overall load allocation for each AU, these TMDLs establish reach-specific allocations for solar loads at PNV condition. Some reaches are likely already reaching their target shade and solar loading rates. Other reaches have estimated shade deficits ranging from 2 to 88%. These locations can be prioritized for implementation activities including tree planting.

Lack of shade and excess solar loads can result from a variety of circumstances, including natural events, such as wildfire, and anthropogenic activities with varying degrees of permanency (e.g., paved roads compared to partial vegetation removal along recreational properties). Some of these conditions can be changed while others cannot, and implementation strategies must take these realities into account.

Water quality improvement projects for TMDL implementation should be combined with ongoing monitoring and evaluation to do the following:

- Verify assumptions and estimates used in the TMDL analysis. For example, estimates of existing shade made from aerial photographs should be field-verified using the Solar Pathfinder. Bank-full width estimates from regional curves can also be field-verified to refine estimates of existing solar loads.
- Monitor water quality trends including water temperature and overall support of beneficial uses. Water temperatures should be measured to evaluate trends and effects to aquatic life. Riparian vegetation, channel dimensions, and shade should be measured to detect trends and evaluate progress toward TMDL goals.
- Provide feedback on BMPs and water quality improvement projects to determine what practices are most effective and how they can best be employed to reach TMDL targets.
- Supply data for use in water body assessments during DEQ's preparation of the Integrated Report. Monitoring data meeting DEQ requirements can be used during this process to identify streams from this subbasin as either impaired due to excess water temperatures or as fully supporting beneficial uses and attaining TMDL water quality goals.
- Provide information useful during development and possible revisions of water quality standards.
- Inform the 5-year review process for the TMDL. DEQ will work with the WAG to review and reevaluate each TMDL within 5 years of its completion to accomplish the following:
  - Assess the water quality status of water bodies
  - Evaluate the criteria, instream targets, pollutant allocations, assumptions, and analyses upon which the TMDL was based
  - Evaluate the attainability of water quality standards and TMDL goals

## **Time Frame**

While some implementation strategies may exhibit immediate results in protecting and improving water temperatures, it may take decades for other strategies to take full effect. Planting vegetation and allowing vegetation to grow and mature are expected to be the primary approaches to implement these temperature TMDLs. It may take 10 years of plant growth to begin measuring significant increases in stream shade. The time it will take to meet the TMDL targets depends on the plant communities present and at PNV. The riparian plant communities along some streams are very close to achieving PNV shade targets and may attain water quality

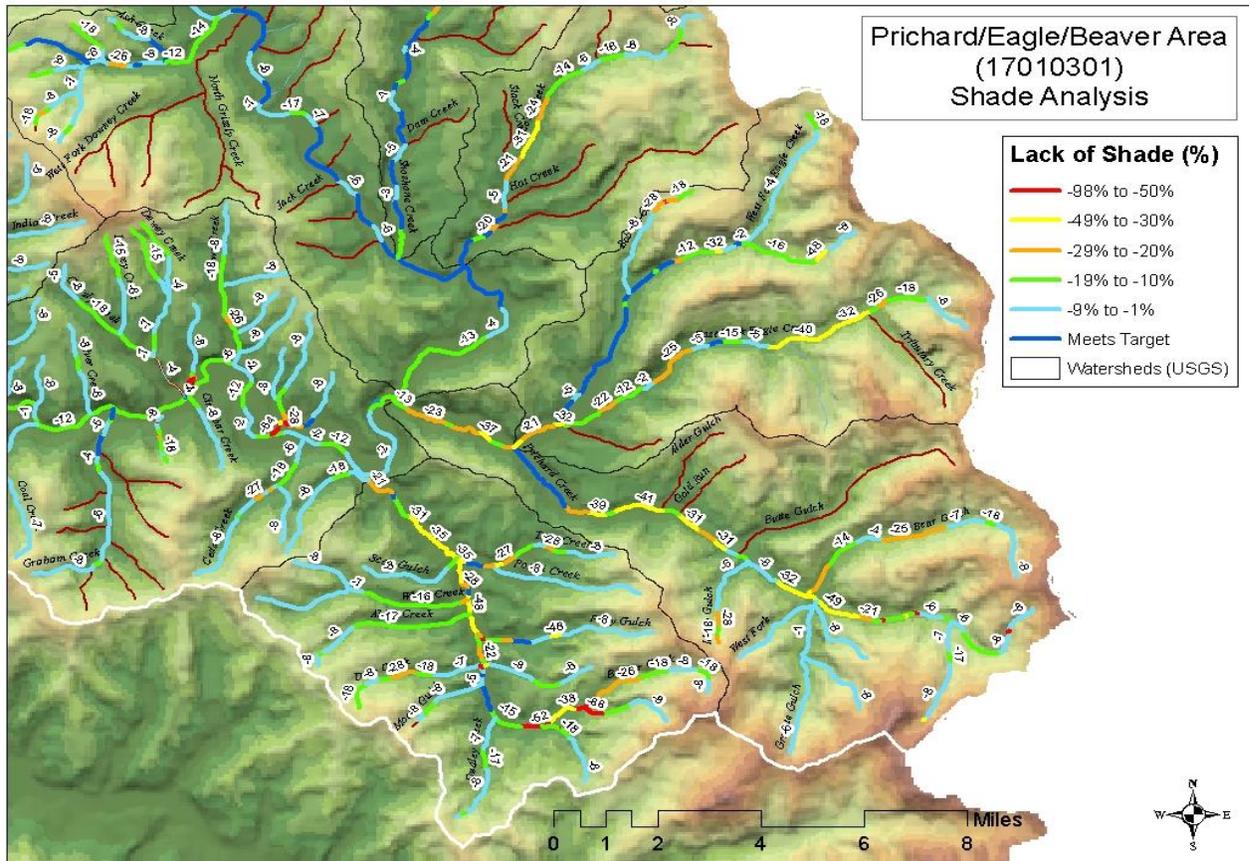
standards within the next 5 years. Other streams with a larger shade deficit may take 50 years to meet water quality standards. Progress will be evaluated during the 5-year review of the TMDL, and TMDL elements may be adjusted if necessary at that time.

### **Strategic Approach**

A TMDL implementation plan for this subbasin should be developed including more detailed recommendations for restoration and monitoring. However, water quality protection and restoration activities are already being implemented and should continue to be carried out even before completion of a formal TMDL implementation plan. Monitoring and evaluation will be an integral part of the process and should begin with field verification of estimated existing shade conditions and bank-full widths. The parameters used to estimate PNV shade and natural bank-full widths can also be refined with more specific data.

In developing restoration priorities related to these TMDLs focused on shade targets, each stream reach needs to be examined for possible corrective action. Restoration activities should be prioritized based on the departure from target conditions (i.e., shade deficit) on a reach-by-reach basis. Reach-specific improvements can result in valuable shade increases, and potential shade conditions should be met in each stream reach to ensure water quality standards are met.

Perhaps the most valuable tools for identifying shade improvement opportunities are the maps included in Appendix H. These maps identify color-coded shade deficits for each reach of the stream system analyzed. As an example, the map for the Prichard, Eagle, and Beaver Creeks watersheds is included here (Figure 23). Stream reaches indicated with red have shade deficits of 50–98%. These reaches may be identified as key restoration priorities during TMDL implementation.



**Figure 23. Shade deficits (percent lack of shade) in the Prichard Creek, Eagle Creek, and Beaver Creek drainages.**

Approved state BMPs listed in the Idaho water quality standards include those in the “Rules Pertaining to the Idaho Forest Practices Act,” “Rules Governing Exploration and Surface Mining in Idaho,” and “Dredge and Placer Mining Operations in Idaho” administered by IDL and the “Stream Channel Alteration Rules” administered by the Idaho Department of Water Resources (IDWR). These temperature TMDLs and shade targets should be considered in these programs to prevent additional stream impairments.

For example, the Idaho Forest Practices Act (FPA) administered by IDL is recognized in the Idaho water quality standards as containing approved BMPs for limiting nonpoint sources of pollution including the excess thermal loading addressed in these TMDLs. These practices especially apply to forest management on private lands and state endowment lands managed by IDL. Within the Upper (North Fork) Coeur d’Alene River subbasin, IDL manages approximately 7,400 acres in the lower part of the watershed, and private landowners own 23,007 acres.

Under the FPA, riparian protections are applied to stream protection zones depending on whether streams are used for domestic water supply or are important for fish spawning, rearing, or migration. Streams used for domestic water supply or important for fisheries are called Class I streams, and the stream protection zone is the area within a slope distance of 75 feet from the ordinary high water mark on each side of the stream. Class II streams are usually headwater streams or minor drainages used for spawning or rearing by few, if any, fish. Class II streams that are not used for domestic water supply or used by fish for spawning and rearing and that

contribute to Class I streams have a stream protection zone of 30 feet slope distance from the ordinary high water mark on each side of the stream. Class II streams that do not contribute to Class I streams must have undisturbed soils within at least a 5 feet slope distance from the ordinary high water mark on each side of the stream.

There are also a number of federal regulations and programs pertinent to these TMDLs. For example, the Inland Native Fish Strategy (INFISH) includes management directives for riparian areas designed to protect inland native fish species on lands managed by the USFS and BLM (USFS 1995). These directives include riparian management objectives (RMOs) that specify goals for riparian buffers and shade. Other pertinent federal programs include dredge and fill permitting by the Army Corps of Engineers and management plans associated with the Endangered Species Act by the US Fish and Wildlife Service. Waters from this subbasin are included in critical habitat designations for the threatened bull trout. Implementation of these TMDLs in coordination with recovery planning should help achieve water temperatures more suitable for bull trout.

Impoundments of water from beaver activity are considered a natural condition and are known to have many desired benefits for water quality and aquatic life. Although these areas can contribute to increased solar loads and increased temperature, they will be considered natural conditions for the purposes of this TMDL even if the resulting solar loading for a given interval does not match the load identified in the load analysis tables in Appendix F.

Increasing riparian shade and restoring natural channel widths are recommended as the primary activities for implementation of this temperature TMDL. However, the following additional strategies can be employed to maintain and improve coldwater habitats for fish and other aquatic organisms in the subbasin:

- Protect springs, headwaters, and other sources of cold water as well as cold water refugia in side-channel habitat. This strategy may be especially important in the larger streams of the system. In the lower North Fork Coeur d'Alene River mainstem, these areas were identified and illustrated by the thermal infrared imaging report (Watershed Sciences 2007).
- Consider enhancing cold water refugia and sources of cold water if needed and where appropriate.
- Retain and restore large wood and boulders in stream channels to encourage development of habitat complexity and deeper pools where aquatic life can access cooler water.
- Monitor the impacts of in-stream flows and water withdrawals on temperature.
- Remove barriers to aquatic organism passage where such reconnection does not pose unacceptable risks from nonnative species or genetic introgression. The removal of barriers may help
- Manage floodplains and wetlands to ensure hydrologic functions that protect cold water.
- Maintain existing shade and increase riparian shade by planting trees and shrubs.
- Follow Idaho water quality standards to minimize other sources of pollution and stressors to cold water aquatic life and salmonid spawning.
- Provide education about recommended practices to protect and restore water quality and cold water aquatic life.

## **Responsible Parties**

The main responsible parties for implementing this TMDL are DEQ and the USFS. DEQ is the designated agency for implementing the CWA in Idaho, including establishing water quality standards and TMDLs, and leading programs to control and abate pollution sources. The USFS is the manager of greater than 90% of the land area and most of the streams in the subbasin. As the subbasin's major land manager, the USFS has the opportunity and responsibility to incorporate these TMDLs into resource decisions for protection of water quality.

Other responsible parties for TMDL implementation include those state agencies identified as designated management agencies in state plans as required by federal (CWA §303(e)) and state (Idaho Code 39-3601) laws and defined in the water quality standards:

- IDL for timber harvest activities, oil and gas exploration and development, and mining activities
- Idaho Soil and Water Conservation Commission for grazing and agricultural activities
- Idaho Transportation Department for public road construction
- Idaho State Department of Agriculture for aquaculture
- DEQ for all other activities

DEQ enters into many interagency agreements with these designated management agencies and other parties to ensure intergovernmental cooperation in Idaho's water quality management program. Important government agency partners in the Upper (North Fork) Coeur d'Alene River subbasin will also include the Bureau of Land Management, USFWS, ACOE, Natural Resources Conservation Service, EPA, IDWR, Idaho Department of Fish and Game, and Shoshone County.

The water quality concerns addressed in these TMDLs cannot be solved by government agencies alone. Efforts by private landowners, nongovernmental organizations, and public-private partnerships are crucial to successful water quality improvements. Environmental protection and water quality improvement projects by private landowners will contribute greatly to improved river conditions. Partnerships with educational institutions like the University of Idaho and organizations like the North Idaho Fly Casters will also be vital to implementing these TMDLs. Numerous opportunities are available for partnerships, funding, and other assistance for work on private lands or with a public-private partnership.

The North Fork Coeur d'Alene River WAG has been instrumental in developing these TMDLs and will continue to provide a vital forum during TMDL implementation. This group combines government agency representatives, nongovernmental organizations, and private landowners to make water quality related decisions in the subbasin. The WAG will lead development of the TMDL implementation plan and its execution.

## **Reasonable Assurance**

All load allocations within this document are directed at nonpoint sources of pollution. On-the-ground actions designed to reduce pollutant loads will be completed through designated management agencies, agency partners, and citizen participation. DEQ's continued interaction with these groups will help ensure progress is made towards pollutant reductions. DEQ will inform these groups about water quality data, updated BMPs, and potential funding sources.

## Monitoring Strategy

Monitoring associated with these TMDLs should include a range of strategies. Monitoring that incorporates the elements of these TMDLs is likely to provide the most important and useful data when evaluating TMDL goals and attainment. These monitoring elements include aerial photographs, bank-full width and Solar Pathfinder shade measurements, and other information about the riparian plant community. Aerial photographs from the NAIP are updated periodically, available online, and can be useful tools to evaluate changing riparian conditions over time.

For DEQ's recommendations on measuring shade and bank-full width associated with PNV temperature TMDLs, see Shumar and De Varona (2009, 6–14). These recommendations are similar to the methods used to field-verify aerial photograph interpretations for this TMDL.

To adequately characterize the effective shade on a stream reach, DEQ recommends 10 Solar Pathfinder traces (photos) taken over systematic intervals (e.g., every 50 m or every 50 paces) within a single shade class category. Random samples can also be useful. Solar Pathfinder photographs should be collected following Solar Pathfinder user manual specifications. The beginning point for Solar Pathfinder monitoring should be selected at a unique location, such as 50 m from a bridge or fence line. Then, monitoring should proceed upstream or downstream collecting photographs at fixed intervals.

DEQ recommends measuring bank-full width, photographing the riparian vegetation and stream landscape, and recording the conditions of riparian vegetation (e.g., species present and dominant) at each Solar Pathfinder site. It may also be helpful to collect densiometer measurements of canopy cover. These data can potentially be used to develop a relationship between canopy cover and shade that could enable TMDL compliance monitoring by densiometer.

There are many publications and resources available to help inform monitoring associated with shade and temperature TMDLs. The Oregon Watershed Enhancement Board's *Water Quality Monitoring: Technical Guide Book* contains a chapter on stream shade and canopy cover monitoring methods that includes a comparison of the various methods and the advantages of each (OWEB 1999). The Idaho *2004 Interagency Forest Practices Water Quality Audit* contains information on shade and a comparison of canopy cover to shade measurements (DEQ 2007a, Appendix F). Another review of stream shade measurement techniques was completed by Teti and Pike (2005) in British Columbia.

In addition to monitoring the elements included in this TMDL load analysis, direct measurements of stream temperature will be valuable to evaluate trends and associated biological impacts. Strategic deployment of digital temperature data recorders can be a simple and inexpensive way to measure stream temperatures over time. DEQ has published a protocol for placement and retrieval of temperature data loggers in Idaho streams (Zaroban 2000). A user's guide to measuring stream temperatures with digital data loggers was published by the USFS (Dunham et al. 2005). New recommendations include long-term, year-round deployment of digital temperature data loggers (Isaak, Horan, and Wollrab 2010). These types of stream temperature data can be very useful for analyzing stream temperatures and biological impacts of temperature changes, and for developing stream temperature models.

Stream temperature models for predicting temperature and habitat suitability in Idaho are being developed and refined. For example, USFS Rocky Mountain Research Station scientists in Boise have developed a multiple regression stream temperature model based on thermograph records

and a simple set of geomorphic predictor variables ([http://www.fs.fed.us/rm/boise/AWAE/projects/stream\\_temperature.shtml](http://www.fs.fed.us/rm/boise/AWAE/projects/stream_temperature.shtml)). Models like this one could be very useful in temperature-related water body assessments, TMDLs, and TMDL implementation.

Aerial remote sensing as a monitoring tool can also provide very useful information about stream temperatures. In 2007, this approach was used to collect thermal infrared (TIR) imagery and LiDAR (light detection and ranging) data to map stream temperatures in the North Fork Coeur d'Alene River from Shoshone Creek to the mouth (Watershed Sciences 2007). This project yielded important information about temperature patterns, including springs and coldwater refugia. Related ongoing cooperation between USFS and IDFG to monitor fish populations and water temperatures could be important in implementing and evaluating these TMDLs.

In addition to stream temperature and shade monitoring, biological monitoring will be helpful to evaluate the effects of changing thermal conditions and ensure full support of cold water aquatic life and salmonid spawning beneficial uses. The primary biological monitoring by DEQ is the annual BURP sampling at sites on wadeable streams. This program collects data on fish, habitat, and macroinvertebrates for water body assessment purposes. Other biological monitoring by USFS, IDFG, and others, particularly related to fisheries, will be valuable in the future.

Adequate planning is important to ensure data quality appropriate for water body assessments. For more information, refer to the discussion of data tiers in DEQ's *Water Body Assessment Guidance* (Grafe et al. 2002). A sampling and analysis plan and quality assurance project plan should be adopted for water quality monitoring efforts. These should follow current monitoring and analysis guidance from EPA to ensure accurate and reliable results. Stream temperature monitoring, Solar Pathfinder measurements, and bank-full width measurements are recommended for all AUs in these TMDLs.

## **Pollutant Trading**

Pollutant trading, also known as water quality trading, is a voluntary contractual agreement to exchange pollutant load reductions between two parties. This formal trading program is included in Idaho water quality standards (IDAPA 58.01.02.055.06), and DEQ's policy is to allow pollutant trading as a means to meet TMDLs, thus restoring water quality limited water bodies to compliance with water quality standards. This policy is implemented through the *Water Quality Pollutant Trading Guidance* (DEQ 2010).

Pollutant trading can help solve surface water quality problems by focusing on cost-effective, local solutions. The practice is especially beneficial when pollutant sources face substantially different costs associated with pollutant load reduction. Typically, a party facing relatively high costs for pollutant load reduction compensates another party to achieve an equivalent, less-costly pollutant load reduction. Parties are likely to trade only if both benefit, and trading allows parties to decide how to best reduce pollutant loadings within the limits of certain requirements.

For pollutant trading to be authorized, it must be specifically mentioned within an EPA-approved TMDL document and a pollutant trading framework must be included in the TMDL implementation plan developed by DEQ and the WAG.

Pollutant trading is not likely to be applicable to these temperature TMDLs. The TMDLs are essentially set to natural background conditions. There are no NPDES-permitted point sources generating thermal loads, and no wasteload allocation is provided. In addition, pollutant trading

for temperature is not currently considered feasible due to the time required for vegetation growth and the lengthy lag time between planting and the development of significant shade. However, pollutant trading should be considered a potential tool for these TMDLs in the future if it can be carried out in accordance with Idaho water quality standards.

### 5.6 Public Participation

Public participation was a vital component of completing these temperature TMDLs and was primarily accomplished by convening a North Fork Coeur d'Alene River WAG. The WAG first convened in 2007 and met every month or two to guide data collection and assessments, review and comment on TMDL development, plan and implement TMDLs, and work toward water quality improvements within the Upper (North Fork) Coeur d'Alene River subbasin. A total of 41 meetings were held from 2007 through 2012 during development of these TMDLs. All WAG meetings were open to the public and most were held in the USDA Forest Service office in Smelterville. Meeting agendas, meeting notes, and copies of handouts and presentations are available on the WAG website at <http://www.deq.idaho.gov/north-fork-cda-river-subbasin-wag>. Following the public comment period on this draft addendum, a distribution list and response to public comments will be provided in Appendices I and J, respectively.

### 5.7 Conclusions

This document addresses water temperature conditions in the streams and rivers of the Upper (North Fork) Coeur d'Alene River subbasin and establishes temperature TMDLs for 54 AUs with water temperatures in excess of Idaho's water quality standards.

The full assessment found 54 AUs exceeding Idaho's water quality standards and recommended changes to the Integrated Report based on these findings (Table 9). Of these AUs, 31 were listed as impaired by temperature in the 2008 Integrated Report (DEQ 2009). An additional 23 AUs were listed as impaired by temperature in the 2010 Integrated Report, and 3 were delisted due to lack of temperature data (DEQ 2011). Load allocations are established for 54 AUs, and no wasteload allocations are made.

**Table 9. Summary of temperature assessment outcomes for all 79 assessment units.**

| Assessment Unit Number | Assessment Unit Name   | TMDL(s) Completed | Recommended Changes to §303(d) List             | Justification  |
|------------------------|--|-------------------|---|--|
| ID17010301PN001_02     | North Fork Coeur d'Alene River tributaries below Prichard Creek                  | Yes               | Listed Category 5 in 2010. Move to Category 4a. | USFS data exceeded SS criteria. Excess solar load from lack of shade.          |
| ID17010301PN001_02a    | North Fork Coeur d'Alene River tributaries between Yellowdog and Prichard Creeks | No                | Temperature not assessed.                       | No temperature data available.   |
| ID17010301PN001_05     | North Fork Coeur d'Alene River below Prichard Creek                              | Yes               | Move to Category 4a.                            | USFS data exceeded SS and CWAL criteria. Excess solar load from lack of shade. |
| ID17010301PN001_05a    | North Fork Coeur d'Alene River between Yellowdog and Prichard Creeks             | Yes               | Move to Category 4a.                            | USFS data exceeded SS and CWAL criteria. Excess solar load from lack of shade. |
| ID17010301PN002_02     | Graham Creek headwaters and tributaries  | No                | Temperature not assessed.                       | No temperature data available.   |

Upper (North Fork) Coeur d'Alene River Temperature TMDL Addendum

| Assessment Unit Number | Assessment Unit Name   | TMDL(s) Completed | Recommended Changes to §303(d) List             | Justification  |
|------------------------|--|-------------------|---|--|
| ID17010301PN002_03     | Graham Creek below Deceitful Gulch                             | Yes               | Move to Category 4a.                            | DEQ data exceeded SS criteria. Excess solar load from lack of shade.             |
| ID17010301PN003_02     | Beaver Creek headwaters and tributaries                        | Yes               | Move to Category 4a.                            | USFS data exceeded SS criteria. Excess solar load from lack of shade.            |
| ID17010301PN003_03     | Beaver Creek below White Creek                                 | Yes               | Move to Category 4a.                            | DEQ and USFS data exceeded SS criteria. Excess solar load from lack of shade.    |
| ID17010301PN004_02     | Prichard Creek tributaries between Butte Gulch and Eagle Creek | No                | Temperature not assessed.                       | No temperature data available.   |
| ID17010301PN004_03     | Prichard Creek between Butte Gulch and Eagle Creek             | No                | Delisted in 2010. Temperature not assessed.     | No temperature data available.   |
| ID17010301PN004_04     | Prichard Creek below Eagle Creek                               | Yes               | Move to Category 4a.                            | DEQ and USFS data exceeded SS criteria. Excess solar load from lack of shade.    |
| ID17010301PN005_02     | Prichard Creek headwaters and tributaries above Butte Gulch    | Yes               | Move to Category 4a.                            | DEQ and USFS data exceeded SS criteria. Excess solar load from lack of shade.    |
| ID17010301PN005_03     | Prichard Creek between Barton Gulch and Butte Gulch            | No                | Delisted in 2010. Temperature not assessed.     | No temperature data available.   |
| ID17010301PN006_02     | Butte Gulch  | No                | Temperature not assessed.                       | No temperature data available.   |
| ID17010301PN007_02     | East Fork Eagle Creek and tributaries                          | No                | Temperature not assessed.                       | No temperature data available.   |
| ID17010301PN007_03     | Eagle Creek  | No                | Temperature not assessed.                       | No temperature data available.   |
| ID17010301PN008_02     | West Fork Eagle Creek and tributaries                          | Yes               | Move to Category 4a.                            | DEQ and USFS data exceeded SS criteria. Excess solar load from lack of shade.    |
| ID17010301PN009_02     | Lost Creek headwaters and tributaries                          | No                | Temperature not assessed.                       | No temperature data available.   |
| ID17010301PN009_03     | Lost Creek below East Fork Lost Creek                          | Yes               | Move to Category 4a.                            | DEQ data exceeded SS criteria. Excess solar load from lack of shade.             |
| ID17010301PN010_02     | Shoshone Creek tributaries below Falls Creek                   | No                | Temperature not assessed.                       | No temperature data available.   |
| ID17010301PN010_03     | Shoshone Creek below Falls Creek                               | Yes               | Listed Category 5 in 2010. Move to Category 4a. | USFS data exceeded SS and CWAL criteria. Excess solar load from lack of shade.   |
| ID17010301PN011_02     | Falls Creek and tributaries                                    | Yes               | Listed Category 5 in 2010. Move to Category 4a. | USFS data exceeded SS and EPA BT criteria. Excess solar load from lack of shade. |

Upper (North Fork) Coeur d'Alene River Temperature TMDL Addendum

| Assessment Unit Number | Assessment Unit Name  | TMDL(s) Completed | Recommended Changes to §303(d) List                | Justification   |
|------------------------|---|-------------------|--|---|
| ID17010301PN012_02     | Shoshone Creek headwaters and tributaries above Falls Creek                   | Yes               | Listed Category 5 in 2010.<br>Move to Category 4a. | USFS data exceeded SS criteria.<br>Excess solar load from lack of shade.            |
| ID17010301PN012_03     | Shoshone Creek between Little Lost Fork and Falls Creek                       | Yes               | Listed Category 5 in 2010.<br>Move to Category 4a. | USFS data exceeded SS and EPA BT criteria.<br>Excess solar load from lack of shade. |
| ID17010301PN013_02     | North Fork Coeur d'Alene River tributaries between Tepee and Yellowdog Creeks | Yes               | Listed Category 5 in 2010.<br>Move to Category 4a. | USFS data exceeded SS and EPA BT criteria.<br>Excess solar load from lack of shade. |
| ID17010301PN013_02a    | North Fork Coeur d'Alene River tributaries between Jordan and Tepee Creeks    | No                | Temperature not assessed.                          | No temperature data available.  |
| ID17010301PN013_04     | North Fork Coeur d'Alene River between Jordan and Tepee Creeks                | Yes               | Listed Category 5 in 2010.<br>Move to Category 4a. | USFS data exceeded SS and EPA BT criteria.<br>Excess solar load from lack of shade. |
| ID17010301PN013_05     | North Fork Coeur d'Alene River between Tepee and Yellowdog Creeks             | Yes               | Move to Category 4a.                               | USFS data exceeded SS criteria.<br>Excess solar load from lack of shade.            |
| ID17010301PN014_02     | Jordan Creek headwaters and tributaries                                       | No                | Temperature not assessed.                          | No temperature data available.  |
| ID17010301PN014_02a    | Cub Creek   | No                | Temperature not assessed.                          | No temperature data available.  |
| ID17010301PN014_02b    | Calamity Creek  | No                | Temperature not assessed.                          | No temperature data available.  |
| ID17010301PN014_03     | Jordan Creek and Lower Lost Fork  | Yes               | Listed Category 5 in 2010.<br>Move to Category 4a. | USFS data exceeded SS criteria.<br>Excess solar load from lack of shade.            |
| ID17010301PN015_02     | North Fork Coeur d'Alene River, upper, headwaters and tributaries             | Yes               | Move to Category 4a.                               | DEQ and USFS data exceeded SS criteria.<br>Excess solar load from lack of shade.    |
| ID17010301PN015_03     | North Fork Coeur d'Alene River, upper, and lower Buckskin Creek               | Yes               | Move to Category 4a.                               | DEQ and USFS data exceeded SS criteria.<br>Excess solar load from lack of shade.    |
| ID17010301PN015_04     | North Fork Coeur d'Alene River between Buckskin and Jordan Creeks             | Yes               | Move to Category 4a.                               | USFS data exceeded SS criteria.<br>Excess solar load from lack of shade.            |
| ID17010301PN016_02     | West Elk Creek and Cataract Creek   | Yes               | Listed Category 5 in 2010.<br>Move to Category 4a. | USFS data exceeded SS criteria.<br>Excess solar load from lack of shade.            |
| ID17010301PN017_02     | Tepee Creek tributaries below Trail Creek                                     | No                | Temperature not assessed.                          | No temperature data available.  |
| ID17010301PN017_04     | Tepee Creek between Trail Creek and Independence Creek                        | Yes               | Move to Category 4a.                               | USFS data exceeded SS criteria.<br>Excess solar load from lack of shade.            |

Upper (North Fork) Coeur d'Alene River Temperature TMDL Addendum

| Assessment Unit Number | Assessment Unit Name                                    | TMDL(s) Completed | Recommended Changes to §303(d) List                | Justification   |
|------------------------|---|-------------------|--|---|
| ID17010301PN017_05     | Tepee Creek below Independence Creek                    | Yes               | Move to Category 4a.                               | USFS data exceeded SS criteria.<br>Excess solar load from lack of shade.          |
| ID17010301PN018_02     | Independence Creek headwaters and tributaries           | Yes               | Listed Category 5 in 2010.<br>Move to Category 4a. | USFS data exceeded SS criteria.<br>Excess solar load from lack of shade.          |
| ID17010301PN018_03     | Independence Creek between Ellis and Declaration Creeks | No                | Delisted in 2010.<br>Temperature not assessed.     | No temperature data available.  |
| ID17010301PN018_03a    | Declaration Creek, lower                                | Yes               | Move to Category 4a.                               | USFS data exceeded SS criteria.<br>Excess solar load from lack of shade.          |
| ID17010301PN018_03b    | Snow Creek, lower                                       | Yes               | Move to Category 4a.                               | USFS data exceeded SS criteria.<br>Excess solar load from lack of shade.          |
| ID17010301PN018_04     | Independence Creek below Declaration Creek              | Yes               | Listed Category 5 in 2010.<br>Move to Category 4a. | USFS data exceeded SS and CWAL criteria.<br>Excess solar load from lack of shade. |
| ID17010301PN019_02     | Trail Creek headwaters and tributaries                  | Yes               | Listed Category 5 in 2010.<br>Move to Category 4a. | USFS data exceeded SS criteria.<br>Excess solar load from lack of shade.          |
| ID17010301PN019_03     | Trail Creek below Stewart Creek                         | Yes               | Move to Category 4a.                               | DEQ and USFS data exceeded SS criteria.<br>Excess solar load from lack of shade.  |
| ID17010301PN020_02     | Tepee Creek headwaters and tributaries                  | Yes               | Listed Category 5 in 2010.<br>Move to Category 4a. | USFS data exceeded SS criteria.<br>Excess solar load from lack of shade.          |
| ID17010301PN020_03     | Tepee Creek between Short Creek and Trail Creek         | Yes               | Move to Category 4a.                               | DEQ and USFS data exceeded SS criteria.<br>Excess solar load from lack of shade.  |
| ID17010301PN021_02     | Brett Creek and tributaries                             | Yes               | Listed Category 5 in 2010.<br>Move to Category 4a. | USFS data exceeded SS criteria.<br>Excess solar load from lack of shade.          |
| ID17010301PN022_02     | Miners Creek and tributaries                            | Yes               | Listed Category 5 in 2010.<br>Move to Category 4a. | USFS data exceeded SS criteria.<br>Excess solar load from lack of shade.          |
| ID17010301PN023_02     | Flat Creek headwaters and tributaries                   | No                | Temperature not assessed.                          | No temperature data available.  |
| ID17010301PN023_03     | Flat Creek, lower                                       | Yes               | Listed Category 5 in 2010.<br>Move to Category 4a. | USFS data exceeded SS criteria.<br>Excess solar load from lack of shade.          |
| ID17010301PN024_02     | Yellowdog Creek and tributaries                         | Yes               | Listed Category 5 in 2010.<br>Move to Category 4a. | USFS data exceeded SS criteria.<br>Excess solar load from lack of shade.          |

Upper (North Fork) Coeur d'Alene River Temperature TMDL Addendum

| Assessment Unit Number | Assessment Unit Name  | TMDL(s) Completed | Recommended Changes to §303(d) List             | Justification  |
|------------------------|---|-------------------|---|--|
| ID17010301PN025_02     | Downey Creek headwaters and tributaries   | No                | Temperature not assessed.                       | No temperature data available.   |
| ID17010301PN025_03     | Downey Creek, lower   | No                | Temperature not assessed.                       | No temperature data available.   |
| ID17010301PN026_02     | Brown Creek and tributaries   | Yes               | Listed Category 5 in 2010. Move to Category 4a. | USFS data exceeded SS and EPA BT criteria. Excess solar load from lack of shade. |
| ID17010301PN027_03     | Grizzly Creek, below Dewey Creek  | No                | Temperature not assessed.                       | No temperature data available.   |
| ID17010301PN028_02     | Steamboat Creek headwaters and tributaries  | Yes               | Listed Category 5 in 2010. Move to Category 4a. | USFS data exceeded SS criteria. Excess solar load from lack of shade.            |
| ID17010301PN028_03     | Steamboat Creek and West Fork Steamboat Creek below Comfy Creek                       | Yes               | Move to Category 4a.                            | DEQ and USFS data exceeded SS criteria. Excess solar load from lack of shade.    |
| ID17010301PN029_02     | Cougar Gulch headwaters and tributaries   | No                | Temperature not assessed.                       | No temperature data available.   |
| ID17010301PN029_03     | Cougar Gulch below East Fork Cougar Gulch   | Yes               | List Category 5 in 2010. Move to Category 4a.   | USFS data exceeded SS criteria. Excess solar load from lack of shade.            |
| ID17010301PN030_02     | Little North Fork Coeur d'Alene River tributaries to Solitaire Creek                  | No                | Temperature not assessed.                       | No temperature data available.   |
| ID17010301PN030_02a    | Little North Fork Coeur d'Alene River tributaries above Iron Creek                    | Yes               | Listed Category 5 in 2010. Move to Category 4a. | USFS data exceeded SS criteria. Excess solar load from lack of shade.            |
| ID17010301PN030_02b    | Hudlow Creek and tributaries  | No                | Temperature not assessed.                       | No temperature data available.   |
| ID17010301PN030_02c    | Little North Fork Coeur d'Alene River tributaries between Hudlow and Deception Creeks | Yes               | Move to Category 4a.                            | DEQ data exceeded SS criteria. Excess solar load from lack of shade.             |
| ID17010301PN030_02d    | Little North Fork Coeur d'Alene River tributaries below Skookum                       | Yes               | Move to Category 4a.                            | DEQ data exceeded SS criteria. Excess solar load from lack of shade.             |
| ID17010301PN030_03     | Little North Fork Coeur d'Alene River between Solitaire and Skookum Creeks            | Yes               | Move to Category 4a.                            | USFS data exceeded SS criteria. Excess solar load from lack of shade.            |
| ID17010301PN030_04     | Little North Fork Coeur d'Alene River below Skookum Creek                             | Yes               | Move to Category 4a.                            | USFS data exceeded SS and CWAL criteria. Excess solar load from lack of shade.   |
| ID17010301PN031_02     | Bumblebee Creek and tributaries   | Yes               | Move to Category 4a.                            | DEQ data exceeded SS criteria. Excess solar load from lack of shade.             |
| ID17010301PN032_02     | Laverne Creek and tributaries   | Yes               | Move to Category 4a.                            | DEQ and USFS data exceeded SS criteria. Excess solar load from lack of shade.    |

| Assessment Unit Number | Assessment Unit Name                     | TMDL(s) Completed | Recommended Changes to §303(d) List             | Justification   |
|------------------------|--|-------------------|---|---|
| ID17010301PN033_02     | Leiberg Creek and tributaries            | Yes               | Move to Category 4a.                            | DEQ data exceeded SS criteria. Excess solar load from lack of shade.          |
| ID17010301PN034_02     | Bootjack Creek and tributaries           | Yes               | Move to Category 4a.                            | DEQ data exceeded SS criteria. Excess solar load from lack of shade.          |
| ID17010301PN035_02     | Iron Creek and tributaries               | Yes               | Listed Category 5 in 2010. Move to Category 4a. | USFS data exceeded SS criteria. Excess solar load from lack of shade.         |
| ID17010301PN036_02     | Burnt Cabin Creek and tributaries        | Yes               | Move to Category 4a.                            | DEQ and USFS data exceeded SS criteria. Excess solar load from lack of shade. |
| ID17010301PN037_02     | Deception Creek and tributaries          | Yes               | Move to Category 4a.                            | DEQ data exceeded SS criteria. Excess solar load from lack of shade.          |
| ID17010301PN038_02     | Skookum Creek headwaters and tributaries | No                | Temperature not assessed.                       | No temperature data available.  |
| ID17010301PN038_03     | Skookum Creek, lower                     | Yes               | Listed Category 5 in 2010. Move to Category 4a. | DEQ data exceeded SS criteria. Excess solar load from lack of shade.          |
| ID17010301PN039_02     | Copper Creek headwaters and tributaries  | No                | Temperature not assessed.                       | No temperature data available.  |
| ID17010301PN039_03     | Copper Creek, lower                      | Yes               | Move to Category 4a.                            | DEQ data exceeded SS criteria. Excess solar load from lack of shade.          |

*Note:* US Forest Service (USFS); salmonid spawning (SS); cold water aquatic life (CWAL); US Environmental Protection Agency (EPA); bull trout (BT)

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## ***GIS Coverages***

Restriction of liability: Neither the State of Idaho nor the Idaho Department of Environmental Quality, nor any of their employees make any warranty, express or implied, or assume any legal liability or responsibility for the accuracy, completeness or usefulness of any information or data provided. Metadata is provided for all data sets, and no data should be used without first reading and understanding its limitations. The data could include technical inaccuracies or typographical errors. The Idaho Department of Environmental Quality may update, modify, or revise the data used at any time, without notice.

## Glossary

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### §305(b)

Refers to section 305 subsection “b” of the Clean Water Act. The term “305(b)” generally describes a report of each state’s water quality and is the principle means by which the US Environmental Protection Agency, Congress, and the public evaluate whether US waters meet water quality standards, the progress made in maintaining and restoring water quality, and the extent of the remaining problems.

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### §303(d)

Refers to section 303 subsection “d” of the Clean Water Act. Section 303(d) requires states to develop a list of water bodies that do not meet water quality standards. This section also requires total maximum daily loads (TMDLs) be prepared for listed waters. Both the list and the TMDLs are subject to US Environmental Protection Agency approval.

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### Ambient

General conditions in the environment (Armantrout 1998). In the context of water quality, ambient waters are those representative of general conditions, not associated with episodic perturbations or specific disturbances such as a wastewater outfall (EPA 1996).

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### Anthropogenic

Relating to, or resulting from, the influence of human beings on nature.

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### Aquatic

Occurring, growing, or living in water.

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### Assemblage (aquatic)

An association of interacting populations of organisms in a given water body; for example, a fish assemblage or a benthic macroinvertebrate assemblage (also see Community) (EPA 1996).

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### Assessment Unit (AU)

A segment of a water body that is treated as a homogenous unit, meaning that any designated uses, the rating of these uses, and any associated causes and sources must be applied to the entirety of the unit.

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### Beneficial Use

Any of the various uses of water, including, but not limited to, aquatic life, recreation, water supply, wildlife habitat, and aesthetics, which are recognized in water quality standards.

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**Beneficial Use Reconnaissance Program (BURP)**

A program for conducting systematic biological and physical habitat surveys of water bodies in Idaho. BURP protocols address lakes, reservoirs, and wadeable streams and rivers.

**Benthic**

Pertaining to or living on or in the bottom sediments of a water body.

**Best Management Practices (BMPs)**

Structural, nonstructural, and managerial techniques that are effective and practical means to control nonpoint source pollutants.

**Biological Integrity**

1) The condition of an aquatic community inhabiting unimpaired water bodies of a specified habitat as measured by an evaluation of multiple attributes of the aquatic biota (EPA 1996). 2) The ability of an aquatic ecosystem to support and maintain a balanced, integrated, adaptive community of organisms having a species composition, diversity, and functional organization comparable to the natural habitats of a region (Karr 1991).

**Biota**

The animal and plant life of a given region.

**Clean Water Act (CWA)**

The Federal Water Pollution Control Act (commonly known as the Clean Water Act), as last reauthorized by the Water Quality Act of 1987, establishes a process for states to develop information on, and control the quality of, the nation's water resources.

**Community**

A group of interacting organisms living together in a given place.

**Criteria**

In the context of water quality, numeric or descriptive factors taken into account in setting standards for various pollutants. These factors are used to determine limits on allowable concentration levels and to limit the number of violations per year. The US Environmental Protection Agency develops criteria guidance; states establish criteria.

**Designated Uses**

Those water uses identified in state water quality standards that must be achieved and maintained as required under the Clean Water Act.

**Discharge**

The amount of water flowing in the stream channel at the time of measurement. Usually expressed as cubic feet per second (cfs).

**Disturbance**

Any event or series of events that disrupts ecosystem, community, or population structure and alters the physical environment.

**Ecosystem**

The interacting system of a biological community and its nonliving (abiotic) environmental surroundings.

**Endangered Species**

Animals, birds, fish, plants, or other living organisms threatened with imminent extinction. Requirements for declaring a species as endangered are contained in the Endangered Species Act.

**Environment**

The complete range of external conditions, physical and biological, that affect a particular organism or community.

**Erosion**

The wearing away of areas of the earth's surface by water, wind, ice, and other forces.

**Exceedance**

A violation (according to DEQ policy) of the pollutant levels permitted by water quality criteria.

**Existing Beneficial Use or Existing Use**

A beneficial use actually attained in waters on or after November 28, 1975, whether or not the use is designated for the waters in Idaho's "Water Quality Standards" (IDAPA 58.01.02).

**Flow**

See Discharge.

**Fully Supporting**

In compliance with water quality standards and within the range of biological reference conditions for all designated and existing beneficial uses as determined through the *Water Body Assessment Guidance* (Grafe et al. 2002).

**Fully Supporting Cold Water**

Reliable data indicate functioning, sustainable coldwater biological assemblages (e.g., fish, macroinvertebrates, or algae), none of which have been modified significantly beyond the natural range of reference conditions.

**Geographic Information Systems (GIS)**

A georeferenced database.

**Gradient**

The slope of the land, water, or streambed surface.

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**Ground Water**

Water found beneath the soil surface saturating the layer in which it is located. Most ground water originates as rainfall, is free to move under the influence of gravity, and usually emerges again as streamflow.

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**Growth Rate**

A measure of how quickly something living will develop and grow, such as the amount of new plant or animal tissue produced per a given unit of time or number of individuals added to a population.

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**Habitat**

The living place of an organism or community.

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**Headwater**

The origin or beginning of a stream.

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**Hydrologic Basin**

The area of land drained by a river system, a reach of a river and its tributaries in that reach, a closed basin, or a group of streams forming a drainage area (also see Watershed).

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**Hydrologic Unit**

One of a nested series of numbered and named watersheds arising from a national standardization of watershed delineation. The initial 1974 effort (USGS 1987) described four levels (region, subregion, accounting unit, cataloging unit) of watersheds throughout the United States. The fourth level is uniquely identified by an eight-digit code built of two-digit fields for each level in the classification. Originally termed a cataloging unit, 4th-field hydrologic units have been more commonly called subbasins; 5th- and 6th-field hydrologic units have since been delineated for much of the country and are known as watershed and subwatersheds, respectively.

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**Hydrologic Unit Code (HUC)**

The number assigned to a hydrologic unit. Often used to refer to 4th-field hydrologic units.

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**Instantaneous**

A condition or measurement at a moment (instant) in time.

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**Key Watershed**

A watershed that has been designated in former Idaho Governor Phil Batt's State of Idaho Bull Trout Conservation Plan (1996) as critical to the long-term persistence of regionally important trout populations.

**Limiting Factor**

A chemical or physical condition that determines the growth potential of an organism. This can result in a complete inhibition of growth, but typically results in less than maximum growth rates.

**Load Allocation (LA)**

A portion of a water body's load capacity for a given pollutant that is given to a particular nonpoint source (by class, type, or geographic area).

**Load(ing)**

The quantity of a substance entering a receiving stream, usually expressed in pounds or kilograms per day or tons per year. Loading is the product of flow (discharge) and concentration.

**Load Capacity (LC)**

How much pollutant a water body can receive over a given period without causing violations of state water quality standards. Upon allocation to various sources, a margin of safety, and natural background contributions, it becomes a total maximum daily load.

**Macroinvertebrate**

An invertebrate animal (without a backbone) large enough to be seen without magnification and retained by a 500 micrometer mesh (U.S. #30) screen.

**Margin of Safety (MOS)**

An implicit or explicit portion of a water body's load capacity set aside to allow the uncertainty about the relationship between the pollutant loads and the quality of the receiving water body. This is a required component of a total maximum daily load (TMDL) and is often incorporated into conservative assumptions used to develop the TMDL (generally within the calculations and/or models). The MOS is not allocated to any sources of pollution.

**Mean**

Describes the central tendency of a set of numbers. The arithmetic mean (calculated by adding all items in a list, then dividing by the number of items) is the statistic most familiar to most people.

**Median**

The middle number in a sequence of numbers (e.g., 4 is the median of 1, 2, 4, 14, 16). If there is an even number of numbers, the median is the average of the two middle numbers. For example, 6 is the median of 1, 2, 5, 7, 9, 11.

**Metric**

1) A discrete measure of something, such as an ecological indicator (e.g., number of distinct taxon). 2) The metric system of measurement.

**Milligrams per Liter (mg/L)**

A unit of measure for concentration. In water, it is essentially equivalent to parts per million (ppm).

**Monitoring**

A periodic or continuous measurement of the properties or conditions of some medium of interest, such as monitoring a water body.

**Mouth**

The location where flowing water enters into a larger water body.

**National Pollutant Discharge Elimination System (NPDES)**

A national program established by the Clean Water Act for permitting point sources of pollution. Discharge of pollution from point sources is not allowed without a permit.

**Natural Condition**

The condition that exists with little or no anthropogenic influence.

**Nonpoint Source**

A dispersed source of pollutants, generated from a geographical area when pollutants are dissolved or suspended in runoff and then delivered into waters of the state. Nonpoint sources are without a discernable point or origin. They include, but are not limited to, irrigated and nonirrigated lands used for grazing, crop production, and silviculture; rural roads; construction and mining sites; log storage or rafting; and recreation sites.

**Not Assessed (NA)**

A concept and an assessment category describing water bodies that have been studied but are missing critical information needed to complete an assessment.

**Not Fully Supporting**

Not in compliance with water quality standards or not within the range of biological reference conditions for any beneficial use as determined through the *Water Body Assessment Guidance* (Grafe et al. 2002).

**Not Fully Supporting Cold Water**

At least one biological assemblage has been significantly modified beyond the natural range of its reference condition.

**Parameter**

A variable, measurable property whose value is a determinant of the characteristics of a system (e.g., temperature, dissolved oxygen, and fish populations are parameters of a stream or lake).

**Point Source**

A source of pollutants characterized by having a discrete conveyance, such as a pipe, ditch, or other identifiable “point” of discharge into a receiving water. Common point sources of pollution are industrial and municipal wastewater.

**Pollutant**

Generally, any substance introduced into the environment that adversely affects the usefulness of a resource or the health of humans, animals, or ecosystems.

**Pollution**

A very broad concept that encompasses human-caused changes in the environment that alter the functioning of natural processes and produce undesirable environmental and health effects. This includes human-induced alteration of the physical, biological, chemical, and radiological integrity of water and other media.

**Population**

A group of interbreeding organisms occupying a particular space; the number of humans or other living creatures in a designated area.

**Protocol**

A series of formal steps for conducting a test or survey.

**Quality Assurance (QA)**

A program organized and designed to provide accurate and precise results. Included are the selection of proper technical methods, tests, or laboratory procedures; sample collection and preservation; the selection of limits; data evaluation; quality control; and personnel qualifications and training (Rand 1995). The goal of QA is to ensure the data provided are of the quality needed and claimed (EPA 1996).

**Quality Control (QC)**

Routine application of specific actions required to provide information for the quality assurance program. Included are standardization, calibration, and replicate samples (Rand 1995). QC is implemented at the field or bench level (EPA 1996).

**Reach**

A stream section with fairly homogenous physical characteristics.

**Reconnaissance**

An exploratory or preliminary survey of an area.

**Reference**

A physical or chemical quantity whose value is known and thus is used to calibrate or standardize instruments.

**Reference Condition**

1) A condition that fully supports applicable beneficial uses with little effect from human activity and represents the highest level of support attainable. 2) A benchmark for populations of aquatic ecosystems used to describe desired conditions in a biological assessment and acceptable or unacceptable departures from them. The reference condition can be determined through examining regional reference sites, historical conditions, quantitative models, and expert judgment (Hughes 1995).

**Reference Site**

A specific locality on a water body that is minimally impaired and is representative of reference conditions for similar water bodies.

**Resident**

Describes fish that do not migrate.

**Riparian**

Associated with aquatic (stream, river, lake) habitats. Living or located on the bank of a water body.

**River**

A large, natural, or human-modified stream that flows in a defined course or channel or in a series of diverging and converging channels.

**Runoff**

The portion of rainfall, melted snow, or irrigation water that flows across the surface, through shallow underground zones (interflow), and through ground water to create streams.

**Sediments**

Deposits of fragmented materials from weathered rocks and organic material that were suspended in, transported by, and eventually deposited by water or air.

**Species**

1) A reproductively isolated aggregate of interbreeding organisms having common attributes and usually designated by a common name. 2) An organism belonging to such a category.

**Spring**

Ground water seeping out of the earth where the water table intersects the ground surface.

**Stream**

A natural water course containing flowing water, at least part of the year. Together with dissolved and suspended materials, a stream normally supports communities of plants and animals within the channel and the riparian vegetation zone.

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**Stream Order**

Hierarchical ordering of streams based on the degree of branching. A 1st-order stream is an unforked or unbranched stream. Under Strahler's (1957) system, higher-order streams result from the joining of two streams of the same order.

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**Stormwater Runoff**

Rainfall that quickly runs off the land after a storm. In developed watersheds, the water flows off roofs and pavement into storm drains that may feed quickly and directly into the stream. The water often carries pollutants picked up from these surfaces.

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**Stressors**

Physical, chemical, or biological entities that can induce adverse effects on ecosystems or human health.

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**Subbasin**

A large watershed of several hundred thousand acres. This is the name commonly given to 4th-field hydrologic units (also see Hydrologic Unit).

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**Subbasin Assessment (SBA)**

A watershed-based problem assessment that is the first step in developing a total maximum daily load in Idaho.

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**Subwatershed**

A smaller watershed area delineated within a larger watershed, often for purposes of describing and managing localized conditions. Also proposed for adoption as the formal name for 6th-field hydrologic units.

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**Surface Runoff**

Precipitation, snowmelt, or irrigation water in excess of what can infiltrate the soil surface and be stored in small surface depressions; a major transporter of nonpoint source pollutants in rivers, streams, and lakes. Surface runoff is also called overland flow.

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**Surface Water**

All water naturally open to the atmosphere (rivers, lakes, reservoirs, streams, impoundments, seas, estuaries, etc.) and all springs, wells, or other collectors that are directly influenced by surface water.

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**Threatened Species**

Species, determined by the US Fish and Wildlife Service, that are likely to become endangered within the foreseeable future throughout all or a significant portion of their range.

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**Total Maximum Daily Load (TMDL)**

A TMDL is a water body's load capacity after it has been allocated among pollutant sources. It can be expressed on a time basis other than daily if appropriate. Sediment loads, for example, are often calculated on an annual basis. A TMDL is equal to the load capacity, such that  $\text{load capacity} = \text{margin of safety} + \text{natural background} + \text{load allocation} + \text{wasteload allocation} = \text{TMDL}$ . In common usage, a TMDL also refers to the written document that contains the statement of loads and supporting analyses, often incorporating TMDLs for several water bodies and/or pollutants within a given watershed.

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**Tributary**

A stream feeding into a larger stream or lake.

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**Turbidity**

A measure of the extent to which light passing through water is scattered by fine suspended materials. The effect of turbidity depends on the size of the particles (the finer the particles, the greater the effect per unit weight) and the color of the particles.

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**Wasteload Allocation (WLA)**

The portion of receiving water's loading capacity that is allocated to one of its existing or future point sources of pollution. Wasteload allocations specify how much pollutant each point source may release to a water body.

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**Water Body**

A stream, river, lake, estuary, coastline, or other water feature, or portion thereof.

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**Water Pollution**

Any alteration of the physical, thermal, chemical, biological, or radioactive properties of any waters of the state, or the discharge of any pollutant into the waters of the state, which will or is likely to create a nuisance or to render such waters harmful, detrimental, or injurious to public health, safety, or welfare; to fish and wildlife; or to domestic, commercial, industrial, recreational, aesthetic, or other beneficial uses.

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**Water Quality**

A term used to describe the biological, chemical, and physical characteristics of water with respect to its suitability for a beneficial use.

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**Water Quality Criteria**

Levels of water quality expected to render a body of water suitable for its designated uses. Criteria are based on specific levels of pollutants that would make the water harmful if used for drinking, swimming, farming, or industrial processes.

**Water Quality Limited**

A label that describes water bodies for which one or more water quality criteria are not met or beneficial uses are not fully supported. Water quality limited segments may or may not be on a §303(d) list.

**Water Quality Limited Segment (WQLS)**

Any segment placed on a state's §303(d) list for failure to meet applicable water quality standards and/or is not expected to meet applicable water quality standards in the period prior to the next list. These segments are also referred to as "§303(d) listed."

**Water Quality Standards**

State-adopted and US Environmental Protection Agency-approved ambient standards for water bodies. The standards prescribe the use of the water body and establish the water quality criteria that must be met to protect designated uses.

**Watershed**

1) All the land that contributes runoff to a common point in a drainage network or to a lake outlet. Watersheds are infinitely nested, and any large watershed is composed of smaller "subwatersheds." 2) The whole geographic region that contributes water to a point of interest in a water body.

**Water Body Identification Number (WBID)**

A number that uniquely identifies a water body in Idaho and ties in to the Idaho water quality standards and GIS information.

**Wetland**

An area that is at least some of the time saturated by surface or ground water so as to support vegetation adapted to saturated soil conditions. Examples include swamps, bogs, fens, and marshes.

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## Appendix A. Unit Conversion Chart

Table A-1. Common conversions from metric to English units.

|                    | English Units   | Metric Units   | To Convert  | Example   |
|--------------------|---|--|---|---|
| <b>Distance</b>    | Miles (mi)  | Kilometers (km)  | 1 mi = 1.61 km<br>1 km = 0.62 mi  | 3 mi = 4.83 km<br>3 km = 1.86 mi  |
| <b>Length</b>      | Inches (in)<br>Feet (ft)  | Centimeters (cm)<br>Meters (m)   | 1 in = 2.54 cm<br>1 cm = 0.39 in<br>1 ft = 0.30 m<br>1 m = 3.28 ft  | 3 in = 7.62 cm<br>3 cm = 1.18 in<br>3 ft = 0.91 m<br>3 m = 9.84 ft  |
| <b>Area</b>        | Acres (ac)<br>Square Feet (ft <sup>2</sup> )<br>Square Miles (mi <sup>2</sup> ) | Hectares (ha)<br>Square Meters (m <sup>2</sup> )<br>Square Kilometers (km <sup>2</sup> ) | 1 ac = 0.40 ha<br>1 ha = 2.47 ac<br>1 ft <sup>2</sup> = 0.09 m <sup>2</sup><br>1 m <sup>2</sup> = 10.76 ft <sup>2</sup><br>1 mi <sup>2</sup> = 2.59 km <sup>2</sup><br>1 km <sup>2</sup> = 0.39 mi <sup>2</sup> | 3 ac = 1.20 ha<br>3 ha = 7.41 ac<br>3 ft <sup>2</sup> = 0.28 m <sup>2</sup><br>3 m <sup>2</sup> = 32.29 ft <sup>2</sup><br>3 mi <sup>2</sup> = 7.77 km <sup>2</sup><br>3 km <sup>2</sup> = 1.16 mi <sup>2</sup> |
| <b>Volume</b>      | Gallons (gal)<br>Cubic Feet (ft <sup>3</sup> )                                  | Liters (L)<br>Cubic Meters (m <sup>3</sup> )   | 1 gal = 3.78 L<br>1 L = 0.26 gal<br>1 ft <sup>3</sup> = 0.03 m <sup>3</sup><br>1 m <sup>3</sup> = 35.32 ft <sup>3</sup>   | 3 gal = 11.35 L<br>3 L = 0.79 gal<br>3 ft <sup>3</sup> = 0.09 m <sup>3</sup><br>3 m <sup>3</sup> = 105.94 ft <sup>3</sup>   |
| <b>Flow Rate</b>   | Cubic Feet per Second (cfs) <sup>a</sup>  | Cubic Meters per Second (m <sup>3</sup> /sec)  | 1 cfs = 0.03 m <sup>3</sup> /sec<br>1 m <sup>3</sup> /sec = 35.31 cfs   | 3 cfs = 0.09 m <sup>3</sup> /sec<br>3 m <sup>3</sup> /sec = 105.94 cfs  |
| <b>Weight</b>      | Pounds (lb)   | Kilograms (kg)   | 1 lb = 0.45 kg<br>1 kg = 2.20 lb  | 3 lb = 1.36 kg<br>3 kg = 6.61 lb  |
| <b>Temperature</b> | Fahrenheit (°F)   | Celsius (°C)   | °C = 0.55 (°F - 32)<br>°F = (°C x 1.8) + 32   | 3 °F = -15.95 °C<br>3 °C = 37.4 °F  |

<sup>a</sup> 1 cfs = 0.65 million gallons per day; 1 million gallons per day is equal to 1.55 cfs.

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## **Appendix B. Applicable Water Quality Standards and Criteria**

### **Beneficial Uses**

Idaho water quality standards require that surface waters of the state be protected for beneficial uses, wherever attainable (IDAPA 58.01.02.050.02). These beneficial uses fulfill Clean Water Act (CWA) goals for “swimmable and fishable waters” and may be categorized as existing uses, designated uses, and presumed uses. Refer to Idaho water quality standards and Section 3 of the *Water Body Assessment Guidance, Second Edition* (Grafe et al. 2002) for additional detail regarding the identification of beneficial uses.

Beneficial uses for waters in the Upper (North Fork) Coeur d'Alene River subbasin include cold water aquatic life, salmonid spawning, primary contact recreation, secondary contact recreation, domestic water supply, agricultural water supply, industrial water supply, wildlife habitats, and aesthetics (Table B-1). Waters with beneficial uses specifically designated in the water quality standards sections 110-160 are also listed separately in Table B-2. These are called designated beneficial uses. There may also be presumed beneficial uses based on background information and DEQ policy. Presumed use protections for all undesignated waters include cold water aquatic life and either primary or secondary contact recreation. Additionally, existing uses are also protected, even if not formally designated, and are those uses that occur now or have occurred since November 28, 1975. An existing use applied in the North Fork Coeur d'Alene River subbasin includes salmonid spawning for all stream segments based on available fisheries data (Wild Trout Enterprises 2009).

In this subbasin, most beneficial uses apply to the entire subbasin. These include cold water aquatic life, recreation, agricultural water supply, industrial water supply, wildlife habitats, and aesthetics. Primary contact recreation is designated for the entire length of the North Fork Coeur d'Alene River, from its headwaters in the upper North Fork Coeur d'Alene River watershed to the confluence with the South Fork Coeur d'Alene River. Prichard Creek, from its headwaters to the North Fork Coeur d'Alene River, is also designated for primary contact recreation. Secondary contact recreation is a presumed use for all other surface waters of the subbasin. Domestic water supply is a designated use for the North Fork Coeur d'Alene River and portions of Prichard Creek.

**Table B-1. Selected beneficial uses defined.**

| <b>Beneficial Use</b>        | <b>Definition</b>   |
|------------------------------|---|
| Cold Water Aquatic Life      | Water quality appropriate for the protection and maintenance of a viable aquatic life community for cold water species.   |
| Salmonid Spawning            | Waters which provide or could provide a habitat for active self-propagating populations of salmonid fishes.   |
| Primary Contact Recreation   | Water quality appropriate for prolonged and intimate contact by humans or for recreational activities when the ingestion of small quantities of water is likely to occur. Such activities include, but are not restricted to, those used for swimming, water skiing, or skin diving.    |
| Secondary Contact Recreation | Water quality appropriate for recreational uses on or about the water and which are not included in the primary contact category. These activities may include fishing, boating, wading, infrequent swimming, and other activities where ingestion of raw water is not likely to occur. |
| Domestic Water Supply        | Water quality appropriate for drinking water supplies.  |
| Special Resource Water       | Those specific segments or bodies of water which are recognized as needing intensive protection to: preserve outstanding or unique characteristics; or to maintain current beneficial use.  |
| Agricultural Water Supply    | Water quality appropriate for the irrigation of crops or as drinking water for livestock.   |
| Industrial Water Supply      | Water quality appropriate for industrial water supplies.  |
| Wildlife Habitats            | Water quality appropriate for wildlife habitats.  |
| Aesthetics                   | Water quality appropriate for aesthetics.   |

**Table B-2. Beneficial uses for North Fork Coeur d'Alene River subbasin waters.**

| <b>Beneficial Use</b>          | <b>Waters</b>   |  | <b>Type</b> |
|--------------------------------|---|--|-------------|
| <b>Cold Water Aquatic Life</b> | North Fork Coeur d'Alene River (Yellow Dog Creek to mouth)        | ID17010301PN001_05   | Designated  |
|                                | Prichard Creek (Butte Creek to mouth)                             | ID17010301PN004_03<br>ID17010301PN004_04                       |             |
|                                | Prichard Creek (source to Butte Creek)                            | ID17010301PN005_02<br>ID17010301PN005_03                       |             |
|                                | North Fork Coeur d'Alene River (Jordan Creek to Yellow Dog Creek) | ID17010301PN013_04<br>ID17010301PN013_05                       |             |
|                                | North Fork Coeur d'Alene River (source to Jordan Creek)           | ID17010301PN015_02<br>ID17010301PN015_03<br>ID17010301PN015_04 |             |
|                                | All additional streams and assessment units.                      |  |             |
| <b>Salmonid Spawning</b>       | North Fork Coeur d'Alene River (Yellow Dog Creek to mouth)        | ID17010301PN001_05   | Designated  |
|                                | Prichard Creek (Butte Creek to mouth)                             | ID17010301PN004_03<br>ID17010301PN004_04                       |             |
|                                | Prichard Creek (source to Butte Creek)                            | ID17010301PN005_02<br>ID17010301PN005_03                       |             |

| Beneficial Use                      | Waters   |  | Type       |
|-------------------------------------|--|--|------------|
|                                     | North Fork Coeur d'Alene River (Jordan Creek to Yellow Dog Creek)                          | ID17010301PN013_04<br>ID17010301PN013_05                       | Existing   |
|                                     | North Fork Coeur d'Alene River (source to Jordan Creek)                                    | ID17010301PN015_02<br>ID17010301PN015_03<br>ID17010301PN015_04 |            |
|                                     | All additional streams and assessment units.   |  |            |
| <b>Primary Contact Recreation</b>   | North Fork Coeur d'Alene River (Yellow Dog Creek to mouth)                                 | ID17010301PN001_05   | Designated |
|                                     | Prichard Creek (Butte Creek to mouth)  | ID17010301PN004_03<br>ID17010301PN004_04                       |            |
|                                     | Prichard Creek (source to Butte Creek)   | ID17010301PN005_02<br>ID17010301PN005_03                       |            |
|                                     | North Fork Coeur d'Alene River (Jordan Creek to Yellow Dog Creek)                          | ID17010301PN013_04<br>ID17010301PN013_05                       |            |
|                                     | North Fork Coeur d'Alene River (source to Jordan Creek)                                    | ID17010301PN015_02<br>ID17010301PN015_03<br>ID17010301PN015_04 |            |
| <b>Secondary Contact Recreation</b> | All additional streams and assessment units not designated for primary contact recreation. |  | Presumed   |
| <b>Domestic Water Supply</b>        | North Fork Coeur d'Alene River (Yellow Dog Creek to mouth)                                 | ID17010301PN001_05   | Designated |
|                                     | Prichard Creek (source to Butte Creek)   | ID17010301PN005_02<br>ID17010301PN005_03                       |            |
|                                     | North Fork Coeur d'Alene River (Jordan Creek to Yellow Dog Creek)                          | ID17010301PN013_04<br>ID17010301PN013_05                       |            |
|                                     | North Fork Coeur d'Alene River (source to Jordan Creek)                                    | ID17010301PN015_02<br>ID17010301PN015_03<br>ID17010301PN015_04 |            |
| <b>Agricultural Water Supply</b>    | All subbasin waters and assessment units.  |  | Designated |
| <b>Industrial Water Supply</b>      | All subbasin waters and assessment units.  |  | Designated |
| <b>Wildlife Habitats</b>            | All subbasin waters and assessment units.  |  | Designated |
| <b>Aesthetics</b>                   | All subbasin waters and assessment units.  |  | Designated |

## Temperature Water Quality Criteria

These temperature TMDLs are based on Idaho water quality standards (IDAPA 58.01.02) adopted by the State of Idaho to protect public health and welfare, enhance the quality of water, and serve the purposes of the Clean Water Act, which states that water quality standards should do the following:

- provide, wherever attainable, water quality for the protection and propagation of fish, shellfish, and wildlife and protection of recreation in and on the water (fishable/swimmable conditions)
- consider the use and value of state waters for public water supplies, propagation of fish and wildlife, recreation, agriculture and industrial purposes, and navigation.

The Idaho water quality standards program is a joint effort between the Idaho Department of Environmental Quality (DEQ) and the U.S. Environmental Protection Agency (EPA). DEQ is responsible for developing and enforcing water quality standards that protect beneficial uses. The EPA develops regulations, policies, and guidance to help Idaho implement the program and to ensure that Idaho's adopted standards are consistent with the requirements of the Clean Water Act and relevant regulations. The EPA has authority to review and approve or disapprove state standards and to promulgate federal water quality rules.

Idaho water quality standards contain several provisions relevant to water temperature and these TMDLs, including descriptions of surface water beneficial uses and specific temperature criteria established to protect aquatic life uses. The main beneficial use addressed by these TMDLs is cold water aquatic life (CWAL), ensuring water quality appropriate for the protection and maintenance of a viable aquatic life community for cold water species (IDAPA 58.01.02.100.01.a). An associated beneficial use is salmonid spawning (SS), which ensures waters that provide or could provide a habitat for active self-propagating populations of salmonid fishes (IDAPA 58.01.02 100.01.b). Temperature criteria for these uses include daily maximum water temperatures and maximum daily average temperatures (Table B-3) (IDAPA 58.01.02 250.02.b).

Cold water aquatic life temperature criteria apply throughout the entire year, but are most likely to exceed standards in late summer and early fall in this subbasin. The application of salmonid spawning criteria is determined by DEQ on a water body specific basis, taking into account the best available scientific information on salmonid spawning and incubation periods. In the Panhandle Region of Idaho, time periods for application of salmonid spawning temperature criteria have been established based on consultation with Idaho Department of Fish and Game biologists and DEQ guidance (Table B-4).

**Table B-3. Summary of state and federal temperature criteria applicable in the North Fork Coeur d'Alene River subbasin.**

| Type                                   | Location  | Criteria <sup>a</sup>                                   | Dates                                |                                   |
|--|---|---|--------------------------------------|-----------------------------------|
| Cold Water Aquatic Life                | Applies to entire subbasin  | 22 °C (71.6 °F)<br>Maximum Instantaneous<br><br>(MDMT)  | Applies entire year                  |                                   |
|  |   | 19 °C (66.2 °F)<br>Maximum Daily Average<br><br>(MDAT)  |                                      |                                   |
| Salmonid Spawning                      | Applies to North Fork Coeur d'Alene River (headwaters to mouth) and Prichard Creek (headwaters to mouth) and all other tributaries  | 13 °C (55.4 °F)<br>Maximum Instantaneous<br><br>(MDMT)  | <u>Spring Spawning</u>               | <u>Fall Spawning</u>              |
|  |   | 9 °C (48.2 °F)<br>Maximum Daily Average<br><br>(MDAT)   | >4,000 ft<br>Jun 1 – July 31         | Aug 15 – Nov 15                   |
|  |   |   | 3,000 – 4,000 ft<br>May 15 – July 15 | <3,000 ft<br>May 1 – July 1       |
| Idaho Bull Trout Criteria <sup>b</sup> | Applies to entire subbasin except 5 <sup>th</sup> order streams (Tepee Creek below Independence Creek, and North Fork Coeur d'Alene River below Tepee Creek) <sup>c</sup> | 13 °C (55.4 °F)<br>Maximum Weekly Maximum<br><br>(MWMT) | <u>Rearing</u><br>Jun 1 – Aug 31     | n.a.                              |
|  |   | 9 °C (48.2 °F)<br>Maximum Daily Average<br><br>(MDAT)   | n.a.                                 | <u>Spawning</u><br>Sep 1 – Oct 31 |
| EPA Bull Trout Criteria                | Brown Creek, Falls Creek, and Graham Creek  | 10 °C (50 °F)<br>Maximum Weekly Maximum<br><br>(MWMT)   | Jun 1 – Sep 30                       |                                   |

<sup>a</sup> MDMT = Maximum Daily Maximum Temperature; MDAT = Maximum Daily Average Temperature; MWMT = Maximum Weekly Maximum Temperature

<sup>b</sup> Current Idaho temperature criteria for bull trout have not been approved or disapproved by EPA and are therefore, not effective for Clean Water Act (CWA) purposes. Instead, the criteria adopted in 1998 are CWA-effective.

<sup>c</sup> There are discrepancies in the *State of Idaho Bull Trout Conservation Plan* (Batt 1996) identification of key watersheds referred to in Idaho water quality standards. See Appendix C for more information.

**Table B-4. Time periods for application of Idaho salmonid spawning temperature criteria in the Idaho Panhandle.**

| Species                   | Timing   |
|---------------------------|--|
| Westslope cutthroat trout | Elevation $\geq$ 4,000 feet (1,219 meters) = June 1 – July 31<br>Elevation 3,000 – 4,000 feet (914 – 1,219 meters) = May 15 – July 15<br>Elevation < 3,000 feet (< 914 m) = May 1 – July 1 |
| Rainbow trout             | May 1 – July 1   |
| Fall spawning salmonids   | August 15 – November 15  |

There are additional provisions in Idaho water quality standards for protection of bull trout due to their temperature sensitivity and conservation status. During the 1990s, DEQ developed temperature water quality criteria for bull trout and submitted these criteria to EPA for approval. During this time period, petitions were made to the U.S. Fish and Wildlife Service to list bull trout under the Endangered Species Act. Idaho addressed these concerns by developing a *State of Idaho Bull Trout Conservation Plan* in 1996 (Batt 1996). In 1997, EPA did not act on Idaho's criteria for bull trout and instead promulgated federal temperature criteria for bull trout in Idaho (CFR §131.33)(Table B-3). The 1997 EPA criteria specified "temperatures not to exceed 10 °C expressed as an average of daily maximum temperatures over a seven day period during the months June through September," and applied to three streams in this subbasin: Brown Creek (AU = ID17010301PN026\_02), Falls Creek (AU = ID17010301PN011\_02), and Graham Creek (AUs = ID17010301PN002\_02 and 002\_03). The Columbia River bull trout population segments, including the Coeur d'Alene Basin, were ultimately listed as threatened under the ESA in 1998.

In 1998, State of Idaho temperature criteria for bull trout were incorporated into state rule. In 2001, Idaho revised portions of the temperature criteria for bull trout (IDAPA 58.01.02 250.02.g). In 2003, Idaho submitted revised water quality standards to EPA, including the revised temperature criteria for bull trout (Table B-5). As of this TMDL in 2013, EPA has taken no action to approve or disapprove these revised criteria. Although the 1998 criteria were not acted on by EPA, they were adopted prior to EPA's adoption of the "Alaska Rule" in 2000 which specified state water quality standards become applicable for CWA purposes only after they are approved by EPA. Thus, although subsequently changed, the 1998 Idaho temperature criteria to protect bull trout are effective for CWA purposes for water bodies not included in the federal rule.

The 1998 Idaho criteria for water temperature and bull trout and the 2003 Idaho criteria revisions apply to the same geographic area. These criteria apply to all tributary waters, not including 5<sup>th</sup>-order main stem rivers, located above 600 meters elevation in the key watersheds listed in Table 6 in Appendix F of the *State of Idaho Bull Trout Conservation Plan* (Batt 1996), which lists "the entire Coeur d'Alene River Drainage."

**Table B-5. Idaho water quality criteria for bull trout in 1998 and 2003.**

| Year | Description  |
|------|--|
| 1998 | Temperatures not to exceed 12 °C daily average during June, July and August for juvenile bull trout rearing and 9 °C daily average during September and October for bull trout spawning.                       |
| 2003 | Temperatures not to exceed 13 °C maximum weekly maximum temperature during June, July, and August for juvenile bull trout rearing and 9 °C daily average during September and October for bull trout spawning. |

For assessment purposes, there are allowances applicable to the numeric temperature criteria including a provision for departures that are infrequent, brief and small.

Idaho water quality standards say:

“In making use support determinations, the Department may give less weight to departures from criteria in Section 250 for pH, turbidity, dissolved oxygen, and temperature that are infrequent, brief, and small if aquatic habitat and biological data indicate to the assessor that aquatic life beneficial uses are otherwise supported. Unless otherwise determined by the Department, “infrequent” means less than ten percent (10%) of valid, applicable, representative measurements when continuous data are available; “brief” means two (2) hours or less; and “small” means conditions that avoid acute effects. Subsection 053.03 only applies to use of this data for determination of beneficial support status. Subsection 053.05 does not apply to or affect the application of criteria for any other regulatory purpose including, but not limited to, determining whether a particular discharge or activity violates water quality standards.” (IDAPA 58.01.02.054.03)

As the rule states, this only applies when determining beneficial use support status *and* when aquatic habitat and biological data (e.g., Beneficial Use Reconnaissance Program (BURP) data) indicate that aquatic life beneficial uses are otherwise supported. If habitat and biological data do not show full support of aquatic life beneficial uses, DEQ cannot apply this allowance. The allowance is for assessment purposes and does not apply for other regulatory purpose. When evaluating whether this rule applies, departures from criteria must be infrequent, brief, and small. When calculating frequency, exceedances occurring less than 10% of the time period being evaluated were considered “infrequent.” Calculating the frequency of exceedance is addressed in a technical memo from Don Essig (2007). There is no specific guidance for brief and small exceedances.

Once the time period to be evaluated is determined, complete data records for that time period are necessary to measure the frequency of exceedance for temperature criteria. If incomplete data records exist, they may be used to infer the frequency of exceedance (Essig 2007). Given these time periods for water temperature criteria, it is helpful to have water temperature data from May 15 to October 31.

To determine whether departures from temperature criteria are brief, the water temperature data being evaluated ideally must be recorded at hourly intervals or less. If water temperature data are recorded at a longer interval (e.g., daily), it may not be possible to determine whether exceedances of acute criteria were actually brief.

To determine whether departures from temperature criteria are small, the water temperature data being evaluated, must be measured at an appropriate resolution (ideally intervals of 1°C or less). The measurement accuracy of many data logger thermistors is  $\pm 0.2$  to  $\pm 0.3$  °C (Onset Computer Corporation [www.onsetcomp.com](http://www.onsetcomp.com); Essig and Mebane 2003).

The temperature data assessed for this TMDL were evaluated relative to this exemption for brief, infrequent, and small exceedances. This evaluation did not alter the outcome of any water body assessments. When water temperatures exceeded the numeric criteria, those exceedances were not brief, infrequent, and small.

There is also a provision in the Idaho water quality standards for days when the air temperature is extremely high (IDAPA 58.01.02.080.03). This exemption states that “exceeding the temperature criteria in Section 250 will not be considered a water quality standard violation when the air temperature of a given day exceeds the ninetieth percentile of a yearly series of the maximum weekly maximum air temperature (MWMT) calculated over the historic record measured at the nearest weather reporting station.”

The maximum weekly maximum temperature (MWMT) is defined as the single highest weekly maximum temperature (WMT) that occurs during a given year or other period of interest (e.g., a spawning period). The WMT is “the mean of daily maximum temperatures measured over a consecutive seven (7) day period ending on the day of calculation” (IDAPA 58.01.02.010.59). In other words, the MWMT is “the mean of daily maximum water temperatures measured over the annual warmest consecutive seven (7) day period occurring during a given year” (IDAPA 58.01.02.250.02.g).

The temperature data assessed for this TMDL were evaluated relative to this exemption for extremely warm air temperatures. The exemption did not alter the outcome of any water body assessments. When water temperatures exceeded the numeric criteria, those exceedances did not occur only during times of extremely warm air temperatures.

Perhaps the most important water quality criteria relevant to this TMDL are the provisions related to natural background conditions in the Idaho water quality standards.

There are many water bodies in Idaho that have minimal human impacts (e.g., wilderness areas) but exceed Idaho’s water quality criteria for temperature. It is possible that some waters are naturally warmer than Idaho water quality criteria and that beneficial uses may be supported at temperatures warmer than the numeric criteria. This subject has been studied by DEQ and Idaho water quality standards address the issue with a provision for natural conditions.

The natural conditions (IDAPA 58.01.02.054.03) provision reads as follows:

“There is no impairment of beneficial uses or violation of water quality standards where natural background conditions exceed any applicable water quality criteria as determined by the Department, and such natural background conditions shall not, alone, be the basis for placing a water body on the list of water quality limited water bodies described in Section 054.”

Natural background conditions are defined (IDAPA 58.01.02.010.63) as follows:

“The physical, chemical, biological, or radiological conditions existing in a water body without human sources of pollution within the watershed. Natural disturbances including, but not limited to, wildfire, geologic disturbance, diseased

vegetation, or flow extremes that affect the physical, chemical, and biological integrity of the water are part of natural background conditions. Natural background conditions should be described and evaluated taking into account this inherent variability with time and place.”

Natural background conditions as criteria (IDAPA 58.01.02 200.09) are stated as follows:

“When natural background conditions exceed any applicable water quality criteria set forth in Sections 210, 250, 251, 252, or 253, the applicable water quality criteria shall not apply; instead, there shall be no lowering of water quality from natural background conditions. Provided, however, that temperature may be increased above natural background conditions when allowed under Section 401.”

Applying the natural conditions provisions in Idaho water quality standards can be difficult, and DEQ has developed guidelines and resources that can be used to determine natural background conditions and how to apply water quality criteria (see Essig and Mebane 2003).

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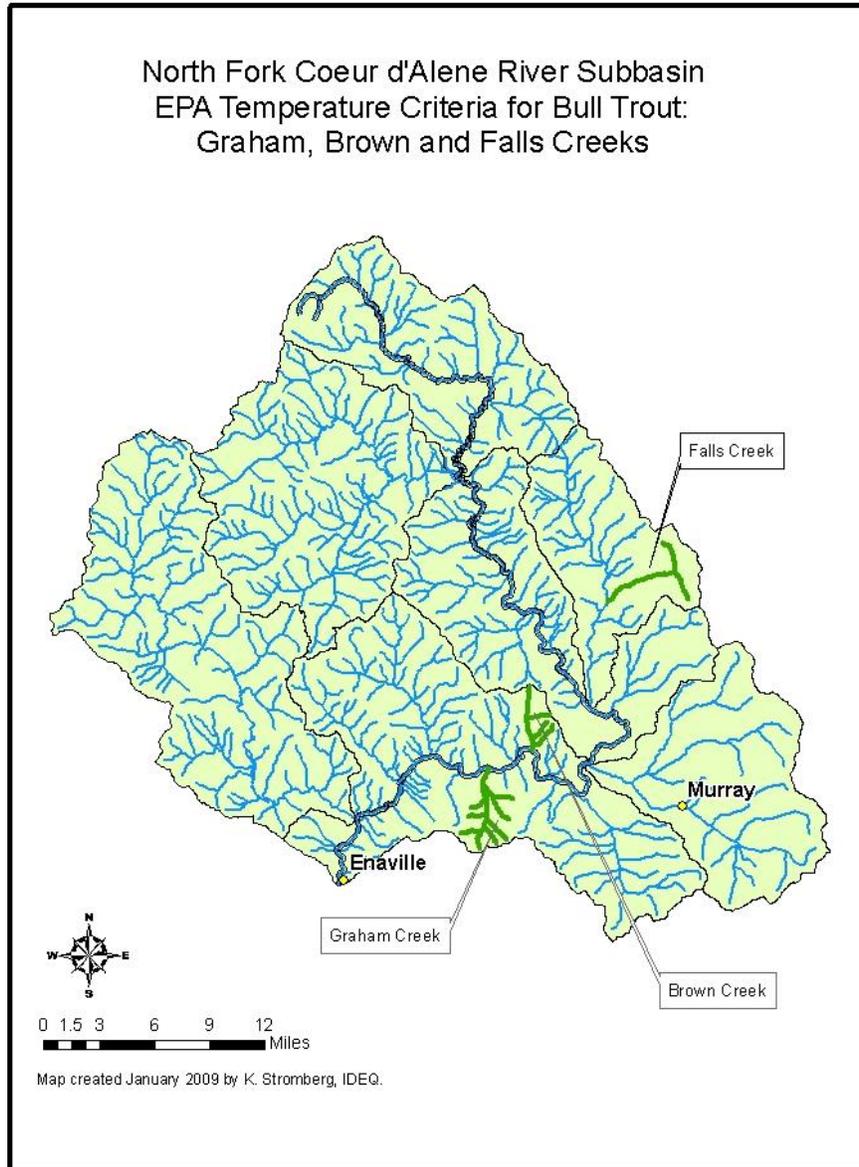
## Appendix C. Assessment of Compliance with EPA Bull Trout Temperature Criteria

Water quality criteria for temperature applicable in this subbasin include federally-promulgated water quality standards for bull trout (CFR §131.33). See Appendix B of this TMDL for further information on temperature criteria. Three streams within the North Fork Coeur d'Alene River subbasin are included in EPA's temperature criteria (Table C-1, Figure C-1). In the 2002 Integrated Report, only one of these streams, Graham Creek, had been assessed for temperature status and it was considered impaired. Upper Graham Creek, Brown Creek and Falls Creek were not assessed. In the 2008 Integrated Report, these assessments for temperature were unchanged from 2002.

**Table C-1. Assessment status of the North Fork Coeur d'Alene River subbasin streams included in EPA's temperature criteria for bull trout.**

| Stream       | Assessment Unit(s) | 2002 Status (Pollutant)                          | 2008 Status (Pollutant)                          |
|--------------|--------------------|--|--|
| Brown Creek  | ID17010301PN026_02 | Not Assessed                                     | Not Assessed                                     |
| Falls Creek  | ID17010301PN011_02 | Impaired (Sediment)/<br>Temperature Not Assessed | Impaired (Sediment)/<br>Temperature Not Assessed |
| Graham Creek | ID17010301PN002_02 | Not Assessed                                     | Not Assessed                                     |
|              | ID17010301PN002_03 | Impaired (Temperature)                           | Impaired (Temperature)                           |

The U.S. Forest Service (USFS) Idaho Panhandle National Forests, Coeur d'Alene River Ranger District provided DEQ with a substantial temperature dataset covering the years 1998 to 2008. DEQ collected water temperature data on Graham Creek in 1999. These data were evaluated relevant to the EPA bull trout temperature criteria for this TMDL analysis.



**Figure C-1. EPA temperature criteria for bull trout apply in Graham Creek, Brown Creek, and Falls Creek within the North Fork Coeur d'Alene subbasin.**

**Brown Creek (ID17010301PN026\_02)**

Brown Creek was evaluated for EPA bull trout temperature criteria using USFS data from three sites over four years (four loggers total) during the criteria evaluation period of June through September (Table C-2). Rookie Creek, a tributary to Brown Creek, was also evaluated as part of this assessment unit. Results of the evaluation showed exceedances of the 10 °C weekly maximum temperature criteria approximately 81% of the evaluation time period. The highest maximum weekly maximum temperature (MWMT) was 13 °C. All sites exceeded criteria in every year evaluated.

**Table C-2. Brown Creek temperature evaluation.**

| Site               | Year(s)    | Date Range Evaluated |
|--------------------|------------|----------------------|
| Brown Creek, Upper | 2000, 2001 | July 18–Sept 4, 2000 |
|                    |            | May 30–Sept 17, 2001 |
| Brown Creek        | 2007       | June 7–Sept 30, 2007 |
| Rookie Creek       | 2005       | May 24–Sept 20, 2005 |

**Falls Creek (ID17010301PN011\_02)**

Falls Creek was evaluated for EPA bull trout temperature criteria using USFS data from two sites over two years (two loggers total) during the criteria evaluation period of June through September (Table 3). Results of the evaluation showed exceedances of the 10 °C weekly maximum temperature criteria approximately 83% of the evaluation time period. The highest MWMT was 14 °C. Both sites exceeded criteria in each year evaluated.

**Table C-3. Falls Creek temperature evaluation.**

| Site                  | Year(s)    | Date Range Evaluated |
|-----------------------|------------|----------------------|
| Falls Creek (2 sites) | 2001, 2002 | Aug 1–Sept 30, 2001  |
|                       |            | Jun 8–Sept 30, 2002  |

**Graham Creek (ID17010301PN002\_03)**

Lower Graham Creek was evaluated for EPA bull trout temperature criteria using DEQ data from one site in 1999 during the criteria evaluation period (Table C-4). Results from the evaluation showed exceedances of the 10 °C weekly maximum temperature criteria approximately 81% of the evaluation time period up to 14 °C MWMT. The site exceeded criteria in the year evaluated. Temperature data are not available for upper Graham Creek assessment unit number ID17010301PN002\_02. That assessment unit remains unassessed with regards to temperature.

**Table C-4. Graham Creek temperature evaluation.**

| Site         | Year(s) | Date Range           |
|--------------|---------|----------------------|
| Graham Creek | 1999    | July 2–Sept 30, 1999 |

**Conclusions**

In every year evaluated, all of the sites at Graham Creek, Brown Creek, and Falls Creek exceeded the EPA bull trout temperature criteria. Exceedances were not isolated events, and occurred during most of the spawning time period evaluated (June through September). Exceedances of the 10 °C weekly maximum temperature criteria were not small and were up to 4 °C above criteria. In this analysis, the three streams evaluated did not exceed Idaho water quality standards for cold water aquatic life, but all three did exceed Idaho water quality standards for salmonid spawning. Due to the identified exceedances of criteria, DEQ recommended that Brown Creek (ID17010301PN026\_02), Falls Creek (ID17010301PN011\_02), and Graham Creek (ID17010301PN002\_03) be added to the 2010 Integrated Report as impaired by temperature for cold water aquatic life and salmonid spawning (Table C-5). These assessments were formalized with EPA's approval of the 2010 Integrated Report in September 2011.

**Table C-5. Summary of EPA bull trout temperature criteria exceedances. Italics indicate status changes in the 2010 Integrated Report.**

| <b>Stream</b> | <b>Assessment Unit(s)</b> | <b>Exceedance of EPA Criteria</b> | <b>2008 Integrated Report</b>                    | <b>2010 Integrated Report</b>              |
|---------------|---------------------------|-----------------------------------|--|--|
| Brown Creek   | ID17010301PN026_02        | Exceeds                           | Not Assessed                                     | <i>Impaired (Temperature)</i>              |
| Falls Creek   | ID17010301PN011_02        | Exceeds                           | Impaired (Sediment)/<br>Temperature Not Assessed | <i>Impaired (Sediment and Temperature)</i> |
| Graham Creek  | ID17010301PN002_02        | Not Assessed                      | Not Assessed                                     | Not Assessed                               |
|               | ID17010301PN002_03        | Exceeds                           | Impaired (Temperature)                           | Impaired (Temperature)                     |

## Appendix D. Data Sources and Estimates of Bank-full Width

**Table D-1. Data sources for Upper (North Fork) Coeur d'Alene River subbasin TMDLs.**

| <b>Water Body/Assessment Unit</b>  | <b>Data Source</b>                  | <b>Type of Data</b>   | <b>When Collected</b> |
|--|-------------------------------------|---|-----------------------|
| Beaver Creek, Deception Creek, Leiberg Creek, Little North Fork Coeur d'Alene River, Skookum Creek, Steamboat Creek, Tepee Creek, West Fork Eagle Creek  | DEQ Regional Office                 | Solar Pathfinder effective shade and stream width                         | Summer 2007           |
| All rivers and tributaries examined  | DEQ State Technical Services Office | Aerial photo interpretation of existing shade and stream width estimation | 2006–2007             |
| Graham Creek, Beaver Creek, Prichard Creek, West Fork Eagle Creek, Lost Creek, North Fork Coeur d'Alene River, Independence Creek, Trail Creek (trib to Tepee Creek), Tepee Creek, Steamboat Creek, Little North Fork Coeur d'Alene River tributaries, Little North Fork Coeur d'Alene River, Bumblebee Creek, Laverne Creek, Leiberg Creek, Bootjack Creek, Burnt Cabin Creek, Deception Creek, Skookum Creek, Copper Creek | DEQ IDASA Database                  | Stream temperature  | 1997 and 1999         |
| North Fork Coeur d'Alene River, Beaver Creek, Prichard Creek, West Fork Eagle Creek, Tepee Creek, Declaration Creek, Snow Creek, Trail Creek (trib to Tepee Creek), Steamboat Creek, Little North Fork Coeur d'Alene River tributaries, Little North Fork Coeur d'Alene River, Laverne Creek, Burnt Cabin Creek  | USFS IPNF Datasets                  | Stream temperature  | 1998–2008             |

**Table D-2. Regional curve estimates and existing measurements of bank-full width for major streams.**

| Location                                    | area (sq mi) | Clearwater (m) | CDA USFS (m) | USFS power (m) | CDA WPN (m) | Average existing (m) |
|---|--------------|----------------|--------------|----------------|-------------|----------------------|
| Beaver Creek @ mouth                        | 42.3         | 12             | 10           | 13             | 13          |                      |
| Beaver Creek bl Trail Creek                 | 36           | 11             | 9            | 12             | 13          | 14.85                |
| Beaver Creek bl Deer Creek                  | 17.7         | 8              | 7            | 8              | 9           |                      |
| Beaver Creek ab Dobson Gulch                | 4.9          | 4              | 6            | 4              | 5           | 7.95                 |
| Beaver Creek ab Carbon Creek                | 2.66         | 3              | 5            | 3              | 4           |                      |
| Big Elk Creek @ mouth                       | 11.6         | 6              | 6            | 6              | 8           | 6.8                  |
| Big Elk Creek ab First Creek                | 8.47         | 5              | 6            | 5              | 7           | 4.46                 |
| Big Elk Creek ab Boundary Creek             | 6.23         | 4              | 6            | 4              | 6           | 5.76                 |
| Bootjack Creek @ mouth                      | 4.08         | 4              | 6            | 3              | 5           |                      |
| Bootjack Creek ab Smith Creek               | 2.3          | 3              | 5            | 2              | 4           |                      |
| Bumblebee Creek @ mouth                     | 5.81         | 4              | 6            | 4              | 6           | 6                    |
| Bumblebee Creek ab 3rd tributary            | 1.62         | 2              | 5            | 2              | 3           |                      |
| Burnt Cabin Creek @ mouth                   | 11.3         | 6              | 6            | 6              | 8           | 8.25                 |
| Burnt Cabin Creek ab Lone Cabin Creek       | 7.24         | 5              | 6            | 5              | 6           |                      |
| Burnt Cabin Creek ab Bottom Creek           | 4.24         | 4              | 6            | 3              | 5           |                      |
| Burnt Cabin Creek bl Lost Mine Creek        | 1.9          | 2              | 5            | 2              | 4           |                      |
| Copper Creek @ mouth                        | 14           | 7              | 7            | 7              | 8           | 9                    |
| Copper Creek bl Mineral Creek               | 12.2         | 6              | 7            | 6              | 8           | 6.4                  |
| Copper Creek ab Mineral Creek               | 7.45         | 5              | 6            | 5              | 7           | 6.3                  |
| Copper Creek bl Fisher Creek                | 6.58         | 5              | 6            | 4              | 6           |                      |
| Copper Creek ab Fisher Creek                | 3.99         | 4              | 6            | 3              | 5           |                      |
| Deception Creek @ mouth                     | 5.54         | 4              | 6            | 4              | 6           |                      |
| Deception Creek ab Hoodoo Creek             | 2.96         | 3              | 5            | 3              | 4           |                      |
| Graham Creek @ mouth                        | 9.62         | 6              | 6            | 6              | 7           | 6.33                 |
| Graham Creek ab Deceitful Gulch             | 6.88         | 5              | 6            | 5              | 6           |                      |
| Graham Creek ab East Fork                   | 2.78         | 3              | 5            | 3              | 4           |                      |
| Independence Creek @ mouth                  | 59.8         | 14             | 12           | 16             | 16          | 17.76                |
| Independence Creek bl North Creek           | 42           | 12             | 10           | 13             | 13          |                      |
| Independence Creek bl Declaration Creek     | 21.7         | 9              | 8            | 9              | 10          | 12.4                 |
| Independence Creek ab Declaration Creek     | 12.6         | 6              | 7            | 6              | 8           | 8.1                  |
| Laverne Creek @ mouth                       | 6.9          | 5              | 6            | 5              | 6           | 8.43                 |
| Laverne Creek ab 2nd tributary              | 3.37         | 3              | 5            | 3              | 5           |                      |
| Leiberg Creek @ mouth                       | 12.1         | 6              | 7            | 6              | 8           | 9.5                  |
| Leiberg Creek bl Lavin Creek                | 6.34         | 4              | 6            | 4              | 6           |                      |
| Leiberg Creek ab Stull Creek                | 2.25         | 3              | 5            | 2              | 4           |                      |
| Shoshone Cr @ mouth                         | 69.2         | 16             | 13           | 17             | 17          |                      |
| Shoshone Cr bl Falls Cr                     | 55.7         | 14             | 12           | 15             | 15          |                      |
| Shoshone Cr ab Falls Cr                     | 41.7         | 12             | 10           | 13             | 13          |                      |
| Shoshone Cr ab Cabin Cr                     | 32.7         | 11             | 9            | 11             | 12          |                      |
| Shoshone Cr ab Clinton Cr                   | 21.9         | 9              | 8            | 9              | 10          |                      |
| Shoshone Cr ab Ulm Cr                       | 8.2          | 5              | 6            | 5              | 7           |                      |
| Shoshone Cr ab Hemlock Cr                   | 4.5          | 4              | 6            | 4              | 5           | 5.27                 |
| Shoshone Cr ab 1st tributary                | 1.43         | 2              | 5            | 2              | 3           |                      |
| Lost Creek @ mouth                          | 24.3         | 9              | 8            | 9              | 11          | 9                    |
| Lost Creek ab EF                            | 13.7         | 7              | 7            | 7              | 8           |                      |
| Lost Creek ab Stack Creek                   | 8.51         | 5              | 6            | 5              | 7           |                      |
| Lost Creek ab 4th tributary                 | 3.69         | 3              | 5            | 3              | 5           |                      |
| Prichard Creek @ mouth                      | 97.8         | 19             | 17           | 21             | 19          | 15.65                |
| Prichard Creek ab Eagle Creek               | 49.7         | 13             | 11           | 14             | 14          | 15.5                 |
| Prichard Creek bl Butte Gulch               | 39           | 12             | 10           | 12             | 13          | 12.2                 |
| Prichard Creek ab Granite Gulch             | 10.4         | 6              | 6            | 6              | 7           | 13.5                 |
| Skookum Creek @ mouth                       | 6.35         | 4              | 6            | 4              | 6           | 7.05                 |
| Skookum Creek ab McCauley/Knight Creeks     | 4.04         | 4              | 6            | 3              | 5           |                      |
| Skookum Creek ab Early Creek                | 2.07         | 3              | 5            | 2              | 4           |                      |
| Steamboat Creek @ mouth                     | 42           | 12             | 10           | 13             | 13          | 11.6                 |
| Steamboat Creek bl Barrymore Creek          | 34.6         | 11             | 9            | 11             | 12          | 11.6                 |
| Steamboat Creek bl EF/WF confluence         | 23.2         | 9              | 8            | 9              | 10          | 11.3                 |
| EF Steamboat Creek @ mouth                  | 11           | 6              | 6            | 6              | 8           |                      |
| EF Steamboat Creek ab Little EF Creek       | 6.95         | 5              | 6            | 5              | 6           |                      |
| EF Steamboat Creek ab Cabin Creek           | 4.42         | 4              | 6            | 4              | 5           |                      |
| EF Steamboat Creek ab Martin Creek          | 1.36         | 2              | 5            | 2              | 3           |                      |
| WF Steamboat Creek @ mouth                  | 11.5         | 6              | 6            | 6              | 8           |                      |
| WF Steamboat Creek bl Comfy Creek           | 8.21         | 5              | 6            | 5              | 7           |                      |
| WF Steamboat Creek ab Comfy Creek           | 4.04         | 4              | 6            | 3              | 5           |                      |
| Tepee Creek @ mouth                         | 144          | 23             | 23           | 26             | 22          |                      |
| Tepee Creek ab Independence Creek           | 73.5         | 16             | 14           | 17             | 17          |                      |
| Tepee Creek ab Trail Creek                  | 35.6         | 11             | 9            | 12             | 13          | 12.95                |
| Tepee Creek ab Big Elk Creek                | 14.1         | 7              | 7            | 7              | 9           | 3.5                  |
| Trail Creek @ mouth                         | 29.7         | 10             | 9            | 10             | 12          |                      |
| Trail Creek ab Bear Creek                   | 26           | 9              | 8            | 10             | 11          |                      |
| Trail Creek bl Callis Creek                 | 18.5         | 8              | 7            | 8              | 10          | 16.25                |
| Trail Creek bl Stewart/Potter confluence    | 11.5         | 6              | 6            | 6              | 8           |                      |
| Eagle Creek @ mouth                         | 44.5         | 12             | 10           | 13             | 14          | 20.65                |
| WF Eagle Creek @ mouth                      | 18.9         | 8              | 7            | 8              | 10          | 10.85                |
| WF Eagle Creek ab Bobtail Creek             | 11.9         | 6              | 6            | 6              | 8           |                      |
| WF Eagle Creek ab Cottonwood Creek          | 6.07         | 4              | 6            | 4              | 6           |                      |
| EF Eagle Creek @ mouth                      | 22.7         | 9              | 8            | 9              | 10          |                      |
| EF Eagle Creek bl 2nd tributary             | 15           | 7              | 7            | 7              | 9           | 11.5                 |
| EF Eagle Creek ab Tributary Creek           | 4.97         | 4              | 6            | 4              | 6           |                      |
| Coeur d'Alene River @ SF confluence         | 896          | 59             | 114          | 72             | 48          | -60                  |
| Coeur d'Alene River ab NF CDA River         | 713          | 52             | 92           | 63             | 44          |                      |
| Coeur d'Alene River bl Beaver Creek         | 581          | 47             | 76           | 56             | 40          | 46.03                |
| Coeur d'Alene River ab Prichard Creek       | 439          | 41             | 58           | 48             | 36          | 33                   |
| Coeur d'Alene River ab Shoshone Creek       | 334          | 35             | 46           | 41             | 32          | 48.2                 |
| Coeur d'Alene River ab Tepee Creek          | 102          | 19             | 17           | 21             | 19          |                      |
| Coeur d'Alene River ab Jordan Creek         | 70.2         | 16             | 14           | 17             | 17          | 13.3                 |
| Coeur d'Alene River ab Spruce Creek         | 26.5         | 9              | 8            | 10             | 11          | 6.4                  |
| NF Coeur d'Alene River @ mouth              | 170          | 25             | 26           | 28             | 24          | -24                  |
| NF Coeur d'Alene River ab Copper Creek      | 125          | 21             | 20           | 24             | 21          |                      |
| NF Coeur d'Alene River ab Leiberg Creek     | 95.4         | 18             | 17           | 20             | 19          | 22                   |
| NF Coeur d'Alene River ab Burnt Cabin Creek | 44.5         | 12             | 10           | 13             | 14          | 13.2                 |
| NF Coeur d'Alene River ab Iron Creek        | 17.5         | 8              | 7            | 8              | 9           | 8.05                 |
| NF Coeur d'Alene River bl Honey Creek       | 4.37         | 4              | 6            | 4              | 5           |                      |

**Table D-3. Regional curve estimates and existing measurements of bank-full width for Little North Fork Coeur d'Alene River tributaries.**

| Location                        | area (sq mi) | Clearwater (m) | CDA USFS (m) | USFS power (m) | CDA WPN (m) |                                  |
|---------------------------------|--------------|----------------|--------------|----------------|-------------|----------------------------------|
| Honey Cr @ mouth                | 2.49         | 3              | 5            | 3              | 4           | Trib to Little NF CDA<br>030_02a |
| Honey Cr bl Prospect Cr         | 1.82         | 2              | 5            | 2              | 4           |                                  |
| Honey Cr ab Unnamed Trib        | 0.5          | 1              | 5            | 1              | 2           |                                  |
| Prospect Cr @ mouth             | 0.41         | 1              | 5            | 1              | 2           |                                  |
| Unnamed Trib to Honey Cr        | 0.61         | 1              | 5            | 1              | 2           |                                  |
| Sob Cr @ mouth                  | 1.25         | 2              | 5            | 2              | 3           |                                  |
| Solitaire Cr @ mouth            | 2.61         | 3              | 5            | 3              | 4           |                                  |
| Solitaire Cr bl EF/WF confl     | 2.29         | 3              | 5            | 2              | 4           |                                  |
| EF Solitaire Cr                 | 1.42         | 2              | 5            | 2              | 3           |                                  |
| WF Solitaire Cr                 | 0.87         | 2              | 5            | 1              | 3           |                                  |
| Tom Lavin Cr @ mouth            | 3.23         | 3              | 5            | 3              | 5           |                                  |
| Lewelling Cr @ mouth            | 2.17         | 3              | 5            | 2              | 4           |                                  |
| Iron Cr @ mouth                 | 9.9          | 6              | 6            | 6              | 7           |                                  |
| Iron Cr ab Cataract Cr          | 5.6          | 4              | 6            | 4              | 6           |                                  |
| Iron Cr ab Rabiens Cr           | 2.74         | 3              | 5            | 3              | 4           |                                  |
| Rabiens Cr @ mouth              | 1.79         | 2              | 5            | 2              | 4           |                                  |
| Silver Run @ mouth              | 0.48         | 1              | 5            | 1              | 2           |                                  |
| Cataract Cr @ mouth             | 2.04         | 2              | 5            | 2              | 4           |                                  |
| Rusty Cr @ mouth                | 0.3          | 1              | 5            | 1              | 2           |                                  |
| Moose Cr @ mouth                | 0.59         | 1              | 5            | 1              | 2           |                                  |
| Hudlow Cr @ mouth               | 5.47         | 4              | 6            | 4              | 6           | 030_02b                          |
| Hudlow Cr ab EF                 | 4.45         | 4              | 6            | 4              | 5           |                                  |
| EF Hudlow Cr @ mouth            | 0.72         | 1              | 5            | 1              | 2           |                                  |
| MF Hudlow Cr @ confluence       | 2.23         | 3              | 5            | 2              | 4           |                                  |
| WF Hudlow Cr @ confluence       | 1.92         | 2              | 5            | 2              | 4           |                                  |
| Trib to WF Hudlow Cr            | 0.53         | 1              | 5            | 1              | 2           |                                  |
| Hudlow Cr bl WF/MF confluence   | 4.15         | 4              | 6            | 3              | 5           |                                  |
| Gimlet Cr @ mouth               | 4.2          | 4              | 6            | 3              | 5           |                                  |
| Unnamed Trib to Gimlet Cr       | 0.71         | 1              | 5            | 1              | 2           |                                  |
| Gimlet Cr ab Trib               | 1.37         | 2              | 5            | 2              | 3           |                                  |
| Owl Cr (Little NF) @ mouth      | 2.35         | 3              | 5            | 2              | 4           |                                  |
| Owl Cr (Little NF) ab 1st Trib  | 0.83         | 2              | 5            | 1              | 3           |                                  |
| 1st Trib to Owl Cr              | 0.59         | 1              | 5            | 1              | 2           |                                  |
| 2nd Trib to Owl Cr              | 0.31         | 1              | 5            | 1              | 2           |                                  |
| Nicholas Cr @ mouth             | 4.2          | 4              | 6            | 3              | 5           | 030_02c                          |
| Nicholas Cr ab Canyon Fk        | 2.02         | 2              | 5            | 2              | 4           |                                  |
| Canyon Fork @ mouth             | 1.88         | 2              | 5            | 2              | 4           |                                  |
| Barney Cr @ mouth               | 3.59         | 3              | 5            | 3              | 5           |                                  |
| Barney Cr ab Argument Cr        | 1.17         | 2              | 5            | 2              | 3           |                                  |
| Argument Cr @ mouth             | 0.32         | 1              | 5            | 1              | 2           |                                  |
| Little Cr @ mouth               | 0.5          | 1              | 5            | 1              | 2           |                                  |
| Cathcart Cr @ mouth             | 1.07         | 2              | 5            | 2              | 3           |                                  |
| Cascade Cr @ mouth              | 6.11         | 4              | 6            | 4              | 6           |                                  |
| Cascade Cr ab Walker Cr         | 3.63         | 3              | 5            | 3              | 5           |                                  |
| Cascade Cr ab Unnamed Trib      | 1.86         | 2              | 5            | 2              | 4           |                                  |
| Unnamed Trib to Cascade Cr      | 0.53         | 1              | 5            | 1              | 2           |                                  |
| Walker Cr @ mouth               | 1.27         | 2              | 5            | 2              | 3           |                                  |
| Picnic Cr @ mouth               | 5.18         | 4              | 6            | 4              | 6           |                                  |
| Picnic Cr ab Thiesen Cr         | 4.44         | 4              | 6            | 4              | 5           |                                  |
| Picnic Cr ab Lunch Cr           | 3.23         | 3              | 5            | 3              | 5           |                                  |
| Lunch Cr @ mouth                | 0.52         | 1              | 5            | 1              | 2           |                                  |
| Thiesen Cr @ mouth              | 0.68         | 1              | 5            | 1              | 2           |                                  |
| Trestle Cr @ mouth              | 0.85         | 2              | 5            | 1              | 3           | 030_02d                          |
| Delaney Cr @ mouth              | 0.74         | 1              | 5            | 1              | 2           |                                  |
| Lindberg Cr @ mouth             | 0.82         | 2              | 5            | 1              | 3           |                                  |
| Breadwater Cr @ mouth           | 0.59         | 1              | 5            | 1              | 2           |                                  |
| Canyon Cr @ mouth               | 3.38         | 3              | 5            | 3              | 5           |                                  |
| Little Tepee Cr @ mouth         | 2.69         | 3              | 5            | 3              | 4           |                                  |
| Unnamed Trib ab Williams Draw   | 0.69         | 1              | 5            | 1              | 2           |                                  |
| Williams Draw @ mouth           | 1.46         | 2              | 5            | 2              | 3           |                                  |
| County Cr @ mouth               | 0.63         | 1              | 5            | 1              | 2           |                                  |
| Browns Gulch @ mouth            | 1            | 2              | 5            | 2              | 3           |                                  |
| Cannon Cr @ mouth               | 0.63         | 1              | 5            | 1              | 2           |                                  |
| Little Bumblebee Cr @ mouth     | 3.22         | 3              | 5            | 3              | 5           |                                  |
| Lost Mine Cr @ mouth            | 1.17         | 2              | 5            | 2              | 3           | Trib to Burnt Cabin Cr<br>036_02 |
| Lone Cabin Cr @ mouth           | 2.38         | 3              | 5            | 3              | 4           |                                  |
| Botm Cr @ mouth                 | 2.11         | 3              | 5            | 2              | 4           |                                  |
| George Cr @ mouth               | 0.73         | 1              | 5            | 1              | 2           |                                  |
| Hoodoo Cr @ mouth               | 0.47         | 1              | 5            | 1              | 2           | Trib to Deception Cr<br>037_02   |
| Demorest Cr @ mouth             | 0.46         | 1              | 5            | 1              | 2           |                                  |
| Sands Cr @ mouth                | 0.85         | 2              | 5            | 1              | 3           |                                  |
| Smith Cr @ mouth                | 1.4          | 2              | 5            | 2              | 3           | Trib to Bootjack Cr 034_02       |
| Stull Cr @ mouth                | 1.81         | 2              | 5            | 2              | 4           | Trib to Leiberg Cr<br>033_02     |
| Lavin Cr @ mouth                | 1.51         | 2              | 5            | 2              | 3           |                                  |
| Hemlock Cr @ mouth              | 1.81         | 2              | 5            | 2              | 4           |                                  |
| Tie Cr @ mouth                  | 1.39         | 2              | 5            | 2              | 3           |                                  |
| Unnamed Trib #1 to Laverne Cr   | 0.76         | 1              | 5            | 1              | 3           | Trib to Laverne Cr<br>032_02     |
| Unnamed Trib #2 to Laverne Cr   | 0.58         | 1              | 5            | 1              | 2           |                                  |
| Unnamed Trib #3 to Laverne Cr   | 1.35         | 2              | 5            | 2              | 3           |                                  |
| Unnamed Trib #1 to Bumblebee Cr | 0.62         | 1              | 5            | 1              | 2           | Trib to Bumblebee Cr<br>031_02   |
| Unnamed Trib #2 to Bumblebee Cr | 0.8          | 2              | 5            | 1              | 3           |                                  |
| Unnamed Trib #3 to Bumblebee Cr | 0.71         | 1              | 5            | 1              | 2           |                                  |

**Table D-4. Regional curve estimates and existing measurements of bank-full width for Upper North Fork Coeur d'Alene River tributaries.**

| Location                                 | area (sq mi) | Clearwater (m) | CDA USFS (m) | USFS power (m) | CDA WPN (m) |                                |
|--|--------------|----------------|--------------|----------------|-------------|--------------------------------|
| 1st Trib to Upper NF CDA River           | 1.35         | 2              | 5            | 2              | 3           | Trib to Upper NF CDA<br>015_02 |
| 2nd Trib to Upper NF CDA River           | 0.78         | 2              | 5            | 1              | 3           |                                |
| 3rd Trib to Upper NF CDA River           | 0.98         | 2              | 5            | 2              | 3           |                                |
| 4th Trib to Upper NF CDA River           | 3.18         | 3              | 5            | 3              | 5           |                                |
| Trib to 4th Trib                         | 0.68         | 1              | 5            | 1              | 2           |                                |
| 4th Trib ab its Trib                     | 1.39         | 2              | 5            | 2              | 3           |                                |
| Mosquito Cr @ mouth                      | 2.67         | 3              | 5            | 3              | 4           |                                |
| Trib to Mosquito Cr                      | 1.35         | 2              | 5            | 2              | 3           |                                |
| Mosquito Cr ab its Trib                  | 0.82         | 2              | 5            | 1              | 3           |                                |
| Trib bl Mosquito Cr                      | 1.06         | 2              | 5            | 2              | 3           |                                |
| Dahman Cr @ mouth                        | 1.6          | 2              | 5            | 2              | 3           |                                |
| Buckskin Cr @ mouth                      | 6.81         | 5              | 6            | 5              | 6           |                                |
| 1st Trib to Buckskin Cr                  | 0.41         | 1              | 5            | 1              | 2           |                                |
| 2nd Trib to Buckskin Cr                  | 3.6          | 3              | 5            | 3              | 5           |                                |
| Trib to 2nd Trib to Buckskin             | 1.01         | 2              | 5            | 2              | 3           |                                |
| Buckskin Cr ab 1st Trib                  | 2.02         | 2              | 5            | 2              | 4           |                                |
| Buckskin Cr ab 2nd Trib                  | 2.66         | 3              | 5            | 3              | 4           |                                |
| Spruce Cr @ mouth                        | 10.06        | 6              | 6            | 6              | 7           |                                |
| Spruce Cr ab Powder Cr                   | 3.94         | 4              | 6            | 3              | 5           |                                |
| Spruce Cr ab Larch Cr                    | 5.73         | 4              | 6            | 4              | 6           |                                |
| Spruce Cr ab Barren Cr                   | 8.51         | 5              | 6            | 5              | 7           |                                |
| Powder Cr @ mouth                        | 0.83         | 2              | 5            | 1              | 3           |                                |
| Larch Cr @ mouth                         | 2.15         | 3              | 5            | 2              | 4           |                                |
| Barren Cr @ mouth                        | 0.78         | 2              | 5            | 1              | 3           |                                |
| Martin Cr @ mouth                        | 1.22         | 2              | 5            | 2              | 3           |                                |
| Devil Cr @ mouth                         | 4.56         | 4              | 6            | 4              | 5           |                                |
| 1st Trib to Devil Cr                     | 0.48         | 1              | 5            | 1              | 2           |                                |
| Imp Cr Trib to Devil Cr                  | 0.99         | 2              | 5            | 2              | 3           |                                |
| Devil Cr ab 1st Trib                     | 1.02         | 2              | 5            | 2              | 3           |                                |
| Devil Cr ab Imp Cr                       | 3.56         | 3              | 5            | 3              | 5           |                                |
| Wren Cr @ mouth                          | 0.66         | 1              | 5            | 1              | 2           |                                |
| Clark Cr @ mouth                         | 0.82         | 2              | 5            | 1              | 3           |                                |
| Sluice Cr @ mouth                        | 0.81         | 2              | 5            | 1              | 3           |                                |
| Deer Cr @ mouth                          | 10.04        | 6              | 6            | 6              | 7           | 015_03                         |
| Deer Cr @ confl of Whitetail & Blacktail | 8.54         | 5              | 6            | 5              | 7           |                                |
| Whitetail Cr @ mouth                     | 3.26         | 3              | 5            | 3              | 5           | 015_02                         |
| Trib to Whitetail Cr                     | 1.02         | 2              | 5            | 2              | 3           |                                |
| Whitetail Cr ab Trib                     | 0.94         | 2              | 5            | 1              | 3           |                                |
| Blacktail Cr @ mouth                     | 5            | 4              | 6            | 4              | 6           |                                |
| Trib to Blacktail Cr                     | 1.18         | 2              | 5            | 2              | 3           |                                |
| Blacktail Cr ab Trib                     | 2.64         | 3              | 5            | 3              | 4           |                                |
| Alden Cr @ mouth                         | 5.63         | 4              | 6            | 4              | 6           |                                |
| East Alden Cr @ mouth                    | 2.66         | 3              | 5            | 3              | 4           |                                |
| Alden Cr ab East Alden                   | 2.44         | 3              | 5            | 3              | 4           |                                |
| Sheep Run Cr @ mouth                     | 1.03         | 2              | 5            | 2              | 3           |                                |
| East Alden Cr ab Sheep Run Cr            | 1.36         | 2              | 5            | 2              | 3           |                                |
| Jordan Cr @ mouth                        | 17.4         | 8              | 7            | 8              | 9           |                                |
| Jordan Cr ab Lost Fork                   | 4.42         | 4              | 6            | 4              | 5           |                                |
| Jordan Cr ab 1st tributary               | 0.73         | 1              | 5            | 1              | 2           |                                |
| 1st tributary to Jordan Cr               | 1.52         | 2              | 5            | 2              | 3           |                                |
| 2nd tributary to Jordan Cr               | 1.39         | 2              | 5            | 2              | 3           |                                |
| 3rd tributary to Jordan Cr               | 0.37         | 1              | 5            | 1              | 2           |                                |
| Calamity Cr @ mouth                      | 3.19         | 3              | 5            | 3              | 5           |                                |
| Calamity Cr ab 1st tributary             | 1.89         | 2              | 5            | 2              | 4           |                                |
| 1st tributary to Calamity Cr             | 0.9          | 2              | 5            | 1              | 3           |                                |
| Lost Fork @ mouth                        | 7.86         | 5              | 6            | 5              | 7           |                                |
| Lost Fork ab Plant Cr                    | 4.03         | 4              | 6            | 3              | 5           |                                |
| Lost Fork ab 1st tributary               | 0.77         | 2              | 5            | 1              | 3           |                                |
| 1st tributary to Lost Fork               | 0.45         | 1              | 5            | 1              | 2           |                                |
| Sho Cr @ mouth                           | 1.81         | 2              | 5            | 2              | 4           |                                |
| Plant Cr @ mouth                         | 0.58         | 1              | 5            | 1              | 2           |                                |
| Bluff Cr @ mouth                         | 1.45         | 2              | 5            | 2              | 3           |                                |
| 1st tributary to Bluff Cr                | 0.48         | 1              | 5            | 1              | 2           |                                |
| Cub Cr @ mouth                           | 0.8          | 2              | 5            | 1              | 3           |                                |

**Table D-4 (cont.). Regional curve estimates and existing measurements of bank-full width for Upper North Fork Tributaries.**

|   |      |   |   |   |   |
|---|------|---|---|---|---|
| Cataract Cr @ mouth                       | 6.2  | 4 | 6 | 4 | 6 |
| Cataract Cr ab W. Elk Cr                  | 2.29 | 3 | 5 | 2 | 4 |
| West Elk Cr @ mouth                       | 3.83 | 3 | 6 | 3 | 5 |
| Senator Cr @ mouth                        | 0.83 | 2 | 5 | 1 | 3 |
| Spion Kop Cr @ mouth                      | 1.06 | 2 | 5 | 2 | 3 |
| Cinnamon Cr @ mouth                       | 5.46 | 4 | 6 | 4 | 6 |
| Cinnamon Cr bl 2nd tributary              | 3.08 | 3 | 5 | 3 | 5 |
| 1st tributary to Cinnamon Cr              | 0.61 | 1 | 5 | 1 | 2 |
| 2nd tributary to Cinnamon Cr              | 1.14 | 2 | 5 | 2 | 3 |
| 3rd tributary to Cinnamon Cr              | 0.99 | 2 | 5 | 2 | 3 |
| Lion Cr @ mouth                           | 0.35 | 1 | 5 | 1 | 2 |
| Taft Cr @ mouth                           | 1.12 | 2 | 5 | 2 | 3 |
| Presidents Cr @ mouth                     | 0.53 | 1 | 5 | 1 | 2 |
| Wilson Cr @ mouth                         | 0.73 | 1 | 5 | 1 | 2 |
| Brett Cr @ mouth                          | 5.23 | 4 | 6 | 4 | 6 |
| Brett Cr ab 1st tributary                 | 2.35 | 3 | 5 | 2 | 4 |
| 1st tributary to Brett Cr                 | 1.11 | 2 | 5 | 2 | 3 |
| 2nd tributary to Brett Cr                 | 1.2  | 2 | 5 | 2 | 3 |
| Gold Cr @ mouth                           | 1.62 | 2 | 5 | 2 | 3 |
| Miners Cr @ mouth                         | 4.55 | 4 | 6 | 4 | 5 |
| Miners Cr ab 1st tributary                | 0.77 | 2 | 5 | 1 | 3 |
| 1st tributary to Miners Cr                | 0.75 | 1 | 5 | 1 | 3 |
| Debbs Cr @ mouth                          | 0.65 | 1 | 5 | 1 | 2 |
| Bennett Cr @ mouth                        | 0.72 | 1 | 5 | 1 | 2 |
| Big Hank Cr @ mouth                       | 2.26 | 3 | 5 | 2 | 4 |
| Big Hank Cr ab 1st tributary              | 1.21 | 2 | 5 | 2 | 3 |
| 1st tributary to Big Hank Cr              | 1.21 | 2 | 5 | 2 | 3 |
| Un-named ab Little Canyon Cr              | 0.57 | 1 | 5 | 1 | 2 |
| Little Canyon Cr @ mouth                  | 1.91 | 2 | 5 | 2 | 4 |
| Flat Cr @ mouth                           | 14.1 | 7 | 7 | 7 | 9 |
| Flat Cr bl Svee Cr                        | 11.1 | 6 | 6 | 6 | 8 |
| Flat Cr ab Svee Cr                        | 8.09 | 5 | 6 | 5 | 7 |
| Flat Cr bl 3rd tributary                  | 5.6  | 4 | 6 | 4 | 6 |
| Flat Cr ab 1st tributary                  | 0.88 | 2 | 5 | 1 | 3 |
| 1st tributary to Flat Cr                  | 1.07 | 2 | 5 | 2 | 3 |
| 2nd tributary to Flat Cr                  | 0.63 | 1 | 5 | 1 | 2 |
| 3rd tributary to Flat Cr                  | 2.22 | 3 | 5 | 2 | 4 |
| 1st tributary to 3rd tributary to Flat Cr | 0.59 | 1 | 5 | 1 | 2 |
| Svee Cr @ mouth                           | 2.98 | 3 | 5 | 3 | 4 |
| 4th tributary to Flat Cr                  | 0.85 | 2 | 5 | 1 | 3 |
| 5th tributary to Flat Cr                  | 0.82 | 2 | 5 | 1 | 3 |
| Teddy Cr @ mouth                          | 2.31 | 3 | 5 | 2 | 4 |
| Yellow Dog Cr @ mouth                     | 7.77 | 5 | 6 | 5 | 7 |
| Yellow Dog Cr bl 4th tributary            | 5.22 | 4 | 6 | 4 | 6 |
| Yellow Dog Cr ab 1st tributary            | 0.97 | 2 | 5 | 2 | 3 |
| 1st tributary to Yellow Dog Cr            | 0.76 | 1 | 5 | 1 | 3 |
| 2nd tributary to Yellow Dog Cr            | 0.99 | 2 | 5 | 2 | 3 |
| 3rd tributary to Yellow Dog Cr            | 1.53 | 2 | 5 | 2 | 3 |
| 4th tributary to Yellow Dog Cr            | 0.5  | 1 | 5 | 1 | 2 |
| Ash Cr @ mouth                            | 0.81 | 2 | 5 | 1 | 3 |

**Table D-5. Regional curve estimates and existing measurements of bank-full width for Independence Creek tributaries.**

| Location                             | area (sq mi) | Clearwater (m) | CDA USFS (m) | USFS power (m) | CDA WPN (m) |                                   |
|--------------------------------------|--------------|----------------|--------------|----------------|-------------|-----------------------------------|
| Goose Cr @ mouth                     | 3.18         | 3              | 5            | 3              | 5           | Trib to Independence Cr<br>018_02 |
| Gosling Cr @ mouth                   | 0.67         | 1              | 5            | 1              | 2           |                                   |
| Goose Cr ab Gosling Cr               | 1.58         | 2              | 5            | 2              | 3           |                                   |
| Snowshoe Cr @ mouth                  | 1.16         | 2              | 5            | 2              | 3           |                                   |
| Ellis Cr @ mouth                     | 1.84         | 2              | 5            | 2              | 4           |                                   |
| Trib to Ellis Cr                     | 0.44         | 1              | 5            | 1              | 2           |                                   |
| Ellis Cr ab Trib                     | 0.82         | 2              | 5            | 1              | 3           |                                   |
| Declaration Cr @ mouth               | 9.06         | 5              | 6            | 5              | 7           | 018_02 & 018_03a                  |
| Declaration Cr ab 3rd Trib           | 7.69         | 5              | 6            | 5              | 7           | 018_02                            |
| Declaration Cr ab 2nd Trib           | 4.1          | 4              | 6            | 3              | 5           |                                   |
| Declaration Cr ab 1st Trib           | 2.69         | 3              | 5            | 3              | 4           |                                   |
| 1st Trib to Declaration Cr           | 1.25         | 2              | 5            | 2              | 3           |                                   |
| 2nd Trib to Declaration Cr           | 3.55         | 3              | 5            | 3              | 5           |                                   |
| 3rd Trib to Declaration Cr           | 0.37         | 1              | 5            | 1              | 2           |                                   |
| Trib to 2nd Trib to Declaration      | 0.77         | 2              | 5            | 1              | 3           |                                   |
| 2nd Trib ab its Trib                 | 2.33         | 3              | 5            | 2              | 4           |                                   |
| Trib bl Declaration Cr               | 0.42         | 1              | 5            | 1              | 2           |                                   |
| Snowbird Cr @ mouth                  | 1.32         | 2              | 5            | 2              | 3           |                                   |
| Surprise Cr @ mouth                  | 1.56         | 2              | 5            | 2              | 3           |                                   |
| 1st Trib bl Surprise Cr (North side) | 0.39         | 1              | 5            | 1              | 2           |                                   |
| 2nd Trib bl Surprise Cr (South side) | 0.49         | 1              | 5            | 1              | 2           |                                   |
| Ermine Cr @ mouth                    | 2.39         | 3              | 5            | 3              | 4           |                                   |
| Trib to Ermine Cr                    | 0.62         | 1              | 5            | 1              | 2           |                                   |
| Ermine Cr ab Trib                    | 1.63         | 2              | 5            | 2              | 3           |                                   |
| Snow Cr @ mouth                      | 7.35         | 5              | 6            | 5              | 6           | 018_02 & 018_03b                  |
| Snow Cr ab 3rd Trib                  | 3.35         | 3              | 5            | 3              | 5           | 018_02                            |
| Snow Cr ab 2nd Trib                  | 2.27         | 3              | 5            | 2              | 4           |                                   |
| Snow Cr ab 1st Trib                  | 1.27         | 2              | 5            | 2              | 3           |                                   |
| 1st Trib to Snow Cr                  | 0.71         | 1              | 5            | 1              | 2           |                                   |
| 2nd Trib to Snow Cr                  | 0.92         | 2              | 5            | 1              | 3           |                                   |
| 3rd Trib to Snow Cr                  | 1.82         | 2              | 5            | 2              | 4           |                                   |
| Trib to 3rd Snow Trib                | 0.62         | 1              | 5            | 1              | 2           |                                   |
| North Cr @ mouth                     | 3.95         | 4              | 6            | 3              | 5           |                                   |
| Trib to North Cr                     | 0.56         | 1              | 5            | 1              | 2           |                                   |
| North Cr ab Trib                     | 2.12         | 3              | 5            | 2              | 4           |                                   |
| Griffith Cr @ mouth                  | 0.75         | 1              | 5            | 1              | 3           |                                   |
| Green Cr @ mouth                     | 2.23         | 3              | 5            | 2              | 4           |                                   |
| Trib bl Green Cr                     | 0.37         | 1              | 5            | 1              | 2           |                                   |
| Emerson Cr @ mouth                   | 4.69         | 4              | 6            | 4              | 5           |                                   |
| Trib to Emerson Cr                   | 1.24         | 2              | 5            | 2              | 3           |                                   |
| Emerson Cr ab Trib                   | 2.3          | 3              | 5            | 2              | 4           |                                   |
| Owl Cr @ mouth                       | 3.67         | 3              | 5            | 3              | 5           |                                   |
| Minor Cr @ mouth                     | 0.72         | 1              | 5            | 1              | 2           |                                   |
| Trident Cr @ mouth                   | 0.84         | 2              | 5            | 1              | 3           |                                   |
| Trib to Trident Cr                   | 0.39         | 1              | 5            | 1              | 2           |                                   |
| Trident Cr ab Trib                   | 0.41         | 1              | 5            | 1              | 2           |                                   |
| 1st Trib bl Trident Cr               | 0.25         | 1              | 5            | 1              | 2           |                                   |
| 2nd Trib bl Trident Cr               | 0.29         | 1              | 5            | 1              | 2           |                                   |

**Table D-6. Regional curve estimates and existing measurements of bank-full width for Shoshone Creek tributaries.**

| Location                          | area (sq mi) | Clearwater (m) | CDA USFS (m) | USFS power (m) | CDA WPN (m) |
|-----------------------------------|--------------|----------------|--------------|----------------|-------------|
| 1st Tributary to Shoshone Cr      | 0.28         | 1              | 5            | 1              | 2           |
| 2nd tributary to Shoshone Cr      | 2.03         | 2              | 5            | 2              | 4           |
| Hemlock Cr @ mouth                | 2.04         | 2              | 5            | 2              | 4           |
| 3rd tributary to Shoshone Cr      | 0.31         | 1              | 5            | 1              | 2           |
| Tent Cr @ mouth                   | 0.42         | 1              | 5            | 1              | 2           |
| Ulm Cr @ mouth                    | 2.57         | 3              | 5            | 3              | 4           |
| Little Lost Fork @ mouth          | 3.61         | 3              | 5            | 3              | 5           |
| 1st tributary to Little Lost Fork | 0.88         | 2              | 5            | 1              | 3           |
| 2nd tributary to Little Lost Fork | 0.32         | 1              | 5            | 1              | 2           |
| 3rd tributary to Little Lost Fork | 0.95         | 2              | 5            | 1              | 3           |
| Sentinel Cr @ mouth               | 2            | 2              | 5            | 2              | 4           |
| Windfall Cr @ mouth               | 0.49         | 1              | 5            | 1              | 2           |
| Camp Cr @ mouth                   | 0.91         | 2              | 5            | 1              | 3           |
| Hells Gulch @ mouth               | 2.6          | 3              | 5            | 3              | 4           |
| SF Hells Gulch @ mouth            | 1.21         | 2              | 5            | 2              | 3           |
| Clinton Cr @ mouth                | 4.5          | 4              | 6            | 4              | 5           |
| Rampike Cr @ mouth                | 3.56         | 3              | 5            | 3              | 5           |
| Pine Flat Cr @ mouth              | 1.82         | 2              | 5            | 2              | 4           |
| Cabin Cr @ mouth                  | 3.92         | 3              | 6            | 3              | 5           |
| SF Cabin Cr @ mouth               | 1.25         | 2              | 5            | 2              | 3           |
| Chute Cr @ mouth                  | 0.9          | 2              | 5            | 1              | 3           |
| Pipe Cr @ mouth                   | 0.55         | 1              | 5            | 1              | 2           |
| Falls Cr @ mouth                  | 14           | 7              | 7            | 7              | 8           |
| Falls Cr bi NF/SF confluence      | 7            | 5              | 6            | 5              | 6           |
| NF Falls Cr @ mouth               | 3.64         | 3              | 5            | 3              | 5           |
| SF Falls Cr @ mouth               | 3.37         | 3              | 5            | 3              | 5           |

**Table D-7. Regional curve estimates and existing measurements of bank-full width for Lower North Fork Coeur d'Alene River tributaries.**

| Location                         | area (sq mi) | Clearwater (m) | CDA USFS (m) | USFS power (m) | CDA WPN (m) |
|----------------------------------|--------------|----------------|--------------|----------------|-------------|
| Cedar Cr @ mouth                 | 4.67         | 4              | 6            | 4              | 5           |
| Cedar Cr ab Lansdale Cr          | 3.7          | 3              | 5            | 3              | 5           |
| Lansdale Cr @ mouth              | 0.38         | 1              | 5            | 1              | 2           |
| Hopkins Cr @ mouth               | 1.85         | 2              | 5            | 2              | 4           |
| Hopkins Cr ab 1st tributary      | 1.09         | 2              | 5            | 2              | 3           |
| 1st tributary to Hopkins Cr      | 0.48         | 1              | 5            | 1              | 2           |
| 2nd tributary to Hopkins Cr      | 0.6          | 1              | 5            | 1              | 2           |
| Brown Cr @ mouth                 | 5.78         | 4              | 6            | 4              | 6           |
| Brown Cr ab Hart Cr              | 4.15         | 4              | 6            | 3              | 5           |
| Brown Cr ab 1st tributary        | 2.45         | 3              | 5            | 3              | 4           |
| 1st tributary to Brown Cr        | 0.66         | 1              | 5            | 1              | 2           |
| Hart Cr @ mouth                  | 0.38         | 1              | 5            | 1              | 2           |
| Rookie Cr @ mouth                | 0.97         | 2              | 5            | 2              | 3           |
| Little Grizzly Cr @ mouth        | 0.92         | 2              | 5            | 1              | 3           |
| Cinnabar Cr @ mouth              | 1.11         | 2              | 5            | 2              | 3           |
| Grizzly Cr @ mouth               | 7.17         | 5              | 6            | 5              | 6           |
| Grizzly Cr ab Lindsey Cr         | 1.74         | 2              | 5            | 2              | 4           |
| Lindsey Cr @ mouth               | 1.3          | 2              | 5            | 2              | 3           |
| Dewey Cr @ mouth                 | 2.94         | 3              | 5            | 3              | 4           |
| Dewey Cr ab 1st tributary        | 0.99         | 2              | 5            | 2              | 3           |
| 1st tributary to Dewey Cr        | 0.83         | 2              | 5            | 1              | 3           |
| Un-named (West of Grizzly Cr)    | 0.41         | 1              | 5            | 1              | 2           |
| Silver Cr @ mouth                | 1.3          | 2              | 5            | 2              | 3           |
| Coal Cr @ mouth                  | 3.45         | 3              | 5            | 3              | 5           |
| Tent Cr @ mouth                  | 0.61         | 1              | 5            | 1              | 2           |
| Pablo Cr @ mouth                 | 0.33         | 1              | 5            | 1              | 2           |
| Scott Cr @ mouth                 | 1.81         | 2              | 5            | 2              | 4           |
| Un-named (parallel Simmons Draw) | 0.54         | 1              | 5            | 1              | 2           |
| Simmons Draw @ mouth             | 0.32         | 1              | 5            | 1              | 2           |
| Guard Cr @ mouth                 | 0.42         | 1              | 5            | 1              | 2           |
| Spring Cr @ mouth                | 0.79         | 2              | 5            | 1              | 3           |
| Un-named (bl Spring Cr)          | 0.66         | 1              | 5            | 1              | 2           |
| Un-named (ab McRae Cr)           | 0.48         | 1              | 5            | 1              | 2           |
| McRae Cr @ mouth                 | 0.21         | 1              | 5            | 1              | 1           |
| Cougar Gulch @ mouth             | 19.4         | 8              | 7            | 8              | 10          |
| Cougar Gulch ab Dennis Cr        | 12.6         | 6              | 7            | 6              | 8           |
| Cougar Gulch bl Lone Cr          | 10.1         | 6              | 6            | 6              | 7           |
| Cougar Gulch bl forks confluence | 6            | 4              | 6            | 4              | 6           |
| Smith Cr @ mouth                 | 1.07         | 2              | 5            | 2              | 3           |
| Fall Cr @ mouth                  | 1.86         | 2              | 5            | 2              | 4           |
| Thomas Cr @ mouth                | 2.96         | 3              | 5            | 3              | 4           |
| Marsh Cr @ mouth                 | 0.55         | 1              | 5            | 1              | 2           |
| Un-named (bl Marsh Cr)           | 0.38         | 1              | 5            | 1              | 2           |
| Studer Cr @ mouth                | 0.99         | 2              | 5            | 2              | 3           |
| Lightner Draw @ mouth            | 1.78         | 2              | 5            | 2              | 4           |
| Un-named (ab Little NF CDA R)    | 1.07         | 2              | 5            | 2              | 3           |
| Hazendorf Cr @ mouth             | 1.94         | 2              | 5            | 2              | 4           |
| Hullman Gulch @ mouth            | 0.9          | 2              | 5            | 1              | 3           |
| Prado Cr @ mouth                 | 4.34         | 4              | 6            | 4              | 5           |
| 1st tributary to Prado Cr        | 2.02         | 2              | 5            | 2              | 4           |
| Un-named (bl Prado Cr)           | 1.11         | 2              | 5            | 2              | 3           |
| McPhee Cr @ mouth                | 1.59         | 2              | 5            | 2              | 3           |

Tribs to Lower NF CDA R.  
001\_02

**Table D-8. Regional curve estimates and existing measurements of bank-full width for Trail Creek and Tepee Creek tributaries.**

| Location                        | area (sq mi) | Clearwater (m) | CDA USFS (m) | USFS power (m) | CDA WPN (m) |                                     |
|---------------------------------|--------------|----------------|--------------|----------------|-------------|-------------------------------------|
| Potter Cr @ mouth               | 5.22         | 4              | 6            | 4              | 6           | Tribes to Trail Creek<br>019_02,_03 |
| Potter Cr ab SF Potter Cr       | 1.91         | 2              | 5            | 2              | 4           |                                     |
| SF Potter Cr @ mouth            | 1.69         | 2              | 5            | 2              | 4           |                                     |
| Stewart Cr @ mouth              | 6.2          | 4              | 6            | 4              | 6           |                                     |
| Stewart Cr bl 3rd tributary     | 3.34         | 3              | 5            | 3              | 5           |                                     |
| 1st tributary to Stewart Cr     | 0.69         | 1              | 5            | 1              | 2           |                                     |
| 2nd tributary to Stewart Cr     | 0.49         | 1              | 5            | 1              | 2           |                                     |
| 3rd tributary to Stewart Cr     | 0.41         | 1              | 5            | 1              | 2           |                                     |
| 4th tributary to Stewart Cr     | 0.3          | 1              | 5            | 1              | 2           |                                     |
| 5th tributary to Stewart Cr     | 0.46         | 1              | 5            | 1              | 2           |                                     |
| Callis Cr @ mouth               | 5.89         | 4              | 6            | 4              | 6           |                                     |
| Callis Cr bl NF Callis Cr       | 5            | 4              | 6            | 4              | 6           |                                     |
| Callis Cr ab NF Callis Cr       | 4.29         | 4              | 6            | 4              | 5           |                                     |
| Callis Cr ab 1st tributary      | 1.95         | 2              | 5            | 2              | 4           |                                     |
| 1st tributary to Callis Cr      | 1.05         | 2              | 5            | 2              | 3           |                                     |
| 2nd tributary to Callis Cr      | 0.6          | 1              | 5            | 1              | 2           |                                     |
| NF Callis Cr @ mouth            | 0.7          | 1              | 5            | 1              | 2           |                                     |
| Coon Gulch @ mouth              | 0.97         | 2              | 5            | 2              | 3           |                                     |
| Hamilton Cr @ mouth             | 1.71         | 2              | 5            | 2              | 4           |                                     |
| Dresser Cr @ mouth              | 1.39         | 2              | 5            | 2              | 3           |                                     |
| Bear Cr @ mouth                 | 3.5          | 3              | 5            | 3              | 5           |                                     |
| Bear Cr ab West Bear Cr         | 2.54         | 3              | 5            | 3              | 4           |                                     |
| West Bear Cr @ mouth            | 0.82         | 2              | 5            | 1              | 3           |                                     |
| tributary to West Bear Cr       | 0.45         | 1              | 5            | 1              | 2           |                                     |
| US Cr @ mouth                   | 1.77         | 2              | 5            | 2              | 4           |                                     |
| 1st un-named to Big Elk Cr      | 0.44         | 1              | 5            | 1              | 2           |                                     |
| 2nd un-named to Big Elk Cr      | 0.46         | 1              | 5            | 1              | 2           |                                     |
| 3rd un-named to Big Elk Cr      | 0.44         | 1              | 5            | 1              | 2           |                                     |
| Boundary Cr @ mouth             | 1.24         | 2              | 5            | 2              | 3           |                                     |
| 4th tributary to Big Elk Cr     | 0.42         | 1              | 5            | 1              | 2           |                                     |
| First Cr @ mouth                | 1.83         | 2              | 5            | 2              | 4           |                                     |
| New Cr @ mouth                  | 0.42         | 1              | 5            | 1              | 2           |                                     |
| 1st un-named to Tepee Cr        | 0.68         | 1              | 5            | 1              | 2           |                                     |
| Y Cr @ mouth                    | 0.8          | 2              | 5            | 1              | 3           |                                     |
| Riley Cr @ mouth                | 1.2          | 2              | 5            | 2              | 3           |                                     |
| Short Cr @ mouth                | 2.88         | 3              | 5            | 3              | 4           |                                     |
| 1st tributary to Short Cr       | 0.5          | 1              | 5            | 1              | 2           |                                     |
| Little Elk Cr @ mouth           | 3.93         | 4              | 6            | 3              | 5           |                                     |
| 1st tributary to Little Elk Cr  | 0.77         | 2              | 5            | 1              | 3           |                                     |
| 2nd tributary to Little Elk Cr  | 0.87         | 2              | 5            | 1              | 3           |                                     |
| Drexall Cr @ mouth              | 0.7          | 1              | 5            | 1              | 2           |                                     |
| Halsey Cr @ mouth               | 4.87         | 4              | 6            | 4              | 5           |                                     |
| Halsey Cr ab 1st tributary      | 1.93         | 2              | 5            | 2              | 4           |                                     |
| 1st tributary to Halsey Cr      | 0.5          | 1              | 5            | 1              | 2           |                                     |
| 2nd tributary to Halsey Cr      | 0.65         | 1              | 5            | 1              | 2           |                                     |
| 3rd tributary to Halsey Cr      | 0.59         | 1              | 5            | 1              | 2           |                                     |
| Van Hooster Cr @ mouth          | 1.54         | 2              | 5            | 2              | 3           |                                     |
| 1st tributary to Van Hooster Cr | 0.43         | 1              | 5            | 1              | 2           |                                     |
| Ryan Cr @ mouth                 | 0.77         | 2              | 5            | 1              | 3           |                                     |

**Table D-9. Regional curve estimates and existing measurements of bank-full width for Prichard Creek and Eagle Creek tributaries.**

| Location                          | area (sq mi) | Clearwater (m) | CDA USFS (m) | USFS power (m) | CDA WPN (m) |                                 |
|-----------------------------------|--------------|----------------|--------------|----------------|-------------|---------------------------------|
| Falls Cr @ mouth                  | 0.68         | 1              | 5            | 1              | 2           | Tribes to Prichard Cr<br>005_02 |
| Cascade Gulch @ mouth             | 1.76         | 2              | 5            | 2              | 4           |                                 |
| Granite Gulch @ mouth             | 9            | 5              | 6            | 5              | 7           |                                 |
| Barton Gulch @ mouth              | 1.16         | 2              | 5            | 2              | 3           |                                 |
| West Fork @ mouth                 | 1.25         | 2              | 5            | 2              | 3           |                                 |
| Moonshine Gulch @ mouth           | 1.62         | 2              | 5            | 2              | 3           |                                 |
| Granite Gulch ab Barton/West Fork | 6.56         | 5              | 6            | 4              | 6           |                                 |
| Granite Gulch ab Moonshine Gulch  | 4.07         | 4              | 6            | 3              | 5           |                                 |
| Bear Gulch @ mouth                | 7.88         | 5              | 6            | 5              | 7           |                                 |
| Idaho Gulch @ mouth               | 2.35         | 3              | 5            | 2              | 4           |                                 |
| Cottonwood Cr @ mouth             | 2.46         | 3              | 5            | 3              | 4           |                                 |
| Bobtail Cr @ mouth                | 2.02         | 2              | 5            | 2              | 4           |                                 |

**Table D-10. Regional curve estimates and existing measurements of bank-full width for Steamboat Creek tributaries.**

| Location                   | area (sq mi) | Clearwater (m) | CDA USFS (m) | USFS power (m) | CDA WPN (m) |                                  |
|----------------------------|--------------|----------------|--------------|----------------|-------------|----------------------------------|
| Martin Cr @ mouth          | 0.71         | 1              | 5            | 1              | 2           | Tribes to Steamboat Cr<br>028_02 |
| Clay Cr @ mouth            | 1.1          | 2              | 5            | 2              | 3           |                                  |
| Cabin Cr @ mouth           | 1.99         | 2              | 5            | 2              | 4           |                                  |
| Little EF Cr @ mouth       | 2.75         | 3              | 5            | 3              | 4           |                                  |
| Long Tom Cr @ mouth        | 0.75         | 1              | 5            | 1              | 3           |                                  |
| Betty Cr @ mouth           | 0.58         | 1              | 5            | 1              | 2           |                                  |
| Un-named @ mouth           | 0.79         | 2              | 5            | 1              | 3           |                                  |
| Comfy Cr @ mouth           | 4.19         | 4              | 6            | 3              | 5           |                                  |
| Clark Gulch @ mouth        | 0.33         | 1              | 5            | 1              | 2           |                                  |
| Black Canyon Cr @ mouth    | 1.69         | 2              | 5            | 2              | 4           |                                  |
| Boston Brook @ mouth       | 0.41         | 1              | 5            | 1              | 2           |                                  |
| June Cr @ mouth            | 0.6          | 1              | 5            | 1              | 2           |                                  |
| Big Bob Cr @ mouth         | 1.04         | 2              | 5            | 2              | 3           |                                  |
| Can Cr @ mouth             | 4.39         | 4              | 6            | 4              | 5           |                                  |
| Can Cr ab Felder Cr        | 1.08         | 2              | 5            | 2              | 3           |                                  |
| Felder Cr @ mouth          | 0.78         | 2              | 5            | 1              | 3           |                                  |
| 2nd tributary to Can Cr    | 0.48         | 1              | 5            | 1              | 2           |                                  |
| Barrymore Cr @ mouth       | 3.94         | 4              | 6            | 3              | 5           |                                  |
| Indian Cr @ mouth          | 3.42         | 3              | 5            | 3              | 5           |                                  |
| 1st tributary to Indian Cr | 0.78         | 2              | 5            | 1              | 3           |                                  |
| Omaha Cr @ mouth           | 1.75         | 2              | 5            | 2              | 4           |                                  |
| Eighty Day Cr @ mouth      | 0.67         | 1              | 5            | 1              | 2           |                                  |

**Table D-11. Regional curve estimates and existing measurements of bank-full width for Beaver Creek tributaries.**

| Location                    | area (sq mi) | Clearwater (m) | CDA USFS (m) | USFS power (m) | CDA WPN (m) |                               |
|-----------------------------|--------------|----------------|--------------|----------------|-------------|-------------------------------|
| Carbon Creek @ mouth        | 1.38         | 2              | 5            | 2              | 3           | Tribes to Beaver Cr<br>003_02 |
| Dobson Gulch @ mouth        | 2.02         | 2              | 5            | 2              | 4           |                               |
| Dudley Creek @ mouth        | 2.91         | 3              | 5            | 3              | 4           |                               |
| Moore Gulch @ mouth         | 1.04         | 2              | 5            | 2              | 3           |                               |
| Deer Creek @ mouth          | 2.62         | 3              | 5            | 3              | 4           |                               |
| Unknown Gulch @ mouth       | 0.85         | 2              | 5            | 1              | 3           |                               |
| Pony Gulch @ mouth          | 3.58         | 3              | 5            | 3              | 5           |                               |
| Alder Creek @ mouth         | 2.69         | 3              | 5            | 3              | 4           |                               |
| White Creek @ mouth         | 4.19         | 4              | 6            | 3              | 5           |                               |
| White Creek ab tributary    | 2.25         | 3              | 5            | 2              | 4           |                               |
| Tributary to White Creek    | 0.74         | 1              | 5            | 1              | 2           |                               |
| Scott Gulch @ mouth         | 0.94         | 2              | 5            | 1              | 3           |                               |
| Trail Creek @ mouth         | 5.7          | 4              | 6            | 4              | 6           |                               |
| Trail Creek ab Potosi Gulch | 2.54         | 3              | 5            | 3              | 4           |                               |
| Potosi Gulch @ mouth        | 2.27         | 3              | 5            | 2              | 4           |                               |
| Carpenter Gulch @ mouth     | 1.83         | 2              | 5            | 2              | 4           |                               |

## Appendix E. Potential Natural Vegetation Descriptions and Shade Curves

### Potential Natural Vegetation Groups

The Upper (North Fork) Coeur d'Alene River subbasin temperature TMDLs were based on effective shade estimates for six unique potential natural vegetation (PNV) groups:

- Warm/Dry Forest Group A
- Moist Forest Group B
- Cool/Moist Forest Group C
- Cool/Dry Forest Group D
- Non-Forest Group 1
- Non-Forest Group 2

A detailed description of these groups is available in Shumar and De Varona (2009) along with information on shade curve development. This appendix includes general descriptions, example photographs, and information on the composition and other vegetation characteristics of each PNV group.

The forest groups applied in these TMDLs were built on analyses by the U.S. Forest Service Idaho Panhandle National Forests (IPNF) and used USFS historic range of variability data and tree species information from the Coeur d'Alene National Forest (one of the three forests that make up the IPNF). The non-forest groups applied in these TMDLs were built upon analyses performed during development of Pend Oreille Lake subbasin temperature TMDLs. Detailed information is available in Shumar and De Varona (2009). The non-forest groups and shade curves were developed based on measurements in field plots using canopy cover, constancy, and tree height data.

Shade curves estimating percent effective shade depending on bank-full width were developed for each PNV group using a model called Shade.xls produced by the Washington Department of Ecology (Washington Department of Ecology 2010). Detailed information is available in Shumar and De Varona 2009. This model is based on work by Y.D. Chen and the Oregon Department of Environmental Quality (ODEQ) HeatSource model (Boyd 1996; Chen 1996; Chen et al. 1998a; 1998b; Boyd and Kasper 2003; ODEQ 2006). For these shade curves, the Chen method was applied to the Shade.xls model using the following inputs for each PNV group: average height, average canopy cover, and average overhang (Table E-1).

**Table E-1. Estimated average height and canopy cover data for shade model inputs.**

| PNV Group                 | Average Height (feet) | Average Canopy Cover (%) |
|---------------------------|-----------------------|--------------------------|
| Warm/Dry Forest Group A   | 71                    | 57                       |
| Moist Forest Group B      | 84                    | 81                       |
| Cool/Moist Forest Group C | 73                    | 78                       |
| Cool/Dry Forest Group D   | 68                    | 70                       |
| Non-Forest Group 1        | 71                    | 58                       |
| Non-Forest Group 2        | 82                    | 50                       |

**Table E-2. Estimated average tree height for Idaho Panhandle National Forests, Coeur d'Alene National Forest.**

| Tree Species<br>Common Name   | Size Class and Average Tree Height (feet) |                          |                            |                           |                            |
|-------------------------------|---|--------------------------|----------------------------|---------------------------|----------------------------|
|                               | Sapling<br>(3-inch<br>dbh) <sup>a</sup>   | Small<br>(8-inch<br>dbh) | Medium<br>(13-inch<br>dbh) | Large<br>(19-inch<br>dbh) | Oldest<br>(24-inch<br>dbh) |
| Ponderosa Pine                | 18  | 54                       | 75                         | 91                        | 100                        |
| White Pine                    | 22  | 69                       | 98                         | 119                       | 130                        |
| Western Larch                 | 31  | 73                       | 94                         | 108                       | 115                        |
| Douglas Fir                   | 24  | 59                       | 78                         | 90                        | 97                         |
| Grand Fir/ Western<br>Hemlock | 24  | 64                       | 87                         | 103                       | 112                        |
| Western Redcedar              | 21  | 57                       | 78                         | 92                        | 100                        |
| Lodgepole Pine                | 31  | 61                       | 74                         | 82                        | 87                         |
| Subalpine Fir                 | 22  | 55                       | 73                         | 85                        | 91                         |
| Whitebark Pine                | 31  | 73                       | 94                         | 108                       | 115                        |

a. diameter at breast height

### ***Warm/Dry Forest Group A***

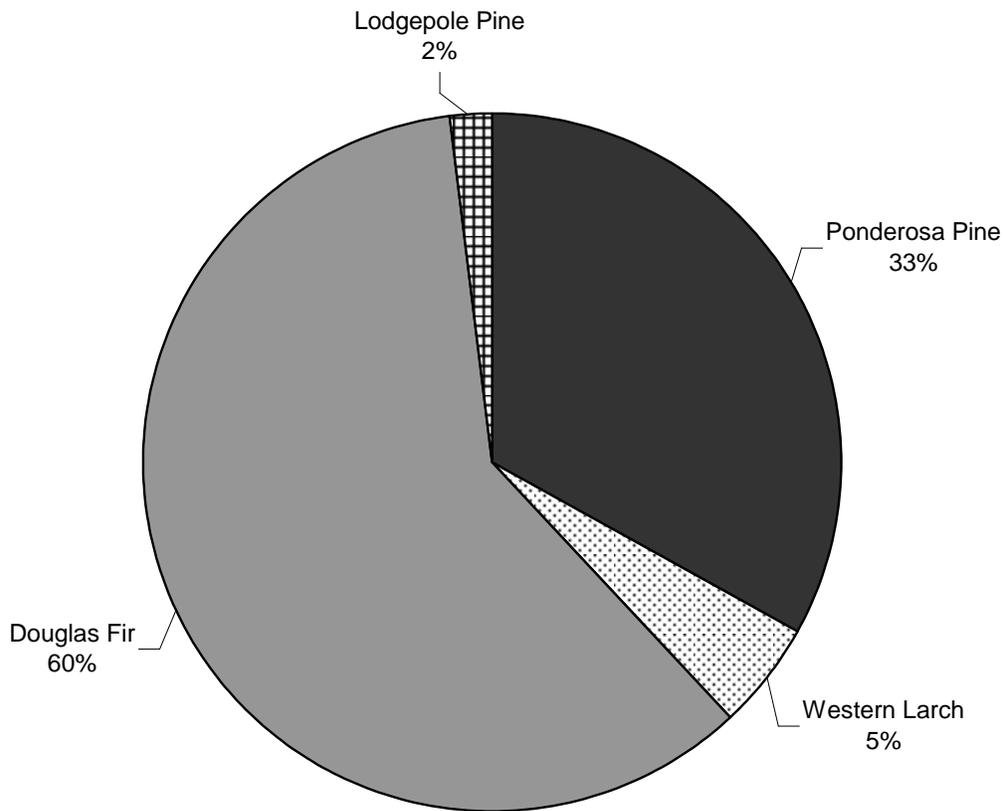
The warm/dry forest group A was applied on streams less than 5th order with a gradient greater than or equal to 3% and vegetation from vegetation response units (VRUs) 1, 2, and 3. This group includes the warmest and driest forest sites that support forest vegetation, usually at low elevations or mid elevations on southerly aspects (Figure E-1, Figure E-2). Historical forest vegetation composition data for the IPNF Coeur d'Alene National Forest were used (Table E-3). Inputs to the shade model for this forest group included estimates of the overall average height (71 feet [ft]), weighted average canopy cover (57%), and average overhang (7.1 ft).





(Photos courtesy Dr. R.E. Rosiere)

**Figure E-1. Forest group A is generally dominated by Douglas fir and Ponderosa pine.**



**Figure E-2. Warm/dry forest group A species composition.**

**Table E-3. Warm/dry forest group A composition by species and size classes.**

| Tree Species<br>Common Name | Size Class and Prevalence (%) |       |        |       |        |       |
|-----------------------------|-------------------------------|-------|--------|-------|--------|-------|
|                             | Sapling                       | Small | Medium | Large | Oldest | Total |
| Ponderosa Pine              | 6.9                           | 5.3   | 5.3    | 7.3   | 8.3    | 33    |
| White Pine                  | --                            | --    | --     | --    | --     | --    |
| Western Larch               | 1.1                           | 0.8   | 0.8    | 1.1   | 1.3    | 5     |
| Douglas Fir                 | 12.6                          | 9.6   | 9.6    | 13.2  | 15.0   | 60    |
| Grand Fir/ Western Hemlock  | --                            | --    | --     | --    | --     | --    |
| Western Redcedar            | --                            | --    | --     | --    | --     | --    |
| Lodgepole Pine              | 0.4                           | 0.3   | 0.3    | 0.4   | 0.5    | 2     |
| Subalpine Fir               | --                            | --    | --     | --    | --     | --    |
| Whitebark Pine              | --                            | --    | --     | --    | --     | --    |
| Total                       | 21                            | 16    | 16     | 22    | 25     | 100   |

**Moist Forest Group B**

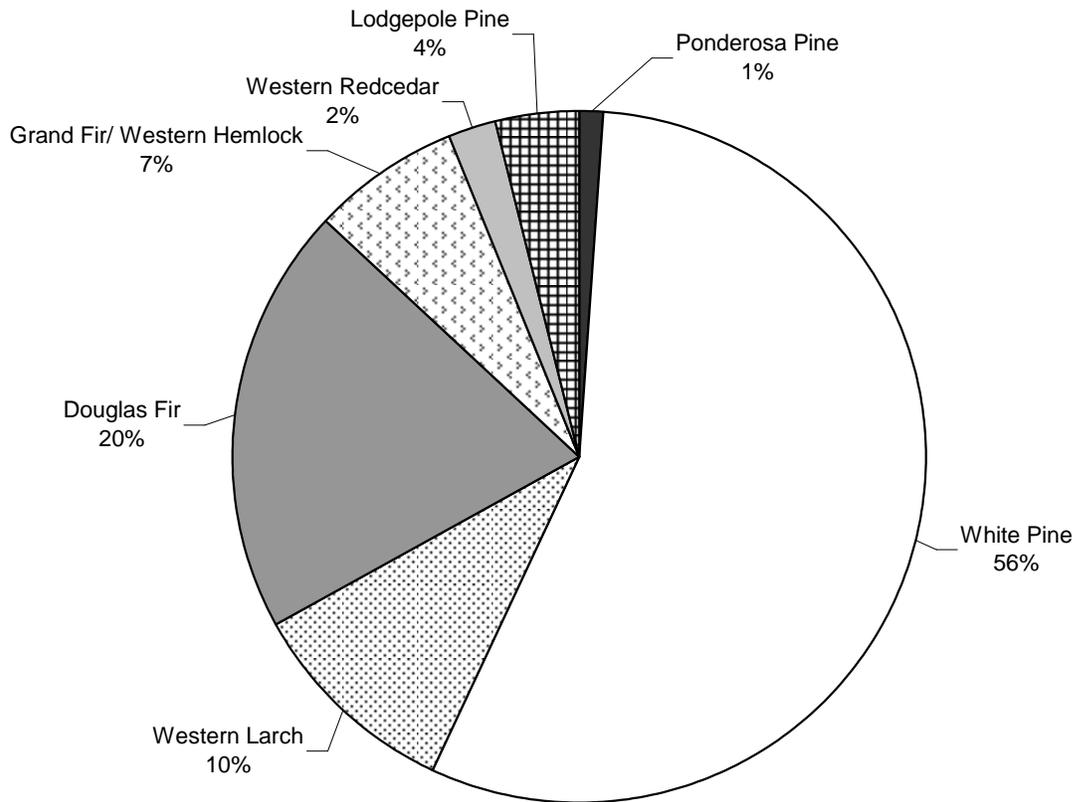
The moist forest group B was applied on streams less than 5th order with a gradient greater than or equal to 3% and vegetation from VRUs 4, 5, and 6. This group includes moist forest sites, usually low to mid elevation, and includes stream bottoms and adjacent benches and toe slopes (Figure E-3, Figure E-4). This setting is the most productive, with favorable soil moisture and temperature regimes that favor abundant plant growth. Historical forest vegetation composition data for IPNF Coeur d'Alene National Forest were used (Table E-4). Abundance of white pine has been greatly reduced from historic conditions due to white pine blister rust and present-day forest communities are likely to demonstrate an altered species composition. Inputs to the shade model for this forest group included estimates of the overall average height (84 ft), weighted average canopy cover (81%), and average overhang (8.4 ft).





(Photos courtesy Dr. R.E. Rosiere)

**Figure E-3. Forest group B is generally dominated by white pine and Douglas fir.**



**Figure E-4. Moist forest group B species composition.**

**Table E-4. Moist forest group B composition by species and size classes.**

| Tree Species<br>Common Name | Size Class and Prevalence (%) |       |        |       |        |       |
|-----------------------------|-------------------------------|-------|--------|-------|--------|-------|
|                             | Sapling                       | Small | Medium | Large | Oldest | Total |
| Ponderosa Pine              | 0.2                           | 0.1   | 0.2    | 0.3   | 0.2    | 1     |
| White Pine                  | 11.2                          | 6.7   | 11.2   | 14.6  | 12.3   | 56    |
| Western Larch               | 2.0                           | 1.2   | 2.0    | 2.6   | 2.2    | 10    |
| Douglas Fir                 | 4.0                           | 2.4   | 4.0    | 5.2   | 4.4    | 20    |
| Grand Fir/ Western Hemlock  | 1.4                           | 0.8   | 1.4    | 1.8   | 1.5    | 7     |
| Western Redcedar            | 0.4                           | 0.2   | 0.4    | 0.6   | 0.4    | 2     |
| Lodgepole Pine              | 0.8                           | 0.4   | 0.8    | 1.2   | 0.8    | 4     |
| Subalpine Fir               | --                            | --    | --     | --    | --     | --    |
| Whitebark Pine              | --                            | --    | --     | --    | --     | --    |
| Total                       | 20                            | 12    | 20     | 26    | 22     | 100   |

**Cool/Moist Forest Group C**

The cool/moist forest group C was applied on streams less than 5th order with a gradient greater than or equal to 3% and vegetation from VRUs 7 and 8. This group is similar to cool/dry forest group D and includes the moist, lower subalpine forest (Figure E-5, Figure E-6). This group is more common on northwest to east-facing slopes, riparian and poorly drained subalpine sites. Historical forest vegetation composition data for IPNF Coeur d'Alene National Forest were used (Table E-5). Inputs to the shade model for this forest group included estimates of the overall average height (73 ft), weighted average canopy cover (78%) and average overhang (7.3 ft).



(Photo courtesy National Park Service)



(Photo courtesy Terry Glase)

Figure E-5. Forest Group C is generally dominated by subalpine fir and white pine.

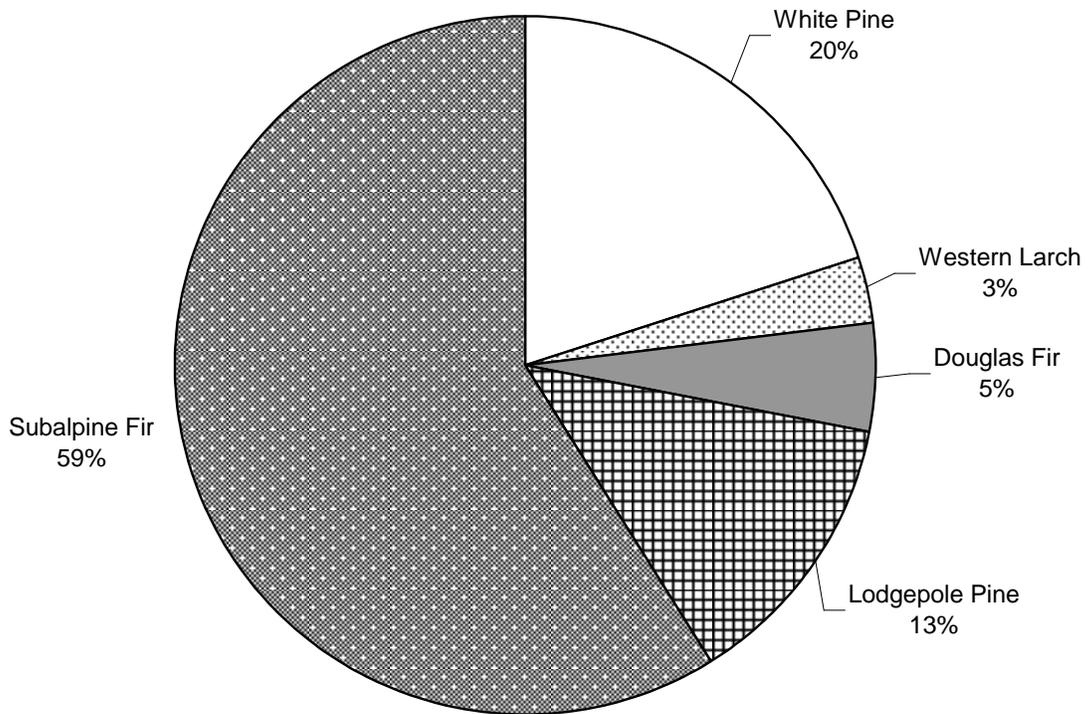


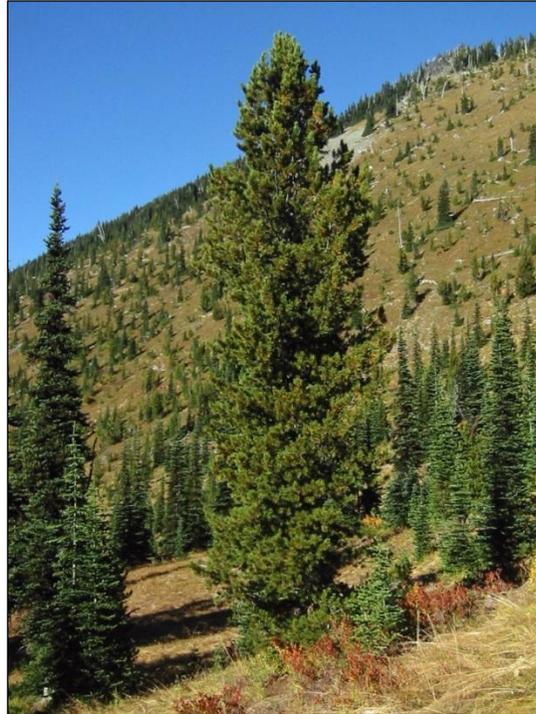
Figure E-6. Cool/moist forest group C species composition.

**Table E-5. Cool/moist forest group C composition by species and size classes.**

| Tree Species<br>Common Name | Size Class and Prevalence (%) |       |        |       |        |       |
|-----------------------------|-------------------------------|-------|--------|-------|--------|-------|
|                             | Sapling                       | Small | Medium | Large | Oldest | Total |
| Ponderosa Pine              | --                            | --    | --     | --    | --     | --    |
| White Pine                  | 4.0                           | 3.6   | 4.2    | 4.4   | 3.8    | 20    |
| Western Larch               | 0.6                           | 0.5   | 0.6    | 0.7   | 0.6    | 3     |
| Douglas Fir                 | 1.0                           | 0.9   | 1.1    | 1.1   | 1.0    | 5     |
| Grand Fir/ Western Hemlock  | --                            | --    | --     | --    | --     | --    |
| Western Redcedar            | --                            | --    | --     | --    | --     | --    |
| Lodgepole Pine              | 2.6                           | 2.3   | 2.7    | 2.9   | 2.5    | 13    |
| Subalpine Fir               | 11.8                          | 10.6  | 12.4   | 13.0  | 11.2   | 59    |
| Whitebark Pine              | --                            | --    | --     | --    | --     | --    |
| Total                       | 20                            | 18    | 21     | 22    | 19     | 100   |

**Cool/Dry Forest Group D**

The cool/dry forest group D was applied on streams less than 5th order with a gradient greater than or equal to 3% and vegetation from VRUs 9, 10 and 11. This group is similar to cool/moist forest group C and includes the subalpine forest and cool or cold dry sites between forest and alpine tundra (Figure E-7, Figure E-8). The cool to cold dry sites occur at higher elevations and typically have a short growing season. Historical forest vegetation composition data for IPNF Coeur d'Alene National Forest were used. Inputs to the shade model for this forest group included estimates of the overall average height (68 ft), weighted average canopy cover (70%) and average overhang (6.8 ft).



(Photo courtesy Walter Siegmund)

**Figure E-7. Forest Group D is generally dominated by subalpine fir and whitebark pine.**

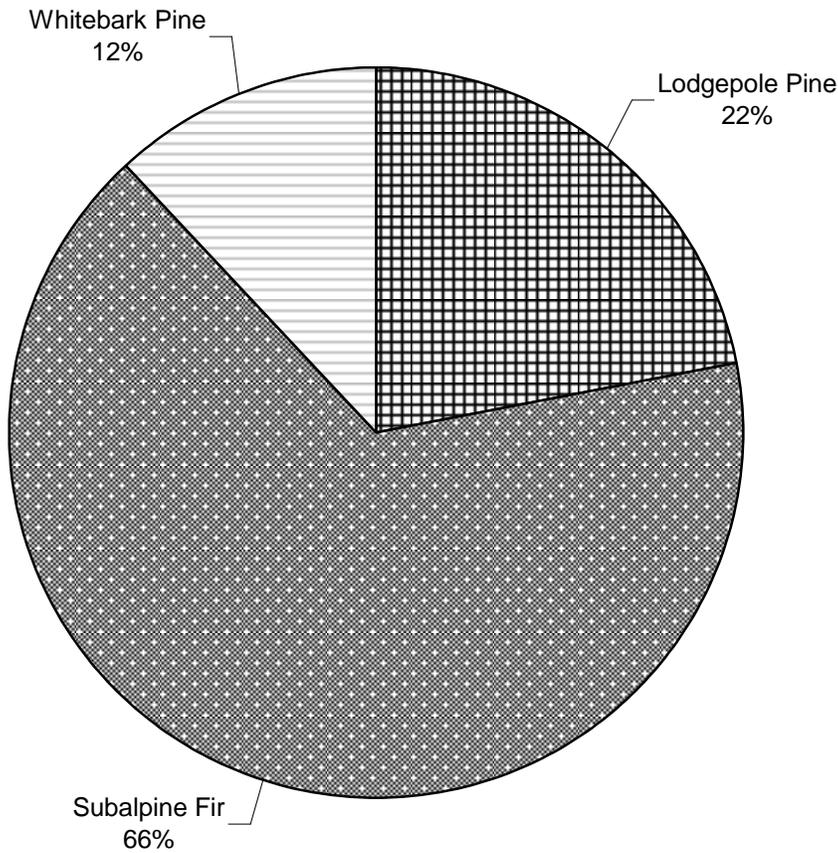


Figure E-8. Cool/dry forest group D species composition.

Table E-6. Cool/dry forest group D composition by species and size classes.

| Tree Species<br>Common Name | Size Class and Prevalence (%) |       |        |       |        | Total |
|-----------------------------|-------------------------------|-------|--------|-------|--------|-------|
|                             | Sapling                       | Small | Medium | Large | Oldest |       |
| Ponderosa Pine              | --                            | --    | --     | --    | --     | --    |
| White Pine                  | --                            | --    | --     | --    | --     | --    |
| Western Larch               | --                            | --    | --     | --    | --     | --    |
| Douglas Fir                 | --                            | --    | --     | --    | --     | --    |
| Grand Fir/ Western Hemlock  | --                            | --    | --     | --    | --     | --    |
| Western Redcedar            | --                            | --    | --     | --    | --     | --    |
| Lodgepole Pine              | 4.8                           | 4.6   | 4.2    | 4.4   | 4.0    | 22    |
| Subalpine Fir               | 14.5                          | 13.9  | 12.5   | 13.2  | 11.9   | 66    |
| Whitebark Pine              | 2.6                           | 2.5   | 2.3    | 2.4   | 2.2    | 12    |
| Total                       | 22                            | 21    | 19     | 20    | 18     | 100   |

**Non-Forest Group 1**

The non-forest group 1 was applied on streams less than 5th order with a gradient less than 3%. Vegetation inputs included VRUs 3C and 4C and measurements collected at sites in the Pend Oreille Lake subbasin. This group represents a diverse plant community including late

successional cedar-hemlock, black cottonwood, mixed conifers and shrubs (Figure E-9, Figure E-10, Table E-7). Inputs to the shade model for this group included estimates of the overall average height (71 ft), weighted average canopy cover (58%) and average overhang (7.1 ft).



Figure E-9. Example of Non-Forest Group 1 vegetation with mixed shrub community and conifers.

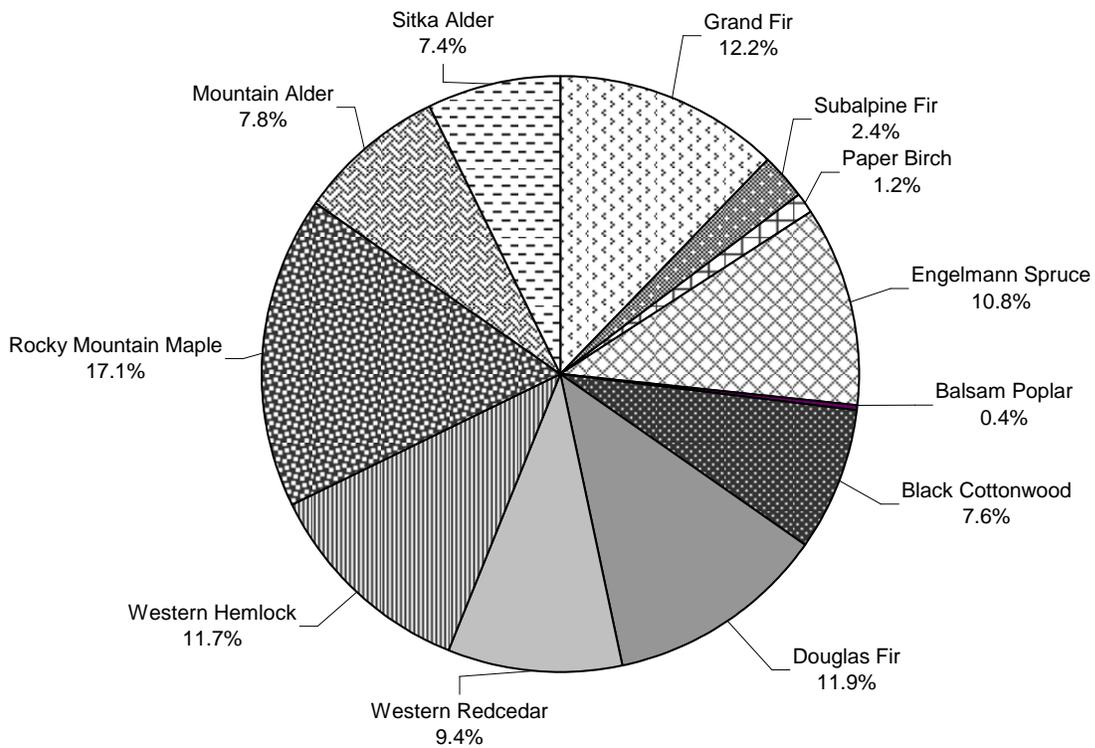


Figure E-10. Non-forest group 1 species composition based on constancy data.

**Table E-7. Characteristics of non-forest group 1 used to develop shade curves.**

| <b>Tree Species Common Name</b> | <b>Canopy Cover (%)</b> | <b>Constancy (%)</b> | <b>Weighted Canopy Cover (%)</b> | <b>System Potential Height (feet)</b> | <b>Weighting Factor (%)</b> | <b>Weighted System Potential Height (feet)</b> |
|---------------------------------|-------------------------|----------------------|----------------------------------|---------------------------------------|-----------------------------|--|
| Grand Fir                       | 13                      | 43                   | 6.38                             | 100                                   | 12.22                       | 12.22  |
| Subalpine Fir                   | 2                       | 8                    | 0.42                             | 63                                    | 2.43                        | 1.53   |
| Paper Birch                     | 19                      | 4                    | 1.70                             | 70                                    | 1.21                        | 0.85   |
| Engelmann Spruce                | 15                      | 38                   | 5.49                             | 90                                    | 10.79                       | 9.71   |
| Balsam Poplar                   | 14                      | 1                    | 0.42                             | 80                                    | 0.40                        | 0.32   |
| Black Cottonwood                | 15                      | 27                   | 4.19                             | 100                                   | 7.65                        | 7.65   |
| Douglas Fir                     | 12                      | 42                   | 5.25                             | 91                                    | 11.89                       | 10.82  |
| Western Redcedar                | 31                      | 33                   | 10.26                            | 87                                    | 9.39                        | 8.17   |
| Western Hemlock                 | 12                      | 42                   | 6.23                             | 85                                    | 11.74                       | 9.98   |
| Rocky Mountain Maple            | 9                       | 61                   | 5.65                             | 30                                    | 17.11                       | 5.13   |
| Mountain Alder                  | 27                      | 28                   | 7.95                             | 30                                    | 7.81                        | 2.34   |
| Sitka Alder                     | 16                      | 26                   | 4.01                             | 30                                    | 7.35                        | 2.21   |
| <b>Total</b>                    |                         |                      | <b>58%</b>                       |                                       |                             | <b>71 feet</b>                                 |

**Non-Forest Group 2**

The non-forest group 2 was applied on streams greater than 5th order with a gradient less than 3%. Vegetation inputs included VRU 5C and measurements collected at sites in the Pend Oreille Lake subbasin. This group is mainly comprised of black cottonwoods, shrubs and grasses while conifers are rare (Figure E-11, Figure E-12, Table E-8). Inputs to the shade model for this group included estimates of the overall average height (82 ft), weighted average canopy cover (50%) and average overhang (8.2 ft).



Figure E-11. Example of non-forest group 2 vegetation with black cottonwood common.

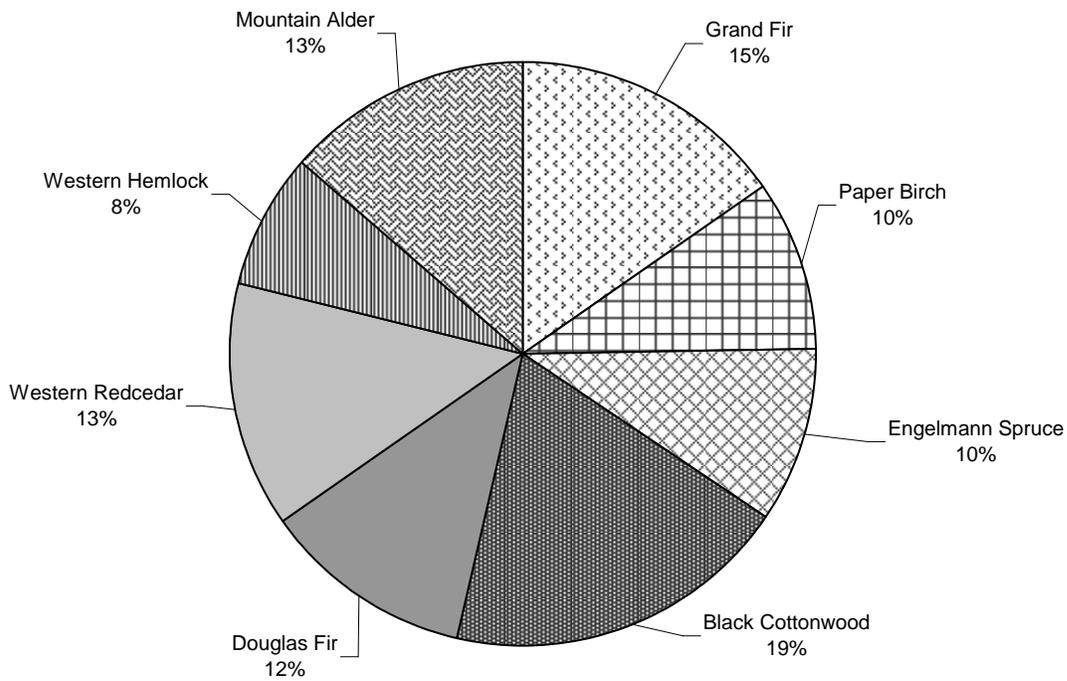


Figure E-12. Non-forest group 2 species composition based on constancy data.

**Table E-8. Characteristics of non-forest group 2 used to develop shade curves.**

| <b>Tree Species Common Name</b> | <b>Canopy Cover (%)</b> | <b>Constancy (%)</b> | <b>Weighted Canopy Cover (%)</b> | <b>System Potential Height (feet)</b> | <b>Weighting Factor (%)</b> | <b>Weighted System Potential Height (feet)</b> |
|---------------------------------|-------------------------|----------------------|----------------------------------|---------------------------------------|-----------------------------|--|
| Grand Fir                       | 16                      | 50                   | 8.00                             | 100                                   | 15                          | 15.34  |
| Paper Birch                     | 12                      | 31                   | 3.72                             | 70                                    | 10                          | 6.66   |
| Engelmann Spruce                | 5                       | 31                   | 1.55                             | 90                                    | 10                          | 8.56   |
| Black Cottonwood                | 28                      | 63                   | 17.64                            | 100                                   | 19                          | 19.33  |
| Douglas Fir                     | 2                       | 38                   | 0.76                             | 91                                    | 12                          | 10.61  |
| Western Redcedar                | 18                      | 44                   | 7.92                             | 87                                    | 13                          | 11.74  |
| Western Hemlock                 | 6                       | 25                   | 1.50                             | 85                                    | 8                           | 6.52   |
| Mountain Alder                  | 20                      | 44                   | 8.80                             | 25                                    | 13                          | 3.37   |
| <b>Total</b>                    |                         |                      | <b>50%</b>                       |                                       |                             | <b>82 feet</b>                                 |

### Effective Shade Curves

Figures E-13 through E-16 show the effective shade curves for forest groups A–D for the Coeur d'Alene National Forest. Figures E-17 and E-18 show the effective shade curves for the non-forest groups.

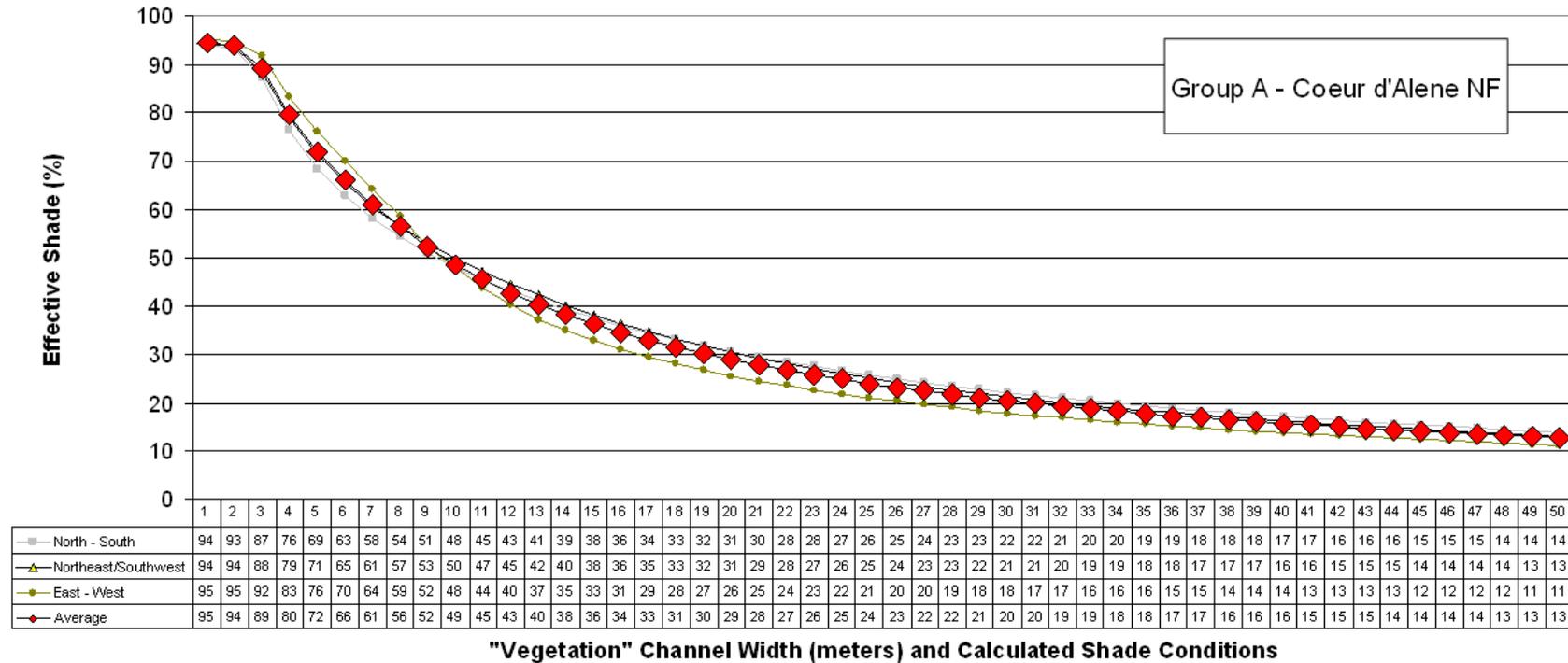


Figure E-13. Target shade curves for forest group A for the Coeur d'Alene National Forest.

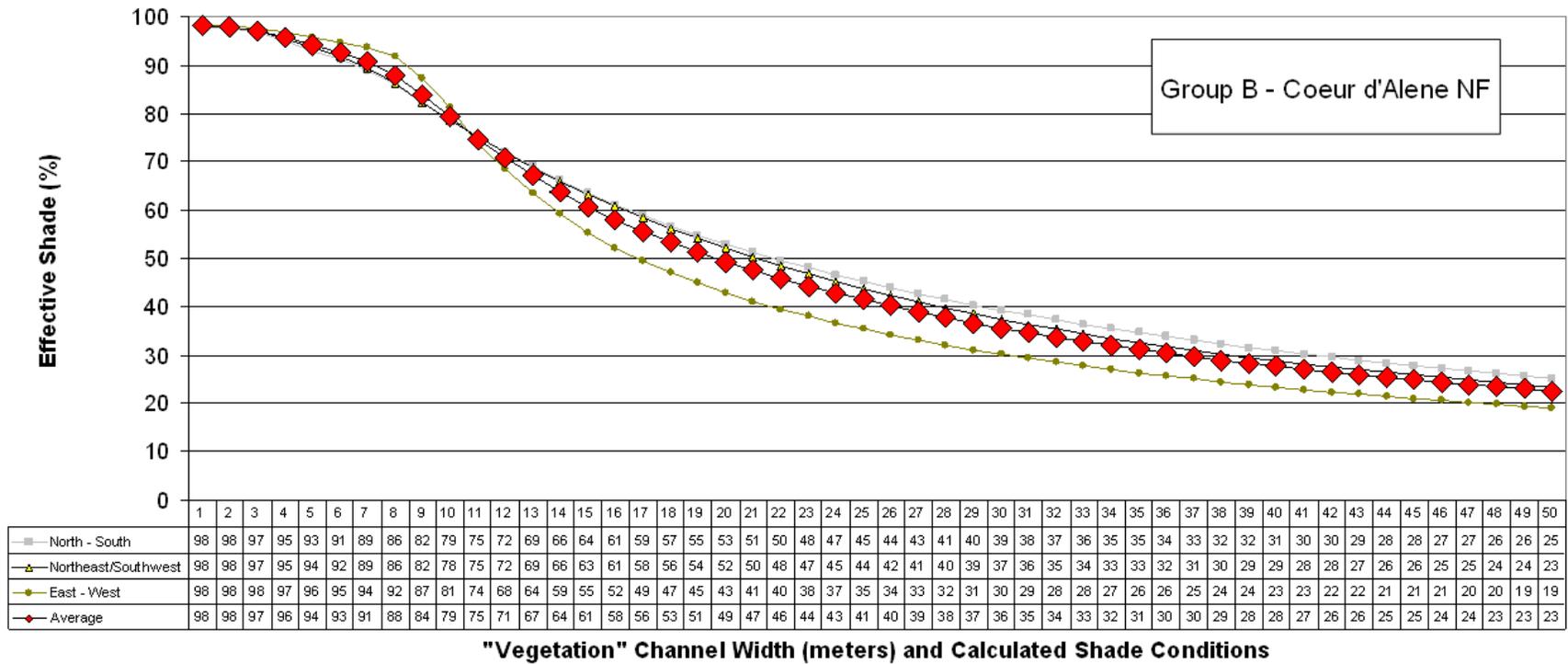


Figure E-14. Target shade curves for forest group B for the Coeur d'Alene National Forest.

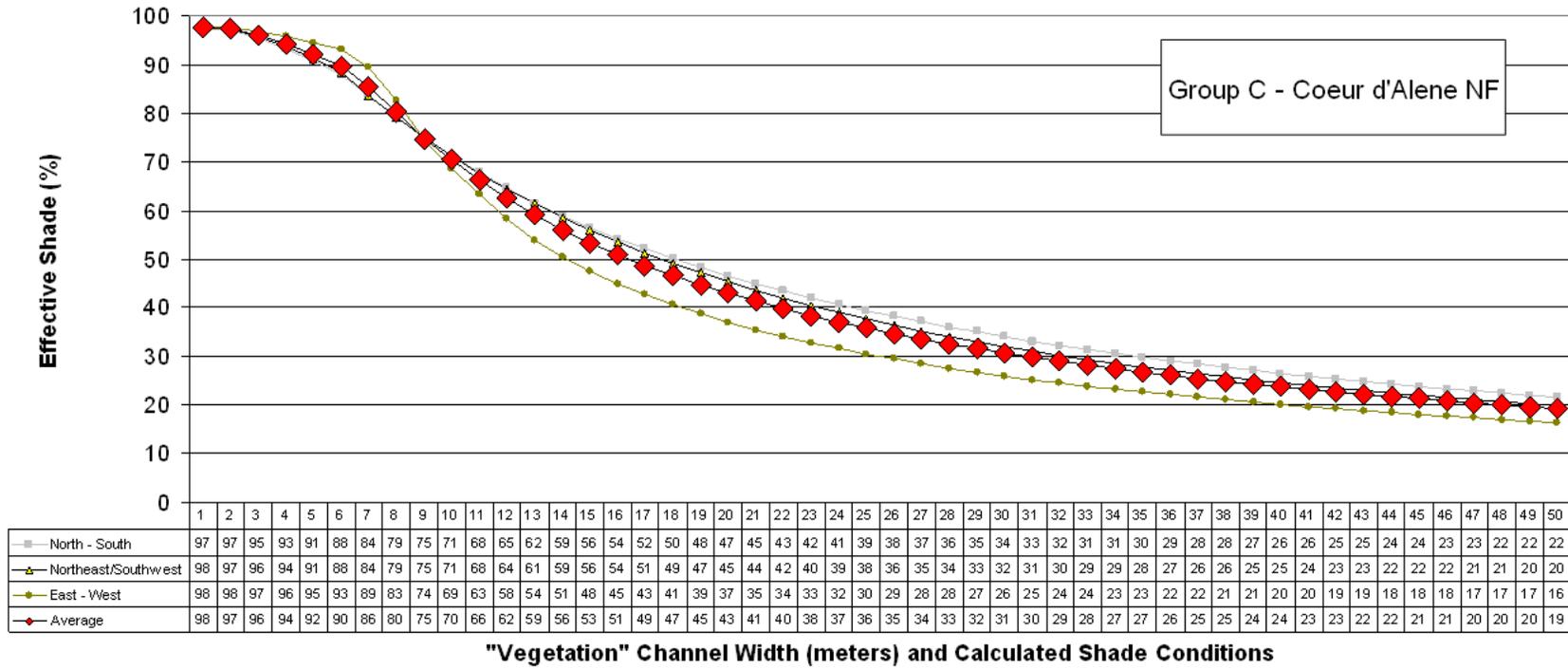


Figure E-15. Target shade curves for forest group C for the Coeur d'Alene National Forest.

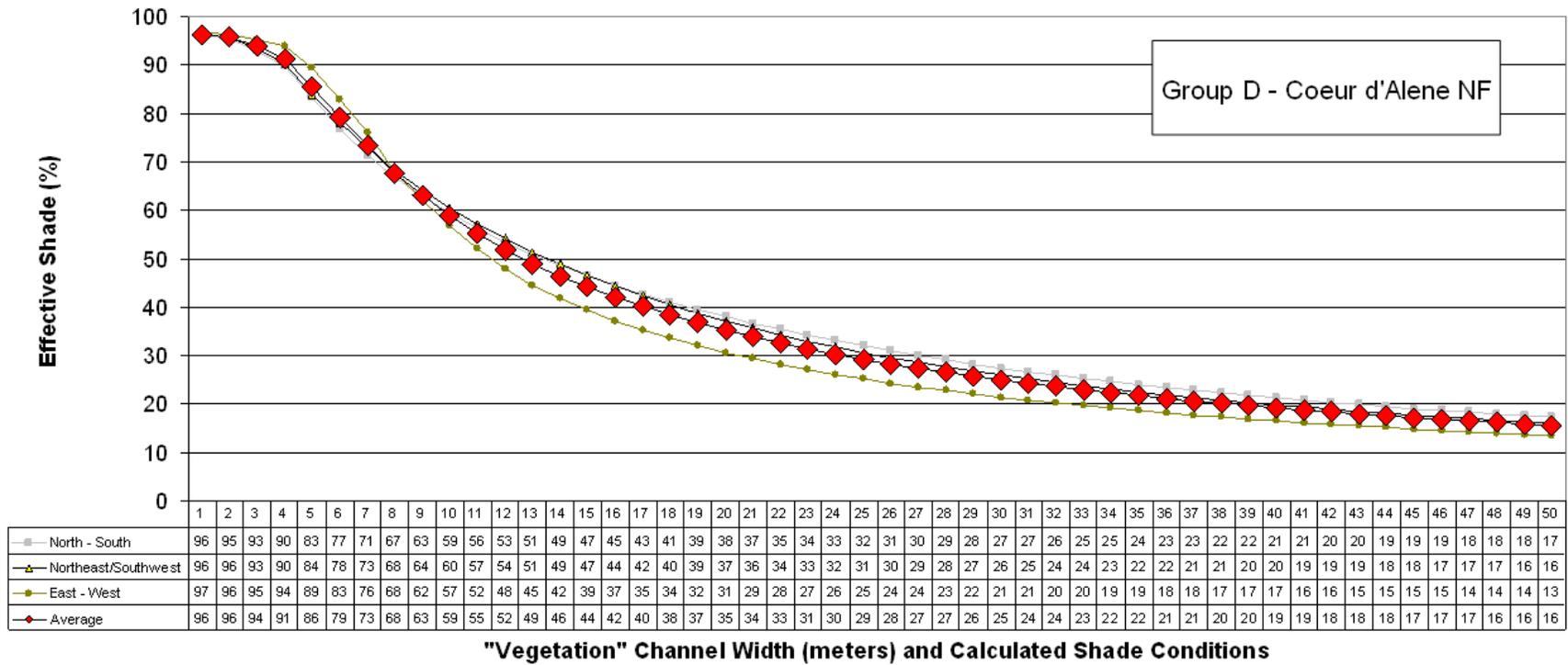


Figure E-16. Target shade curves for forest group D for the Coeur d'Alene National Forest.

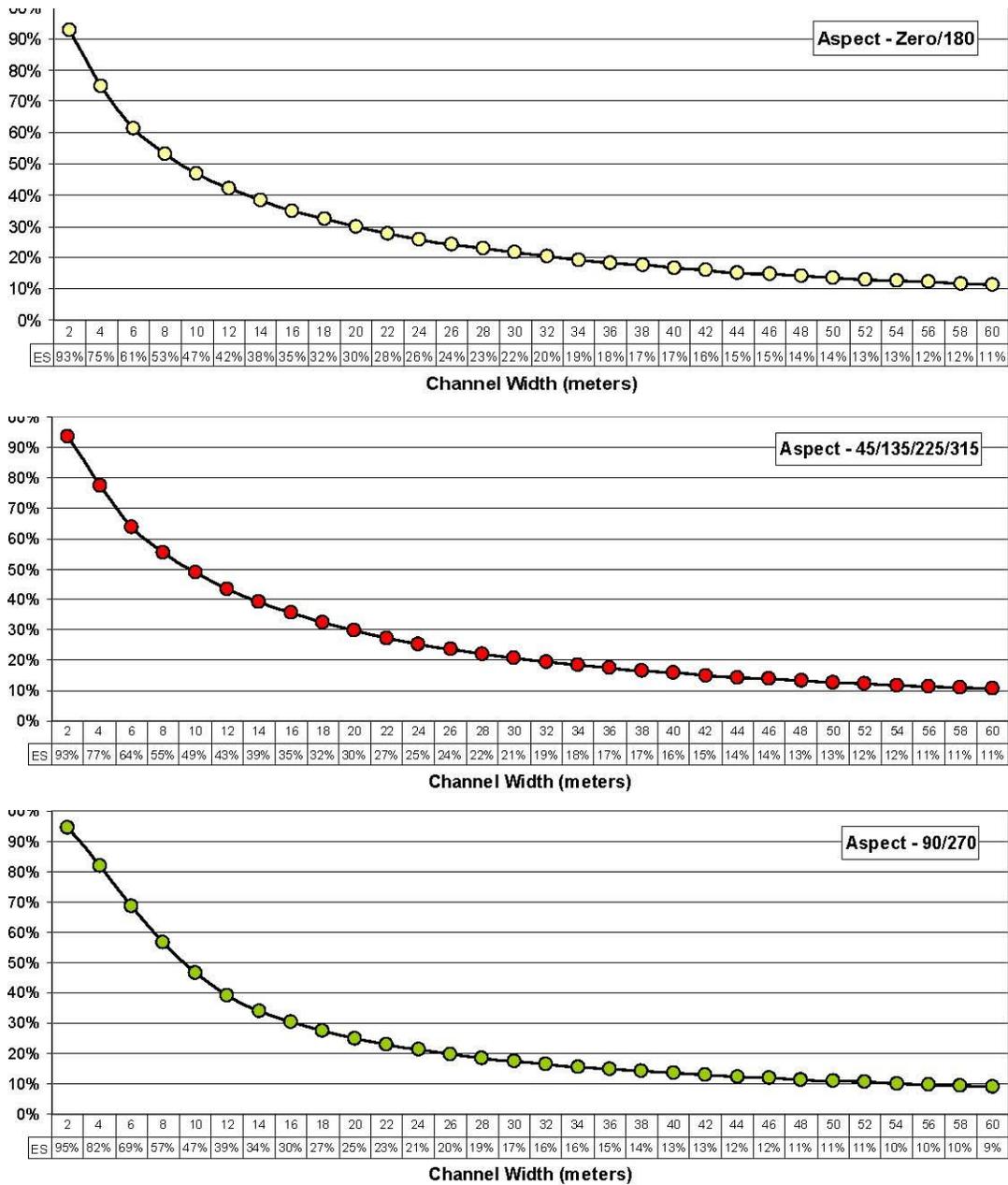


Figure E-17. Target shade curves for non-forest group 1 for the Idaho Panhandle Region.

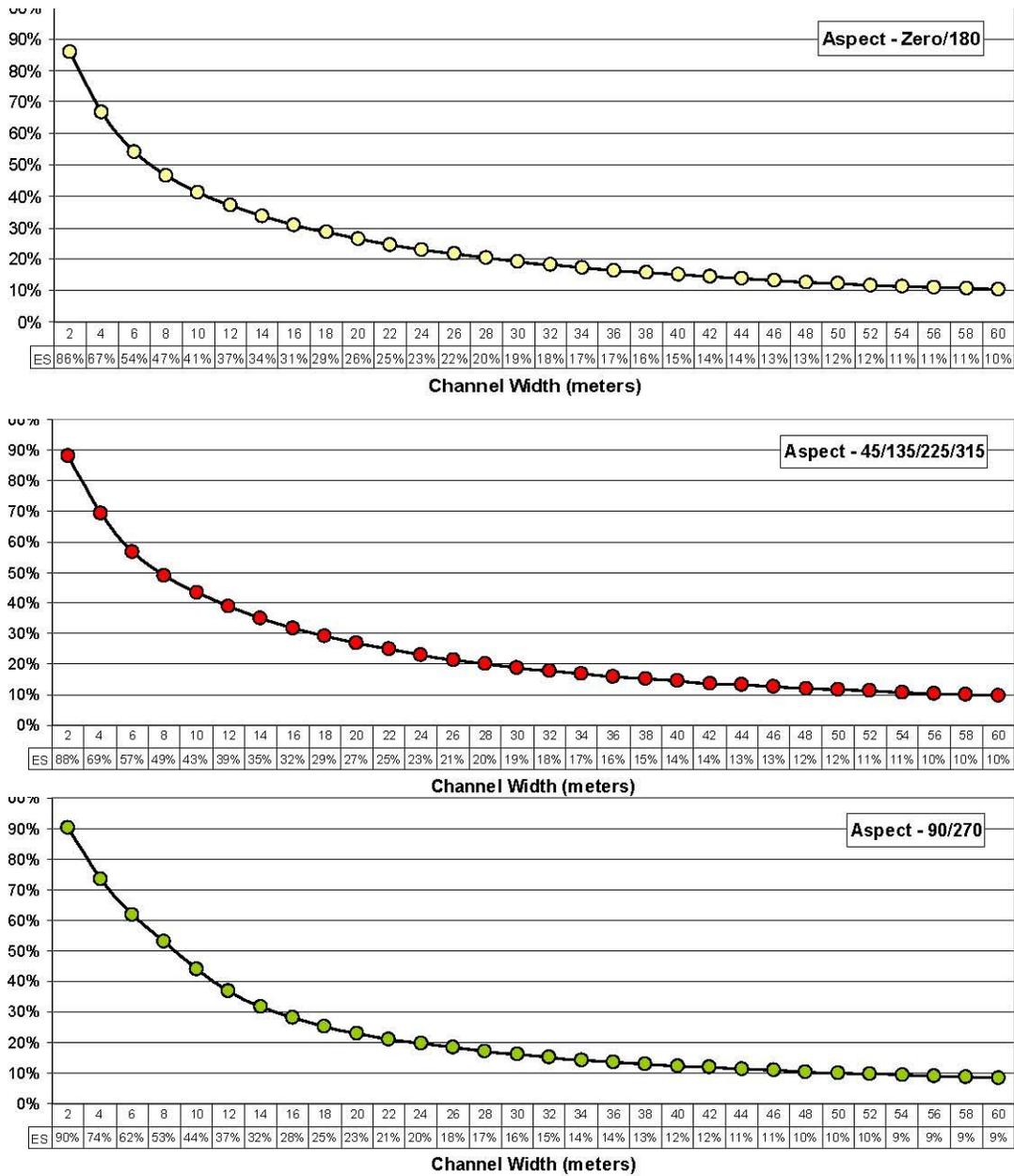


Figure E-18. Target shade curves for non-forest group 2 for the Idaho Panhandle Region.

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## **Appendix F. Existing and Potential Solar Load Calculations**

**Table F-1. Existing and potential solar loads for Beaver Creek.**

| Segment Length (meters)             | Existing Shade (fraction) | Existing Summer Load (kWh/m <sup>2</sup> /day) | Potential Shade (fraction) | Potential Summer Load (kWh/m <sup>2</sup> /day) | Potential Load minus Existing load (kWh/m <sup>2</sup> /day) | Existing Stream Width (m) | Natural Stream Width (m) | Existing Segment Area (m <sup>2</sup> ) | Existing Summer Load (kWh/day) | Natural Segment Area (m <sup>2</sup> ) | Potential Summer Load (kWh/day) | Potential Load minus Existing Load (kWh/day) | Lack of Shade (%) | Beaver Creek |
|-------------------------------------|---------------------------|--|----------------------------|---|--|---------------------------|--------------------------|---|--------------------------------|--|---------------------------------|--|-------------------|--------------|
| Assessment Unit #ID17010301PN003_02 |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |              |
| 520                                 | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 520                                     | 286                            | 520                                    | 57.2                            | -228.8                                       | -8                | Forest       |
| 530                                 | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 530                                     | 583                            | 530                                    | 58.3                            | -524.7                                       | -18               | Group C      |
| 950                                 | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 1900                                    | 1045                           | 1900                                   | 209                             | -836   | -8                | Forest       |
| 950                                 | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 3                         | 2                        | 2850                                    | 3135                           | 1900                                   | 209                             | -2926  | -18               | Group B      |
| 1990                                | 0.7                       | 1.65   | 0.96                       | 0.22  | -1.43  | 5                         | 3                        | 9950                                    | 16417.5                        | 5970                                   | 1313.4                          | -15104.1                                     | -26               |              |
| 400                                 | 0.2                       | 4.4  | 0.78                       | 1.21  | -3.19  | 7                         | 4                        | 2800                                    | 12320                          | 1600                                   | 1936                            | -10384                                       | -58               | Nonforest    |
| 1010                                | 0.4                       | 3.3  | 0.78                       | 1.21  | -2.09  | 8                         | 4                        | 8080                                    | 26664                          | 4040                                   | 4888.4                          | -21775.6                                     | -38               | Group 1      |
| 410                                 | 0.2                       | 4.4  | 0.72                       | 1.54  | -2.86  | 9                         | 5                        | 3690                                    | 16236                          | 2050                                   | 3157                            | -13079                                       | -52               |              |
| 130                                 | 0                         | 5.5  | 0.72                       | 1.54  | -3.96  | 9                         | 5                        | 1170                                    | 6435                           | 650                                    | 1001                            | -5434  | -72               |              |
| 370                                 | 0.2                       | 4.4  | 0.72                       | 1.54  | -2.86  | 9                         | 5                        | 3330                                    | 14652                          | 1850                                   | 2849                            | -11803                                       | -52               |              |
| 1190                                | 0.5                       | 2.75   | 0.65                       | 1.925   | -0.825   | 10                        | 6                        | 11900                                   | 32725                          | 7140                                   | 13744.5                         | -18980.5                                     | -15               |              |
| 360                                 | 0.7                       | 1.65   | 0.6                        | 2.2   | 0.55   | 11                        | 7                        | 3960                                    | 6534                           | 2520                                   | 5544                            | -990   | 0                 |              |
| 660                                 | 0.6                       | 2.2  | 0.6                        | 2.2   | 0  | 11                        | 7                        | 7260                                    | 15972                          | 4620                                   | 10164                           | -5808  | 0                 |              |
| 300                                 | 0.5                       | 2.75   | 0.55                       | 2.475   | -0.275   | 11                        | 8                        | 3300                                    | 9075                           | 2400                                   | 5940                            | -3135  | -5                |              |
| 130                                 | 0.7                       | 1.65   | 0.55                       | 2.475   | 0.825  | 12                        | 8                        | 1560                                    | 2574                           | 1040                                   | 2574                            | -9.09495E-13                                 | 0                 |              |
| 350                                 | 0.5                       | 2.75   | 0.55                       | 2.475   | -0.275   | 12                        | 8                        | 4200                                    | 11550                          | 2800                                   | 6930                            | -4620  | -5                |              |
| 230                                 | 0.4                       | 3.3  | 0.55                       | 2.475   | -0.825   | 12                        | 8                        | 2760                                    | 9108                           | 1840                                   | 4554                            | -4554  | -15               |              |
| 470                                 | 0.3                       | 3.85   | 0.52                       | 2.64  | -1.21  | 12                        | 9                        | 5640                                    | 21714                          | 4230                                   | 11167.2                         | -10546.8                                     | -22               |              |
| 460                                 | 0.4                       | 3.3  | 0.52                       | 2.64  | -0.66  | 13                        | 9                        | 5980                                    | 19734                          | 4140                                   | 10929.6                         | -8804.4                                      | -12               |              |
| 690                                 | 0.2                       | 4.4  | 0.52                       | 2.64  | -1.76  | 13                        | 9                        | 8970                                    | 39468                          | 6210                                   | 16394.4                         | -23073.6                                     | -32               |              |
| 780                                 | 0                         | 5.5  | 0.48                       | 2.86  | -2.64  | 14                        | 10                       | 10920                                   | 60060                          | 7800                                   | 22308                           | -37752                                       | -48               |              |
|                                     |                           |  |                            |   |  |                           |                          | <b>Subtotal</b>                         | <b>101,270</b>                 | <b>326,288</b>                         | <b>65,750</b>                   | <b>125,928</b>                               | <b>-200,360</b>   | <b>-24</b>   |
| Assessment Unit #ID17010301PN003_03 |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |              |
| 220                                 | 0.5                       | 2.75   | 0.48                       | 2.86  | 0.11   | 14                        | 10                       | 3080                                    | 8470                           | 2200                                   | 6292                            | -2178  | 0                 |              |
| 320                                 | 0.2                       | 4.4  | 0.48                       | 2.86  | -1.54  | 14                        | 10                       | 4480                                    | 19712                          | 3200                                   | 9152                            | -10560                                       | -28               |              |
| 1070                                | 0.1                       | 4.95   | 0.45                       | 3.025   | -1.925   | 15                        | 11                       | 16050                                   | 79447.5                        | 11770                                  | 35604.25                        | -43843.25                                    | -35               |              |
| 410                                 | 0                         | 5.5  | 0.45                       | 3.025   | -2.475   | 15                        | 11                       | 6150                                    | 33825                          | 4510                                   | 13642.75                        | -20182.25                                    | -45               |              |
| 1120                                | 0.1                       | 4.95   | 0.45                       | 3.025   | -1.925   | 15                        | 11                       | 16800                                   | 83160                          | 12320                                  | 37268                           | -45892                                       | -35               |              |
| 180                                 | 0                         | 5.5  | 0.41                       | 3.245   | -2.255   | 16                        | 12                       | 2880                                    | 15840                          | 2160                                   | 7009.2                          | -8830.8                                      | -41               |              |
| 480                                 | 0.1                       | 4.95   | 0.41                       | 3.245   | -1.705   | 16                        | 12                       | 7680                                    | 38016                          | 5760                                   | 18691.2                         | -19324.8                                     | -31               |              |
| 780                                 | 0.3                       | 3.85   | 0.41                       | 3.245   | -0.605   | 16                        | 12                       | 12480                                   | 48048                          | 9360                                   | 30373.2                         | -17674.8                                     | -11               |              |
| 230                                 | 0.6                       | 2.2  | 0.41                       | 3.245   | 1.045  | 16                        | 12                       | 3680                                    | 8096                           | 2760                                   | 8956.2                          | 860.2  | 0                 |              |
| 1200                                | 0.2                       | 4.4  | 0.41                       | 3.245   | -1.155   | 16                        | 12                       | 19200                                   | 84480                          | 14400                                  | 46728                           | -37752                                       | -21               |              |
|                                     |                           |  |                            |   |  |                           |                          | <b>Subtotal</b>                         | <b>92,480</b>                  | <b>419,095</b>                         | <b>68,440</b>                   | <b>213,717</b>                               | <b>-205,378</b>   | <b>-25</b>   |
|                                     |                           |  |                            |   |  |                           |                          | <b>Total</b>                            | <b>193,750</b>                 | <b>745,382</b>                         | <b>134,190</b>                  | <b>339,645</b>                               | <b>-405,737</b>   |              |

**Table F-2. Existing and potential solar loads for Beaver Creek tributaries.**

| Segment Length (meters)             | Existing Shade (fraction) | Existing Summer Load (kWh/m <sup>2</sup> /day) | Potential Shade (fraction) | Potential Summer Load (kWh/m <sup>2</sup> /day) | Potential Load minus Existing load (kWh/m <sup>2</sup> /day) | Existing Stream Width (m) | Natural Stream Width (m) | Existing Segment Area (m <sup>2</sup> ) | Existing Summer Load (kWh/day) | Natural Segment Area (m <sup>2</sup> ) | Potential Summer Load (kWh/day) | Potential Load minus Existing Load (kWh/day) | Lack of Shade (%) | Beaver Creek Tributaries |
|-------------------------------------|---------------------------|--|----------------------------|---|--|---------------------------|--------------------------|---|--------------------------------|--|---------------------------------|--|-------------------|--------------------------|
| Assessment Unit #ID17010301PN003_02 |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |                          |
| 770                                 | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 770                                     | 423.5                          | 770                                    | 84.7                            | -338.8                                       | -8                | Group C                  |
| 810                                 | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 810                                     | 445.5                          | 810                                    | 89.1                            | -356.4                                       | -8                | Group B                  |
| 850                                 | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 1700                                    | 1870                           | 1700                                   | 187                             | -1683  | -18               | Forest                   |
| 620                                 | 0.3                       | 3.85   | 0.98                       | 0.11  | -3.74  | 2                         | 2                        | 1240                                    | 4774                           | 1240                                   | 136.4                           | -4637.6                                      | -68               | Carbon Creek             |
| 1800                                | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1800                                    | 990                            | 1800                                   | 198                             | -792   | -8                | Dobson Gulch             |
| 410                                 | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 820                                     | 902                            | 820                                    | 90.2                            | -811.8                                       | -18               |                          |
| 40                                  | 0                         | 5.5  | 0.98                       | 0.11  | -5.39  | 2                         | 2                        | 80                                      | 440                            | 80                                     | 8.8                             | -431.2                                       | -98               |                          |
| 510                                 | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 1020                                    | 1122                           | 1020                                   | 112.2                           | -1009.8                                      | -18               |                          |
| 160                                 | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 160                                     | 88                             | 160                                    | 17.6                            | -70.4  | -8                | Dudley Creek             |
| 130                                 | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 130                                     | 143                            | 130                                    | 14.3                            | -128.7                                       | -18               |                          |
| 1900                                | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 3800                                    | 2090                           | 3800                                   | 418                             | -1672  | -8                |                          |
| 650                                 | 0.8                       | 1.1  | 0.97                       | 0.165   | -0.935   | 3                         | 3                        | 1950                                    | 2145                           | 1950                                   | 321.75                          | -1823.25                                     | -17               |                          |
| 1100                                | 0.9                       | 0.55   | 0.97                       | 0.165   | -0.385   | 3                         | 3                        | 3300                                    | 1815                           | 3300                                   | 544.5                           | -1270.5                                      | -7                |                          |
| 320                                 | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 320                                     | 176                            | 320                                    | 35.2                            | -140.8                                       | -8                | Moore Gulch              |
| 450                                 | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 450                                     | 495                            | 450                                    | 49.5                            | -445.5                                       | -18               |                          |
| 1700                                | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 3400                                    | 1870                           | 3400                                   | 374                             | -1496  | -8                |                          |
| 1000                                | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 1000                                    | 1100                           | 1000                                   | 110                             | -990   | -18               | Deer Creek               |
| 480                                 | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 480                                     | 264                            | 480                                    | 52.8                            | -211.2                                       | -8                |                          |
| 390                                 | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 780                                     | 858                            | 780                                    | 85.8                            | -772.2                                       | -18               |                          |
| 810                                 | 0.7                       | 1.65   | 0.98                       | 0.11  | -1.54  | 2                         | 2                        | 1620                                    | 2673                           | 1620                                   | 178.2                           | -2494.8                                      | -28               |                          |
| 490                                 | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 980                                     | 1078                           | 980                                    | 107.8                           | -970.2                                       | -18               |                          |
| 1600                                | 0.9                       | 0.55   | 0.97                       | 0.165   | -0.385   | 3                         | 3                        | 4800                                    | 2640                           | 4800                                   | 792                             | -1848  | -7                |                          |
| 110                                 | 0.3                       | 3.85   | 0.97                       | 0.165   | -3.685   | 3                         | 3                        | 330                                     | 1270.5                         | 330                                    | 54.45                           | -1216.05                                     | -67               |                          |
| 1200                                | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1200                                    | 660                            | 1200                                   | 132                             | -528   | -8                | Unknown Gulch            |
| 800                                 | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 800                                     | 880                            | 800                                    | 88                              | -792   | -18               |                          |
| 1600                                | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 3200                                    | 1760                           | 3200                                   | 352                             | -1408  | -8                |                          |
| 100                                 | 0.5                       | 2.75   | 0.98                       | 0.11  | -2.64  | 2                         | 2                        | 200                                     | 550                            | 200                                    | 22                              | -528   | -48               |                          |
| 3000                                | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 3000                                    | 1650                           | 3000                                   | 330                             | -1320  | -8                | Pony Gulch               |
| 270                                 | 0.5                       | 2.75   | 0.98                       | 0.11  | -2.64  | 2                         | 2                        | 540                                     | 1485                           | 540                                    | 59.4                            | -1425.6                                      | -48               |                          |
| 730                                 | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 1460                                    | 803                            | 1460                                   | 160.6                           | -642.4                                       | -8                |                          |
| 560                                 | 0.8                       | 1.1  | 0.97                       | 0.165   | -0.935   | 3                         | 3                        | 1680                                    | 1848                           | 1680                                   | 277.2                           | -1570.8                                      | -17               |                          |
| 400                                 | 0.7                       | 1.65   | 0.97                       | 0.165   | -1.485   | 3                         | 3                        | 1200                                    | 1980                           | 1200                                   | 198                             | -1782  | -27               |                          |
| 510                                 | 0.8                       | 1.1  | 0.97                       | 0.165   | -0.935   | 3                         | 3                        | 1530                                    | 1683                           | 1530                                   | 252.45                          | -1430.55                                     | -17               |                          |
| 140                                 | 0.3                       | 3.85   | 0.97                       | 0.165   | -3.685   | 3                         | 3                        | 420                                     | 1617                           | 420                                    | 69.3                            | -1547.7                                      | -67               |                          |
| 150                                 | 0.7                       | 1.65   | 0.97                       | 0.165   | -1.485   | 3                         | 3                        | 450                                     | 742.5                          | 450                                    | 74.25                           | -668.25                                      | -27               |                          |
| 430                                 | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 430                                     | 236.5                          | 430                                    | 47.3                            | -189.2                                       | -8                | Alder Creek              |
| 160                                 | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 160                                     | 176                            | 160                                    | 17.6                            | -158.4                                       | -18               |                          |
| 1300                                | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 2600                                    | 1430                           | 2600                                   | 286                             | -1144  | -8                |                          |
| 3800                                | 0.8                       | 1.1  | 0.97                       | 0.165   | -0.935   | 3                         | 3                        | 11400                                   | 12540                          | 11400                                  | 1881                            | -10659                                       | -17               |                          |
| 3100                                | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 6200                                    | 3410                           | 6200                                   | 682                             | -2728  | -8                | White Creek              |
| 450                                 | 0.9                       | 0.55   | 0.97                       | 0.165   | -0.385   | 3                         | 3                        | 1350                                    | 742.5                          | 1350                                   | 222.75                          | -519.75                                      | -7                |                          |
| 3200                                | 0.8                       | 1.1  | 0.96                       | 0.22  | -0.88  | 4                         | 4                        | 12800                                   | 14080                          | 12800                                  | 2816                            | -11264                                       | -16               |                          |
| 220                                 | 0.7                       | 1.65   | 0.96                       | 0.22  | -1.43  | 4                         | 4                        | 880                                     | 1452                           | 880                                    | 193.6                           | -1258.4                                      | -26               | trib to White            |
| 2200                                | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 2200                                    | 1210                           | 2200                                   | 242                             | -968   | -8                | Scott Gulch              |
| 3100                                | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 3100                                    | 1705                           | 3100                                   | 341                             | -1364  | -8                |                          |
| 400                                 | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 800                                     | 880                            | 800                                    | 88                              | -792   | -18               | Trail Creek              |
| 1600                                | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1600                                    | 880                            | 1600                                   | 176                             | -704   | -8                |                          |
| 440                                 | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 880                                     | 968                            | 880                                    | 96.8                            | -871.2                                       | -18               |                          |
| 260                                 | 0.7                       | 1.65   | 0.98                       | 0.11  | -1.54  | 2                         | 2                        | 520                                     | 858                            | 520                                    | 57.2                            | -800.8                                       | -28               |                          |
| 410                                 | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 820                                     | 451                            | 820                                    | 90.2                            | -360.8                                       | -8                |                          |
| 610                                 | 0.8                       | 1.1  | 0.97                       | 0.165   | -0.935   | 3                         | 3                        | 1830                                    | 2013                           | 1830                                   | 301.95                          | -1711.05                                     | -17               |                          |
| 520                                 | 0.7                       | 1.65   | 0.97                       | 0.165   | -1.485   | 3                         | 3                        | 1560                                    | 2574                           | 1560                                   | 257.4                           | -2316.6                                      | -27               |                          |
| 260                                 | 0.5                       | 2.75   | 0.97                       | 0.165   | -2.585   | 3                         | 3                        | 780                                     | 2145                           | 780                                    | 128.7                           | -2016.3                                      | -47               |                          |
| 280                                 | 0.5                       | 2.75   | 0.78                       | 1.21  | -1.54  | 4                         | 4                        | 1120                                    | 3080                           | 1120                                   | 1355.2                          | -1724.8                                      | -28               | Nonforest                |
| 700                                 | 0.8                       | 1.1  | 0.78                       | 1.21  | 0.11   | 4                         | 4                        | 2800                                    | 3080                           | 2800                                   | 3388                            | 308  | 0                 | Group 1                  |
| 160                                 | 0.4                       | 3.3  | 0.78                       | 1.21  | -2.09  | 4                         | 4                        | 640                                     | 2112                           | 640                                    | 774.4                           | -1337.6                                      | -38               |                          |
| 4900                                | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 9800                                    | 5390                           | 9800                                   | 1078                            | -4312  | -8                | Group B                  |
| 3200                                | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 3200                                    | 1760                           | 3200                                   | 352                             | -1408  | -8                | Potosi Gulch             |
| 560                                 | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 1120                                    | 1232                           | 1120                                   | 123.2                           | -1108.8                                      | -18               | Carpenter Gulch          |
| 690                                 | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 1380                                    | 759                            | 1380                                   | 151.8                           | -607.2                                       | -8                |                          |
|                                     |                           |  |                            |   |  | <b>Total</b>              |                          | <b>117,390</b>                          | <b>110,495</b>                 | <b>117,390</b>                         | <b>21,226</b>                   | <b>-89,269</b>                               | <b>-20</b>        |                          |

**Table F-3. Existing and potential solar loads for Big Elk Creek.**

| Segment Length (meters)              | Existing Shade (fraction) | Existing Summer Load (kWh/m <sup>2</sup> /day) | Potential Shade (fraction) | Potential Summer Load (kWh/m <sup>2</sup> /day) | Potential Load minus Existing load (kWh/m <sup>2</sup> /day) | Existing Stream Width (m) | Natural Stream Width (m) | Existing Segment Area (m <sup>2</sup> ) | Existing Summer Load (kWh/day) | Natural Segment Area (m <sup>2</sup> ) | Potential Summer Load (kWh/day) | Potential Load minus Existing Load (kWh/day) | Lack of Shade (%) | Big Elk Creek                       |  |
|--------------------------------------|---------------------------|--|----------------------------|---|--|---------------------------|--------------------------|---|--------------------------------|--|---------------------------------|--|-------------------|-------------------------------------|--|
| Assessment Unit # ID17010301PN020_02 |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |                                     |  |
| 1920                                 | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1920                                    | 1056                           | 1920                                   | 211.2                           | -844.8                                       | -8                | Forest Group G<br>Nonforest Group 1 |  |
| 890                                  | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 1780                                    | 1958                           | 1780                                   | 195.8                           | -1762.2                                      | -18               |                                     |  |
| 680                                  | 0.8                       | 1.1  | 0.94                       | 0.33  | -0.77  | 2                         | 2                        | 1360                                    | 1496                           | 1360                                   | 448.8                           | -1047.2                                      | -14               |                                     |  |
| 810                                  | 0.7                       | 1.65   | 0.86                       | 0.77  | -0.88  | 3                         | 3                        | 2430                                    | 4009.5                         | 2430                                   | 1871.1                          | -2138.4                                      | -16               |                                     |  |
| 1220                                 | 0.6                       | 2.2  | 0.86                       | 0.77  | -1.43  | 3                         | 3                        | 3660                                    | 8052                           | 3660                                   | 2818.2                          | -5233.8                                      | -26               |                                     |  |
| 690                                  | 0.7                       | 1.65   | 0.78                       | 1.21  | -0.44  | 6                         | 4                        | 4140                                    | 6831                           | 2760                                   | 3339.6                          | -3491.4                                      | -8                |                                     |  |
| 750                                  | 0.6                       | 2.2  | 0.78                       | 1.21  | -0.99  | 4                         | 4                        | 3000                                    | 6600                           | 3000                                   | 3630                            | -2970  | -18               |                                     |  |
| 230                                  | 0.7                       | 1.65   | 0.72                       | 1.54  | -0.11  | 4                         | 5                        | 920                                     | 1518                           | 1150                                   | 1771                            | 253  | -2                |                                     |  |
| 530                                  | 0.6                       | 2.2  | 0.72                       | 1.54  | -0.66  | 5                         | 5                        | 2650                                    | 5830                           | 2650                                   | 4081                            | -1749  | -12               |                                     |  |
| 210                                  | 0.7                       | 1.65   | 0.72                       | 1.54  | -0.11  | 5                         | 5                        | 1050                                    | 1732.5                         | 1050                                   | 1617                            | -115.5                                       | -2                |                                     |  |
| 850                                  | 0.6                       | 2.2  | 0.65                       | 1.925   | -0.28  | 6                         | 6                        | 5100                                    | 11220                          | 5100                                   | 9817.5                          | -1402.5                                      | -5                |                                     |  |
| 320                                  | 0.5                       | 2.75   | 0.65                       | 1.925   | -0.83  | 7                         | 6                        | 2240                                    | 6160                           | 1920                                   | 3696                            | -2464  | -15               |                                     |  |
| <b>Total</b>                         |                           |  |                            |   |  |                           |                          | <b>30,250</b>                           | <b>56,463</b>                  | <b>28,780</b>                          | <b>33,497</b>                   | <b>-22,966</b>                               | <b>-12</b>        |                                     |  |

**Table F-4. Existing and potential solar loads for Big Elk Creek tributaries.**

| Segment Length (meters) | Existing Shade (fraction) | Existing Summer Load (kWh/m <sup>2</sup> /day) | Potential Shade (fraction) | Potential Summer Load (kWh/m <sup>2</sup> /day) | Potential Load minus Existing load (kWh/m <sup>2</sup> /day) | Existing Stream Width (m) | Natural Stream Width (m) | Existing Segment Area (m <sup>2</sup> ) | Existing Summer Load (kWh/day) | Natural Segment Area (m <sup>2</sup> ) | Potential Summer Load (kWh/day) | Potential Load minus Existing Load (kWh/day) | Lack of Shade (%) | Big Elk Creek Tributaries |
|-------------------------|---------------------------|--|----------------------------|---|--|---------------------------|--------------------------|---|--------------------------------|--|---------------------------------|--|-------------------|---------------------------|
| AU# ID17010301PN020_02  |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |                           |
| 2600                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 5200                                    | 2860                           | 5200                                   | 572                             | -2288  | -8                | Forest Group B            |
| 1200                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1200                                    | 660                            | 1200                                   | 132                             | -528   | -8                |                           |
| 330                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 330                                     | 363                            | 330                                    | 36.3                            | -326.7                                       | -18               |                           |
| 1500                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1500                                    | 825                            | 1500                                   | 165                             | -660   | -8                |                           |
| 90                      | 0.7                       | 1.65   | 0.98                       | 0.11  | -1.54  | 1                         | 1                        | 90                                      | 148.5                          | 90                                     | 9.9                             | -138.6                                       | -28               |                           |
| 1600                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1600                                    | 880                            | 1600                                   | 176                             | -704   | -8                |                           |
| 40                      | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 40                                      | 44                             | 40                                     | 4.4                             | -39.6  | -18               |                           |
| 1500                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1500                                    | 825                            | 1500                                   | 165                             | -660   | -8                |                           |
| 1900                    | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 3800                                    | 4180                           | 3800                                   | 418                             | -3762  | -18               |                           |
| 870                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 870                                     | 478.5                          | 870                                    | 95.7                            | -382.8                                       | -8                |                           |
| 570                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 570                                     | 627                            | 570                                    | 62.7                            | -564.3                                       | -18               |                           |
| 170                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 170                                     | 93.5                           | 170                                    | 18.7                            | -74.8  | -8                |                           |
| 1900                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1900                                    | 1045                           | 1900                                   | 209                             | -836   | -8                |                           |
| 1000                    | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 2000                                    | 2200                           | 2000                                   | 220                             | -1980  | -18               |                           |
| 170                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 340                                     | 187                            | 340                                    | 37.4                            | -149.6                                       | -8                |                           |
| 120                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 240                                     | 264                            | 240                                    | 26.4                            | -237.6                                       | -18               |                           |
| 60                      | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 120                                     | 66                             | 120                                    | 13.2                            | -52.8  | -8                |                           |
| 1800                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1800                                    | 990                            | 1800                                   | 198                             | -792   | -8                |                           |
| 40                      | 0.7                       | 1.65   | 0.98                       | 0.11  | -1.54  | 1                         | 1                        | 40                                      | 66                             | 40                                     | 4.4                             | -61.6  | -28               |                           |
| <b>Total</b>            |                           |  |                            |   |  |                           |                          | <b>23,310</b>                           | <b>16,803</b>                  | <b>23,310</b>                          | <b>2,564</b>                    | <b>-14,238</b>                               | <b>-13</b>        |                           |

**Table F-5. Existing and potential solar loads for Bootjack Creek.**

| Segment Length (meters)              | Existing Shade (fraction) | Existing Summer Load (kWh/m <sup>2</sup> /day) | Potential Shade (fraction) | Potential Summer Load (kWh/m <sup>2</sup> /day) | Potential Load minus Existing load (kWh/m <sup>2</sup> /day) | Existing Stream Width (m) | Natural Stream Width (m) | Existing Segment Area (m <sup>2</sup> ) | Existing Summer Load (kWh/day) | Natural Segment Area (m <sup>2</sup> ) | Potential Summer Load (kWh/day) | Potential Load minus Existing Load (kWh/day) | Lack of Shade (%) | Bootjack Creek                            |
|--------------------------------------|---------------------------|--|----------------------------|---|--|---------------------------|--------------------------|---|--------------------------------|--|---------------------------------|--|-------------------|---|
| Assessment Unit # ID17010301PN034_02 |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |   |
| 3960                                 | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 7920                                    | 4356                           | 7920                                   | 871.2                           | -3484.8                                      | -8                | Forest Group B<br>Smith Cr<br>Bootjack Cr |
| 730                                  | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 730                                     | 401.5                          | 730                                    | 80.3                            | -321.2                                       | -8                |   |
| 720                                  | 0.7                       | 1.65   | 0.98                       | 0.11  | -1.54  | 1                         | 1                        | 720                                     | 1188                           | 720                                    | 79.2                            | -1108.8                                      | -28               |   |
| 1290                                 | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 2580                                    | 2838                           | 2580                                   | 283.8                           | -2554.2                                      | -18               |   |
| 600                                  | 0.7                       | 1.65   | 0.96                       | 0.22  | -1.43  | 3                         | 3                        | 1800                                    | 2970                           | 1800                                   | 396                             | -2574  | -26               |   |
| 300                                  | 0.8                       | 1.1  | 0.96                       | 0.22  | -0.88  | 3                         | 3                        | 900                                     | 990                            | 900                                    | 198                             | -792   | -16               |   |
| 690                                  | 0.7                       | 1.65   | 0.94                       | 0.33  | -1.32  | 4                         | 4                        | 2760                                    | 4554                           | 2760                                   | 910.8                           | -3643.2                                      | -24               |   |
|                                      |                           |  |                            |   |  |                           |                          | <b>Total</b>                            | <b>17,410</b>                  | <b>17,298</b>                          | <b>17,410</b>                   | <b>2,819</b>                                 | <b>-14,478</b>    |   |

**Table F-6. Existing and potential solar loads for Brett Creek and tributaries.**

| Segment Length (meters) | Existing Shade (fraction) | Existing Summer Load (kWh/m <sup>2</sup> /day) | Potential Shade (fraction) | Potential Summer Load (kWh/m <sup>2</sup> /day) | Potential Load minus Existing load (kWh/m <sup>2</sup> /day) | Existing Stream Width (m) | Natural Stream Width (m) | Existing Segment Area (m <sup>2</sup> ) | Existing Summer Load (kWh/day) | Natural Segment Area (m <sup>2</sup> ) | Potential Summer Load (kWh/day) | Potential Load minus Existing Load (kWh/day) | Lack of Shade (%) | Brett Creek          |  |
|-------------------------|---------------------------|--|----------------------------|---|--|---------------------------|--------------------------|---|--------------------------------|--|---------------------------------|--|-------------------|----------------------|--|
| AU# ID17010301PN021_02  |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |                      |  |
| 1000                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1000                                    | 550                            | 1000                                   | 110                             | -440   | -8                | Forest<br>Group B    |  |
| 760                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 1520                                    | 1672                           | 1520                                   | 167.2                           | -1504.8                                      | -18               |                      |  |
| 60                      | 0.7                       | 1.65   | 0.94                       | 0.33  | -1.32  | 2                         | 2                        | 120                                     | 198                            | 120                                    | 39.6                            | -158.4                                       | -24               | Group 1              |  |
| 2100                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 2100                                    | 1155                           | 2100                                   | 231                             | -924   | -8                |                      |  |
| 300                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 600                                     | 660                            | 600                                    | 66                              | -594   | -18               | Group B              |  |
| 530                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 1060                                    | 583                            | 1060                                   | 116.6                           | -466.4                                       | -8                |                      |  |
| 90                      | 0.7                       | 1.65   | 0.97                       | 0.165   | -1.485   | 1                         | 1                        | 90                                      | 148.5                          | 90                                     | 14.85                           | -133.65                                      | -27               | Group 1              |  |
| 800                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 800                                     | 440                            | 800                                    | 88                              | -352   | -8                |                      |  |
| 650                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 650                                     | 715                            | 650                                    | 71.5                            | -643.5                                       | -18               | Group B              |  |
| 450                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 900                                     | 495                            | 900                                    | 99                              | -396   | -8                |                      |  |
| 1100                    | 0.8                       | 1.1  | 0.94                       | 0.33  | -0.77  | 2                         | 2                        | 2200                                    | 2420                           | 2200                                   | 726                             | -1694  | -14               | Nonforest<br>Group 1 |  |
| 820                     | 0.7                       | 1.65   | 0.86                       | 0.77  | -0.88  | 3                         | 3                        | 2460                                    | 4059                           | 2460                                   | 1894.2                          | -2164.8                                      | -16               |                      |  |
| 800                     | 0.7                       | 1.65   | 0.86                       | 0.77  | -0.88  | 3                         | 3                        | 2400                                    | 3960                           | 2400                                   | 1848                            | -2112  | -16               | Brett Creek          |  |
| 920                     | 0.6                       | 2.2  | 0.78                       | 1.21  | -0.99  | 4                         | 4                        | 3680                                    | 8096                           | 3680                                   | 4452.8                          | -3643.2                                      | -18               |                      |  |
| 120                     | 0.8                       | 1.1  | 0.78                       | 1.21  | 0.11   | 4                         | 4                        | 480                                     | 528                            | 480                                    | 58.8                            | 52.8   | 0                 |                      |  |
|                         |                           |  |                            |   |  |                           |                          | <b>Total</b>                            | <b>20,060</b>                  | <b>25,680</b>                          | <b>20,060</b>                   | <b>10,506</b>                                | <b>-15,174</b>    | <b>-14</b>           |  |

**Table F-7. Existing and potential solar loads for Brown Creek and tributaries.**

| Segment Length (meters) | Existing Shade (fraction) | Existing Summer Load (kWh/m <sup>2</sup> /day) | Potential Shade (fraction) | Potential Summer Load (kWh/m <sup>2</sup> /day) | Potential Load minus Existing load (kWh/m <sup>2</sup> /day) | Existing Stream Width (m) | Natural Stream Width (m) | Existing Segment Area (m <sup>2</sup> ) | Existing Summer Load (kWh/day) | Natural Segment Area (m <sup>2</sup> ) | Potential Summer Load (kWh/day) | Potential Load minus Existing Load (kWh/day) | Lack of Shade (%) | Brown Creek   |  |
|-------------------------|---------------------------|--|----------------------------|---|--|---------------------------|--------------------------|---|--------------------------------|--|---------------------------------|--|-------------------|---|--|
| AU# ID17010301PN026_02  |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |   |  |
| 2100                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 2100                                    | 1155                           | 2100                                   | 231                             | -924   | -8                | Forest<br>Group B   |  |
| 1900                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1900                                    | 1045                           | 1900                                   | 209                             | -836   | -8                |   |  |
| 2700                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 5400                                    | 2970                           | 5400                                   | 594                             | -2376  | -8                | Group B   |  |
| 1900                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1900                                    | 1045                           | 1900                                   | 209                             | -836   | -8                |   |  |
| 1100                    | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 2200                                    | 2420                           | 2200                                   | 242                             | -2178  | -18               | 1st to Brown<br>Hart Creek<br>Rookie Creek<br>Brown Creek |  |
| 1100                    | 0.8                       | 1.1  | 0.97                       | 0.165   | -0.935   | 3                         | 3                        | 3300                                    | 3630                           | 3300                                   | 544.5                           | -3085.5                                      | -17               |   |  |
| 280                     | 0.7                       | 1.65   | 0.96                       | 0.22  | -1.43  | 4                         | 4                        | 1120                                    | 1848                           | 1120                                   | 246.4                           | -1601.6                                      | -26               | Brown Creek   |  |
| 350                     | 0.8                       | 1.1  | 0.96                       | 0.22  | -0.88  | 4                         | 4                        | 1400                                    | 1540                           | 1400                                   | 308                             | -1232  | -16               |   |  |
| 710                     | 0.8                       | 1.1  | 0.96                       | 0.22  | -0.88  | 4                         | 4                        | 2840                                    | 3124                           | 2840                                   | 624.8                           | -2499.2                                      | -16               |   |  |
| 450                     | 0.9                       | 0.55   | 0.96                       | 0.22  | -0.33  | 4                         | 4                        | 1800                                    | 990                            | 1800                                   | 396                             | -594   | -6                |   |  |
|                         |                           |  |                            |   |  |                           |                          | <b>Total</b>                            | <b>23,960</b>                  | <b>19,767</b>                          | <b>23,960</b>                   | <b>3,605</b>                                 | <b>-16,162</b>    | <b>-13</b>  |  |

**Table F-8. Existing and potential solar loads for Bumblebee Creek.**

| Segment Length (meters)              | Existing Shade (fraction) | Existing Summer Load (kWh/m <sup>2</sup> /day) | Potential Shade (fraction) | Potential Summer Load (kWh/m <sup>2</sup> /day) | Potential Load minus Existing load (kWh/m <sup>2</sup> /day) | Existing Stream Width (m) | Natural Stream Width (m) | Existing Segment Area (m <sup>2</sup> ) | Existing Summer Load (kWh/day) | Natural Segment Area (m <sup>2</sup> ) | Potential Summer Load (kWh/day) | Potential Load minus Existing Load (kWh/day) | Lack of Shade (%) | Bumblebee Creek   |                 |
|--------------------------------------|---------------------------|--|----------------------------|---|--|---------------------------|--------------------------|---|--------------------------------|--|---------------------------------|--|-------------------|-------------------|-----------------|
| Assessment Unit # ID17010301PN031_02 |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |                   |                 |
| 1790                                 | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1790                                    | 984.5                          | 1790                                   | 196.9                           | -787.6                                       | -8                | Forest Group B    |                 |
| 1920                                 | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 3840                                    | 2112                           | 3840                                   | 422.4                           | -1689.6                                      | -8                |                   | Trib #1         |
| 2080                                 | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 2080                                    | 1144                           | 2080                                   | 228.8                           | -915.2                                       | -8                |                   | Trib #2         |
| 870                                  | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 870                                     | 957                            | 870                                    | 95.7                            | -861.3                                       | -18               |                   | Trib #3         |
| 1150                                 | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 1                        | 2300                                    | 1265                           | 1150                                   | 126.5                           | -1138.5                                      | -8                |                   | Bumblebee Creek |
| 300                                  | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 3                         | 2                        | 900                                     | 990                            | 600                                    | 66                              | -924   | -18               |                   |                 |
| 630                                  | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 3                         | 2                        | 1890                                    | 1039.5                         | 1260                                   | 138.6                           | -900.9                                       | -8                |                   |                 |
| 1560                                 | 0.8                       | 1.1  | 0.96                       | 0.22  | -0.88  | 4                         | 3                        | 6240                                    | 6864                           | 4680                                   | 1029.6                          | -5834.4                                      | -16               |                   |                 |
| 270                                  | 0.9                       | 0.55   | 0.96                       | 0.22  | -0.33  | 5                         | 3                        | 1350                                    | 742.5                          | 810                                    | 178.2                           | -564.3                                       | -6                |                   |                 |
| 450                                  | 0.8                       | 1.1  | 0.94                       | 0.33  | -0.77  | 5                         | 4                        | 2250                                    | 2475                           | 1800                                   | 594                             | -1881  | -14               |                   |                 |
| 360                                  | 0.7                       | 1.65   | 0.78                       | 1.21  | -0.44  | 5                         | 4                        | 1800                                    | 2970                           | 1440                                   | 1742.4                          | -1227.6                                      | -8                | Nonforest Group 1 |                 |
| 570                                  | 0.6                       | 2.2  | 0.78                       | 1.21  | -0.99  | 6                         | 4                        | 3420                                    | 7524                           | 2280                                   | 2758.8                          | -4765.2                                      | -18               |                   |                 |
| 890                                  | 0.6                       | 2.2  | 0.78                       | 1.21  | -0.99  | 6                         | 4                        | 5340                                    | 11748                          | 3560                                   | 4307.6                          | -7440.4                                      | -18               |                   |                 |
| <b>Total</b>                         |                           |  |                            |   |  |                           |                          | <b>34,070</b>                           | <b>40,816</b>                  | <b>26,160</b>                          | <b>11,886</b>                   | <b>-28,930</b>                               | <b>-12</b>        |                   |                 |

**Table F-9. Existing and potential solar loads for Burnt Cabin Creek.**

| Segment Length (meters)              | Existing Shade (fraction) | Existing Summer Load (kWh/m <sup>2</sup> /day) | Potential Shade (fraction) | Potential Summer Load (kWh/m <sup>2</sup> /day) | Potential Load minus Existing load (kWh/m <sup>2</sup> /day) | Existing Stream Width (m) | Natural Stream Width (m) | Existing Segment Area (m <sup>2</sup> ) | Existing Summer Load (kWh/day) | Natural Segment Area (m <sup>2</sup> ) | Potential Summer Load (kWh/day) | Potential Load minus Existing Load (kWh/day) | Lack of Shade (%) | Burnt Cabin Creek |                  |
|--------------------------------------|---------------------------|--|----------------------------|---|--|---------------------------|--------------------------|---|--------------------------------|--|---------------------------------|--|-------------------|-------------------|------------------|
| Assessment Unit # ID17010301PN036_02 |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |                   |                  |
| 1590                                 | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 3180                                    | 1749                           | 3180                                   | 349.8                           | -1399.2                                      | -8                | Forest Group B    |                  |
| 310                                  | 0.7                       | 1.65   | 0.98                       | 0.11  | -1.54  | 2                         | 2                        | 620                                     | 1023                           | 620                                    | 68.2                            | -954.8                                       | -28               |                   | Lost Mine Creek  |
| 1540                                 | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1540                                    | 847                            | 1540                                   | 169.4                           | -677.6                                       | -8                |                   | Lone Cabin Creek |
| 420                                  | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 840                                     | 924                            | 840                                    | 92.4                            | -831.6                                       | -18               |                   |                  |
| 250                                  | 0.7                       | 1.65   | 0.98                       | 0.11  | -1.54  | 2                         | 2                        | 500                                     | 825                            | 500                                    | 55                              | -770   | -28               |                   |                  |
| 600                                  | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 1200                                    | 1320                           | 1200                                   | 132                             | -1188  | -18               |                   |                  |
| 2000                                 | 0.9                       | 0.55   | 0.96                       | 0.22  | -0.33  | 3                         | 3                        | 6000                                    | 3300                           | 6000                                   | 1320                            | -1980  | -6                |                   |                  |
| 150                                  | 0.8                       | 1.1  | 0.96                       | 0.22  | -0.88  | 3                         | 3                        | 450                                     | 495                            | 450                                    | 99                              | -396   | -16               |                   |                  |
| 870                                  | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 870                                     | 478.5                          | 870                                    | 95.7                            | -382.8                                       | -8                |                   |                  |
| 80                                   | 0.4                       | 3.3  | 0.98                       | 0.11  | -3.19  | 1                         | 1                        | 80                                      | 264                            | 80                                     | 8.8                             | -255.2                                       | -58               |                   | Bottom Creek     |
| 720                                  | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 1440                                    | 792                            | 1440                                   | 158.4                           | -633.6                                       | -8                |                   |                  |
| 1360                                 | 0.8                       | 1.1  | 0.96                       | 0.22  | -0.88  | 3                         | 3                        | 4080                                    | 4488                           | 4080                                   | 897.6                           | -3590.4                                      | -16               |                   |                  |
| 120                                  | 0.7                       | 1.65   | 0.96                       | 0.22  | -1.43  | 3                         | 3                        | 360                                     | 594                            | 360                                    | 79.2                            | -514.8                                       | -26               |                   |                  |
| 1870                                 | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1870                                    | 1028.5                         | 1870                                   | 205.7                           | -822.8                                       | -8                |                   |                  |
| 580                                  | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 580                                     | 638                            | 580                                    | 63.8                            | -574.2                                       | -18               |                   |                  |
| 740                                  | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 1480                                    | 814                            | 1480                                   | 162.8                           | -651.2                                       | -8                |                   |                  |
| 200                                  | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 400                                     | 440                            | 400                                    | 44                              | -396   | -18               |                   |                  |
| 1630                                 | 0.6                       | 2.2  | 0.86                       | 0.77  | -1.43  | 3                         | 3                        | 4890                                    | 10758                          | 4890                                   | 3765.3                          | -6992.7                                      | -26               | Nonforest Group 1 |                  |
| 570                                  | 0.7                       | 1.65   | 0.86                       | 0.77  | -0.88  | 4                         | 3                        | 2280                                    | 3762                           | 1710                                   | 1316.7                          | -2445.3                                      | -16               |                   |                  |
| 740                                  | 0.6                       | 2.2  | 0.78                       | 1.21  | -0.99  | 5                         | 4                        | 3700                                    | 8140                           | 2960                                   | 3581.6                          | -4558.4                                      | -18               |                   |                  |
| 660                                  | 0.7                       | 1.65   | 0.78                       | 1.21  | -0.44  | 5                         | 4                        | 3300                                    | 5445                           | 2640                                   | 3194.4                          | -2250.6                                      | -8                |                   |                  |
| 1010                                 | 0.6                       | 2.2  | 0.72                       | 1.54  | -0.66  | 6                         | 5                        | 6060                                    | 13332                          | 5050                                   | 7777                            | -5555  | -12               |                   |                  |
| 670                                  | 0.5                       | 2.75   | 0.72                       | 1.54  | -1.21  | 7                         | 5                        | 4690                                    | 12897.5                        | 3350                                   | 5159                            | -7738.5                                      | -22               |                   |                  |
| 2200                                 | 0.6                       | 2.2  | 0.65                       | 1.925   | -0.28  | 8                         | 6                        | 17600                                   | 38720                          | 13200                                  | 25410                           | -13310                                       | -5                |                   |                  |
| <b>Total</b>                         |                           |  |                            |   |  |                           |                          | <b>68,010</b>                           | <b>113,075</b>                 | <b>59,290</b>                          | <b>54,206</b>                   | <b>-58,869</b>                               | <b>-17</b>        |                   |                  |

**Table F-10. Existing and potential solar loads for Callis Creek and tributaries.**

| Segment Length (meters) | Existing Shade (fraction) | Existing Summer Load (kWh/m <sup>2</sup> /day) | Potential Shade (fraction) | Potential Summer Load (kWh/m <sup>2</sup> /day) | Potential Load minus Existing load (kWh/m <sup>2</sup> /day) | Existing Stream Width (m) | Natural Stream Width (m) | Existing Segment Area (m <sup>2</sup> ) | Existing Summer Load (kWh/day) | Natural Segment Area (m <sup>2</sup> ) | Potential Summer Load (kWh/day) | Potential Load minus Existing Load (kWh/day) | Lack of Shade (%) | Callis Creek   |                   |
|-------------------------|---------------------------|--|----------------------------|---|--|---------------------------|--------------------------|---|--------------------------------|--|---------------------------------|--|-------------------|----------------|-------------------|
| AU# ID17010301PN019_02  |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |                |                   |
| 2300                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 4600                                    | 2530                           | 4600                                   | 506                             | -2024  | -8                | Forest Group B |                   |
| 390                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 390                                     | 214.5                          | 390                                    | 42.9                            | -171.6                                       | -8                |                | 1st to Callis     |
| 190                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 190                                     | 209                            | 190                                    | 20.9                            | -188.1                                       | -18               |                | 2nd to Callis     |
| 1700                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1700                                    | 935                            | 1700                                   | 187                             | -748   | -8                |                | NF Callis Cr      |
| 1900                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1900                                    | 1045                           | 1900                                   | 209                             | -836   | -8                |                |                   |
| 850                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 850                                     | 467.5                          | 850                                    | 93.5                            | -374   | -8                |                |                   |
| 700                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 700                                     | 770                            | 700                                    | 77                              | -693   | -18               |                |                   |
| 800                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 1600                                    | 880                            | 1600                                   | 176                             | -704   | -8                |                | Nonforest Group 1 |
| 850                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 1700                                    | 1870                           | 1700                                   | 187                             | -1683  | -18               |                |                   |
| 690                     | 0.8                       | 1.1  | 0.86                       | 0.77  | -0.33  | 3                         | 3                        | 2070                                    | 2277                           | 2070                                   | 1593.9                          | -683.1                                       | -6                |                |                   |
| 320                     | 0.7                       | 1.65   | 0.86                       | 0.77  | -0.88  | 3                         | 3                        | 960                                     | 1584                           | 960                                    | 739.2                           | -844.8                                       | -16               |                |                   |
| 550                     | 0.8                       | 1.1  | 0.86                       | 0.77  | -0.33  | 3                         | 3                        | 1650                                    | 1815                           | 1650                                   | 1270.5                          | -544.5                                       | -6                |                |                   |
| 570                     | 0.8                       | 1.1  | 0.78                       | 1.21  | 0.11   | 4                         | 4                        | 2280                                    | 2508                           | 2280                                   | 2758.8                          | 250.8  | 0                 |                |                   |
| 900                     | 0.7                       | 1.65   | 0.78                       | 1.21  | -0.44  | 4                         | 4                        | 3600                                    | 5940                           | 3600                                   | 4356                            | -1584  | -8                |                |                   |
| 410                     | 0.6                       | 2.2  | 0.78                       | 1.21  | -0.99  | 4                         | 4                        | 1640                                    | 3608                           | 1640                                   | 1984.4                          | -1623.6                                      | -18               |                |                   |
| 640                     | 0.7                       | 1.65   | 0.78                       | 1.21  | -0.44  | 4                         | 4                        | 2560                                    | 4224                           | 2560                                   | 3097.6                          | -1126.4                                      | -8                |                |                   |
| 360                     | 0.8                       | 1.1  | 0.78                       | 1.21  | 0.11   | 4                         | 4                        | 1440                                    | 1584                           | 1440                                   | 1742.4                          | 158.4  | 0                 |                |                   |
| <b>Total</b>            |                           |  |                            |   |  |                           |                          | <b>29,830</b>                           | <b>32,461</b>                  | <b>29,830</b>                          | <b>19,042</b>                   | <b>-13,419</b>                               | <b>-10</b>        |                |                   |

**Table F-11. Existing and potential solar loads for Cataract Creek and West Elk Creek.**

| Segment Length (meters) | Existing Shade (fraction) | Existing Summer Load (kWh/m <sup>2</sup> /day) | Potential Shade (fraction) | Potential Summer Load (kWh/m <sup>2</sup> /day) | Potential Load minus Existing load (kWh/m <sup>2</sup> /day) | Existing Stream Width (m) | Natural Stream Width (m) | Existing Segment Area (m <sup>2</sup> ) | Existing Summer Load (kWh/day) | Natural Segment Area (m <sup>2</sup> ) | Potential Summer Load (kWh/day) | Potential Load minus Existing Load (kWh/day) | Lack of Shade (%) | Cataract Creek |
|-------------------------|---------------------------|--|----------------------------|---|--|---------------------------|--------------------------|---|--------------------------------|--|---------------------------------|--|-------------------|----------------|
| AU# ID17010301PN016_02  |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |                |
| 810                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 810                                     | 445.5                          | 810                                    | 89.1                            | -356.4                                       | -8                | Forest Group B |
| 640                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 640                                     | 704                            | 640                                    | 70.4                            | -633.6                                       | -18               |                |
| 810                     | 0.7                       | 1.65   | 0.94                       | 0.33  | -1.32  | 1                         | 1                        | 810                                     | 1336.5                         | 810                                    | 267.3                           | -1069.2                                      | -24               |                |
| 2800                    | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 5600                                    | 6160                           | 5600                                   | 616                             | -5544  | -18               |                |
| 1100                    | 0.9                       | 0.55   | 0.97                       | 0.165   | -0.385   | 3                         | 3                        | 3300                                    | 1815                           | 3300                                   | 544.5                           | -1270.5                                      | -7                |                |
| 270                     | 0.8                       | 1.1  | 0.97                       | 0.165   | -0.935   | 3                         | 3                        | 810                                     | 891                            | 810                                    | 133.65                          | -757.35                                      | -17               |                |
| 2000                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 2000                                    | 1100                           | 2000                                   | 220                             | -880   | -8                |                |
| 1200                    | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 2400                                    | 2640                           | 2400                                   | 264                             | -2376  | -18               |                |
| 160                     | 0.7                       | 1.65   | 0.86                       | 0.77  | -0.88  | 3                         | 3                        | 480                                     | 792                            | 480                                    | 369.6                           | -422.4                                       | -16               |                |
| 150                     | 0.4                       | 3.3  | 0.86                       | 0.77  | -2.53  | 3                         | 3                        | 450                                     | 1485                           | 450                                    | 346.5                           | -1138.5                                      | -46               |                |
| 690                     | 0.8                       | 1.1  | 0.97                       | 0.165   | -0.935   | 3                         | 3                        | 2070                                    | 2277                           | 2070                                   | 341.55                          | -1935.45                                     | -17               |                |
| 550                     | 0.9                       | 0.55   | 0.97                       | 0.165   | -0.385   | 3                         | 3                        | 1650                                    | 907.5                          | 1650                                   | 272.25                          | -635.25                                      | -7                |                |
| 590                     | 0.7                       | 1.65   | 0.78                       | 1.21  | -0.44  | 4                         | 4                        | 2360                                    | 3894                           | 2360                                   | 2855.6                          | -1038.4                                      | -8                |                |
| <b>Total</b>            |                           |  |                            |   |  |                           |                          | <b>23,380</b>                           | <b>24,448</b>                  | <b>23,380</b>                          | <b>6,390</b>                    | <b>-18,057</b>                               | <b>-16</b>        |                |

**Table F-12. Existing and potential solar loads for Copper Creek.**

| Segment Length (meters)              | Existing Shade (fraction) | Existing Summer Load (kWh/m <sup>2</sup> /day) | Potential Shade (fraction) | Potential Summer Load (kWh/m <sup>2</sup> /day) | Potential Load minus Existing load (kWh/m <sup>2</sup> /day) | Existing Stream Width (m) | Natural Stream Width (m) | Existing Segment Area (m <sup>2</sup> ) | Existing Summer Load (kWh/day) | Natural Segment Area (m <sup>2</sup> ) | Potential Summer Load (kWh/day) | Potential Load minus Existing Load (kWh/day) | Lack of Shade (%) | Copper Creek      |  |
|--------------------------------------|---------------------------|--|----------------------------|---|--|---------------------------|--------------------------|---|--------------------------------|--|---------------------------------|--|-------------------|-------------------|--|
| Assessment Unit # ID17010301PN039_02 |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |                   |  |
| 330                                  | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 330                                     | 181.5                          | 330                                    | 36.3                            | -145.2                                       | -8                | Forest Group B    |  |
| 400                                  | 0.7                       | 1.65   | 0.98                       | 0.11  | -1.54  | 2                         | 2                        | 800                                     | 1320                           | 800                                    | 88                              | -1232  | -28               |                   |  |
| 220                                  | 0.8                       | 1.1  | 0.96                       | 0.22  | -0.88  | 3                         | 3                        | 660                                     | 726                            | 660                                    | 145.2                           | -580.8                                       | -16               |                   |  |
| 990                                  | 0.9                       | 0.55   | 0.94                       | 0.33  | -0.22  | 4                         | 4                        | 3960                                    | 2178                           | 3960                                   | 1306.8                          | -871.2                                       | -4                |                   |  |
| 90                                   | 0.7                       | 1.65   | 0.94                       | 0.33  | -1.32  | 4                         | 4                        | 360                                     | 594                            | 360                                    | 118.8                           | -475.2                                       | -24               |                   |  |
| 470                                  | 0.9                       | 0.55   | 0.91                       | 0.495   | -0.06  | 5                         | 5                        | 2350                                    | 1292.5                         | 2350                                   | 1163.25                         | -129.25                                      | -1                |                   |  |
| 2530                                 | 0.8                       | 1.1  | 0.91                       | 0.495   | -0.61  | 5                         | 5                        | 12650                                   | 13915                          | 12650                                  | 6261.75                         | -7653.25                                     | -11               |                   |  |
| 130                                  | 0.7                       | 1.65   | 0.91                       | 0.495   | -1.155   | 6                         | 5                        | 780                                     | 1287                           | 650                                    | 321.75                          | -965.25                                      | -21               |                   |  |
|                                      |                           |  |                            |   |  |                           |                          | <b>Subtotal</b>                         | <b>21,890</b>                  | <b>21,494</b>                          | <b>21,760</b>                   | <b>9,442</b>                                 | <b>-12,052</b>    | <b>-14</b>        |  |
| Assessment Unit # ID17010301PN039_03 |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |                   |  |
| 650                                  | 0.8                       | 1.1  | 0.65                       | 1.925   | 0.825  | 6                         | 6                        | 3900                                    | 4290                           | 3900                                   | 7507.5                          | 3217.5                                       | 0                 | Nonforest Group 1 |  |
| 520                                  | 0.6                       | 2.2  | 0.65                       | 1.925   | -0.275   | 7                         | 6                        | 3640                                    | 8008                           | 3120                                   | 6006                            | -2002  | -5                |                   |  |
| 710                                  | 0.5                       | 2.75   | 0.65                       | 1.925   | -0.825   | 8                         | 6                        | 5680                                    | 15620                          | 4260                                   | 8200.5                          | -7419.5                                      | -15               |                   |  |
| 770                                  | 0.6                       | 2.2  | 0.6                        | 2.2   | 0  | 8                         | 7                        | 6160                                    | 13552                          | 5390                                   | 11858                           | -1694  | 0                 |                   |  |
| 300                                  | 0.5                       | 2.75   | 0.6                        | 2.2   | -0.55  | 9                         | 7                        | 2700                                    | 7425                           | 2100                                   | 4620                            | -2805  | -10               |                   |  |
| 840                                  | 0.6                       | 2.2  | 0.6                        | 2.2   | 0  | 9                         | 7                        | 7560                                    | 16632                          | 5880                                   | 12936                           | -3696  | 0                 |                   |  |
| 360                                  | 0.3                       | 3.85   | 0.6                        | 2.2   | -1.65  | 9                         | 7                        | 3240                                    | 12474                          | 2520                                   | 5544                            | -6930  | -30               |                   |  |
| 260                                  | 0.1                       | 4.95   | 0.6                        | 2.2   | -2.75  | 9                         | 7                        | 2340                                    | 11583                          | 1820                                   | 4004                            | -7579  | -50               |                   |  |
|                                      |                           |  |                            |   |  |                           |                          | <b>Subtotal</b>                         | <b>35,220</b>                  | <b>89,584</b>                          | <b>28,990</b>                   | <b>60,676</b>                                | <b>-28,908</b>    | <b>-14</b>        |  |
|                                      |                           |  |                            |   |  |                           |                          | <b>Total</b>                            | <b>57,110</b>                  | <b>111,078</b>                         | <b>50,750</b>                   | <b>70,118</b>                                | <b>-40,960</b>    |                   |  |

**Table F-13. Existing and potential solar loads for Cougar Gulch.**

| Segment Length (meters) | Existing Shade (fraction) | Existing Summer Load (kWh/m <sup>2</sup> /day) | Potential Shade (fraction) | Potential Summer Load (kWh/m <sup>2</sup> /day) | Potential Load minus Existing load (kWh/m <sup>2</sup> /day) | Existing Stream Width (m) | Natural Stream Width (m) | Existing Segment Area (m <sup>2</sup> ) | Existing Summer Load (kWh/day) | Natural Segment Area (m <sup>2</sup> ) | Potential Summer Load (kWh/day) | Potential Load minus Existing Load (kWh/day) | Lack of Shade (%) | Cougar Gulch      |  |
|-------------------------|---------------------------|--|----------------------------|---|--|---------------------------|--------------------------|---|--------------------------------|--|---------------------------------|--|-------------------|-------------------|--|
| AU# ID17010301PN029_03  |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |                   |  |
| 880                     | 0.6                       | 2.2  | 0.78                       | 1.21  | -0.99  | 4                         | 4                        | 3520                                    | 7744                           | 3520                                   | 4259.2                          | -3484.8                                      | -18               | Nonforest Group 1 |  |
| 180                     | 0.8                       | 1.1  | 0.78                       | 1.21  | 0.11   | 4                         | 4                        | 720                                     | 792                            | 720                                    | 871.2                           | 79.2   | 0                 |                   |  |
| 1100                    | 0.7                       | 1.65   | 0.72                       | 1.54  | -0.11  | 5                         | 5                        | 5500                                    | 9075                           | 5500                                   | 8470                            | -605   | -2                | Group B           |  |
| 750                     | 0.8                       | 1.1  | 0.93                       | 0.385   | -0.715   | 6                         | 6                        | 4500                                    | 4950                           | 4500                                   | 1732.5                          | -3217.5                                      | -13               |                   |  |
| 360                     | 0.7                       | 1.65   | 0.65                       | 1.925   | 0.275  | 6                         | 6                        | 2160                                    | 3564                           | 2160                                   | 4158                            | 594  | 0                 | Group 1           |  |
| 140                     | 0.8                       | 1.1  | 0.93                       | 0.385   | -0.715   | 6                         | 6                        | 840                                     | 924                            | 840                                    | 323.4                           | -600.6                                       | -13               | Group B           |  |
| 330                     | 0.8                       | 1.1  | 0.93                       | 0.385   | -0.715   | 6                         | 6                        | 1980                                    | 2178                           | 1980                                   | 762.3                           | -1415.7                                      | -13               | Forest            |  |
| 1400                    | 0.6                       | 2.2  | 0.65                       | 1.925   | -0.275   | 6                         | 6                        | 8400                                    | 18480                          | 8400                                   | 16170                           | -2310  | -5                | Group 1           |  |
| 650                     | 0.7                       | 1.65   | 0.91                       | 0.495   | -1.155   | 7                         | 7                        | 4550                                    | 7507.5                         | 4550                                   | 2252.25                         | -5255.25                                     | -21               | Group B           |  |
| 890                     | 0.8                       | 1.1  | 0.91                       | 0.495   | -0.605   | 7                         | 7                        | 6230                                    | 6853                           | 6230                                   | 3083.85                         | -3769.15                                     | -11               | Group 1           |  |
| 400                     | 0.7                       | 1.65   | 0.6                        | 2.2   | 0.55   | 7                         | 7                        | 2800                                    | 4620                           | 2800                                   | 6160                            | 1540   | 0                 |                   |  |
| 130                     | 0.8                       | 1.1  | 0.6                        | 2.2   | 1.1  | 7                         | 7                        | 910                                     | 1001                           | 910                                    | 2002                            | 1001   | 0                 |                   |  |
| 1100                    | 0.6                       | 2.2  | 0.55                       | 2.475   | 0.275  | 8                         | 8                        | 8800                                    | 19360                          | 8800                                   | 21780                           | 2420   | 0                 |                   |  |
| 690                     | 0.5                       | 2.75   | 0.55                       | 2.475   | -0.275   | 8                         | 8                        | 5520                                    | 15180                          | 5520                                   | 13662                           | -1518  | -5                |                   |  |
| 500                     | 0.6                       | 2.2  | 0.55                       | 2.475   | 0.275  | 8                         | 8                        | 4000                                    | 8800                           | 4000                                   | 9900                            | 1100   | 0                 |                   |  |
| 790                     | 0.6                       | 2.2  | 0.55                       | 2.475   | 0.275  | 8                         | 8                        | 6320                                    | 13904                          | 6320                                   | 15642                           | 1738   | 0                 |                   |  |
| 130                     | 0.2                       | 4.4  | 0.55                       | 2.475   | -1.925   | 8                         | 8                        | 1040                                    | 4576                           | 1040                                   | 2574                            | -2002  | -35               |                   |  |
| 230                     | 0.4                       | 3.3  | 0.55                       | 2.475   | -0.825   | 8                         | 8                        | 1840                                    | 6072                           | 1840                                   | 4554                            | -1518  | -15               |                   |  |
|                         |                           |  |                            |   |  |                           |                          | <b>Total</b>                            | <b>69,630</b>                  | <b>135,581</b>                         | <b>69,630</b>                   | <b>118,357</b>                               | <b>-17,224</b>    | <b>-8</b>         |  |

**Table F-14. Existing and potential solar loads for Deception Creek.**

| Segment Length (meters)              | Existing Shade (fraction) | Existing Summer Load (kWh/m <sup>2</sup> /day) | Potential Shade (fraction) | Potential Summer Load (kWh/m <sup>2</sup> /day) | Potential Load minus Existing load (kWh/m <sup>2</sup> /day) | Existing Stream Width (m) | Natural Stream Width (m) | Existing Segment Area (m <sup>2</sup> ) | Existing Summer Load (kWh/day) | Natural Segment Area (m <sup>2</sup> ) | Potential Summer Load (kWh/day) | Potential Load minus Existing Load (kWh/day) | Lack of Shade (%) | Deception Creek |
|--------------------------------------|---------------------------|--|----------------------------|---|--|---------------------------|--------------------------|---|--------------------------------|--|---------------------------------|--|-------------------|-----------------|
| Assessment Unit # ID17010301PN037_02 |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |                 |
| 2170                                 | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 2170                                    | 1193.5                         | 2170                                   | 238.7                           | -954.8                                       | -8                | Forest Group B  |
| 1650                                 | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1650                                    | 907.5                          | 1650                                   | 181.5                           | -726   | -8                |                 |
| 3130                                 | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 6260                                    | 3443                           | 6260                                   | 688.6                           | -2754.4                                      | -8                |                 |
| 710                                  | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 710                                     | 390.5                          | 710                                    | 78.1                            | -312.4                                       | -8                |                 |
| 1540                                 | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 3080                                    | 1694                           | 3080                                   | 338.8                           | -1355.2                                      | -8                |                 |
| 950                                  | 0.7                       | 1.65   | 0.98                       | 0.11  | -1.54  | 2                         | 2                        | 1900                                    | 3135                           | 1900                                   | 209                             | -2926  | -28               |                 |
| 590                                  | 0.6                       | 2.2  | 0.96                       | 0.22  | -1.98  | 3                         | 3                        | 1770                                    | 3894                           | 1770                                   | 389.4                           | -3504.6                                      | -36               |                 |
| 2270                                 | 0.7                       | 1.65   | 0.78                       | 1.21  | -0.44  | 4                         | 4                        | 9080                                    | 14982                          | 9080                                   | 10986.8                         | -3995.2                                      | -8                | Nonforest 1     |
| <b>Total</b>                         |                           |  |                            |   |  |                           |                          | <b>26,620</b>                           | <b>29,640</b>                  | <b>26,620</b>                          | <b>13,111</b>                   | <b>-16,529</b>                               | <b>-14</b>        |                 |

**Table F-15. Existing and potential solar loads for WF Eagle Creek.**

| Segment Length (meters)              | Existing Shade (fraction) | Existing Summer Load (kWh/m <sup>2</sup> /day) | Potential Shade (fraction) | Potential Summer Load (kWh/m <sup>2</sup> /day) | Potential Load minus Existing load (kWh/m <sup>2</sup> /day) | Existing Stream Width (m) | Natural Stream Width (m) | Existing Segment Area (m <sup>2</sup> ) | Existing Summer Load (kWh/day) | Natural Segment Area (m <sup>2</sup> ) | Potential Summer Load (kWh/day) | Potential Load minus Existing Load (kWh/day) | Lack of Shade (%) | WF Eagle Creek    |                  |
|--------------------------------------|---------------------------|--|----------------------------|---|--|---------------------------|--------------------------|---|--------------------------------|--|---------------------------------|--|-------------------|-------------------|------------------|
| Assessment Unit # ID17010301PN008_02 |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |                   |                  |
| 1200                                 | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1200                                    | 660                            | 1200                                   | 132                             | -528   | -8                | Forest Group B    |                  |
| 410                                  | 0.5                       | 2.75   | 0.98                       | 0.11  | -2.64  | 2                         | 2                        | 820                                     | 2255                           | 820                                    | 90.2                            | -2164.8                                      | -48               |                   | Cottonwood Creek |
| 2470                                 | 0.8                       | 1.1  | 0.96                       | 0.22  | -0.88  | 3                         | 3                        | 7410                                    | 8151                           | 7410                                   | 1630.2                          | -6520.8                                      | -16               |                   |                  |
| 580                                  | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 580                                     | 638                            | 580                                    | 63.8                            | -574.2                                       | -18               |                   | Bobtail Creek    |
| 290                                  | 0.7                       | 1.65   | 0.98                       | 0.11  | -1.54  | 1                         | 1                        | 290                                     | 478.5                          | 290                                    | 31.9                            | -446.6                                       | -28               |                   |                  |
| 160                                  | 0.4                       | 3.3  | 0.98                       | 0.11  | -3.19  | 1                         | 1                        | 160                                     | 528                            | 160                                    | 17.6                            | -510.4                                       | -58               |                   | WF Eagle Creek   |
| 450                                  | 0.7                       | 1.65   | 0.98                       | 0.11  | -1.54  | 1                         | 1                        | 450                                     | 742.5                          | 450                                    | 49.5                            | -693   | -28               |                   |                  |
| 3130                                 | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 6260                                    | 3443                           | 6260                                   | 688.6                           | -2754.4                                      | -8                |                   |                  |
| 680                                  | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 680                                     | 748                            | 680                                    | 74.8                            | -673.2                                       | -18               |                   |                  |
| 4550                                 | 0.9                       | 0.55   | 0.94                       | 0.33  | -0.22  | 4                         | 4                        | 18200                                   | 10010                          | 18200                                  | 6006                            | -4004  | -4                |                   |                  |
| 230                                  | 0.7                       | 1.65   | 0.72                       | 1.54  | -0.11  | 5                         | 5                        | 1150                                    | 1897.5                         | 1150                                   | 1771                            | -126.5                                       | -2                | Nonforest Group 1 |                  |
| 230                                  | 0.8                       | 1.1  | 0.72                       | 1.54  | 0.44   | 5                         | 5                        | 1150                                    | 1265                           | 1150                                   | 1771                            | 506  | 0                 |                   |                  |
| 460                                  | 0.7                       | 1.65   | 0.72                       | 1.54  | -0.11  | 5                         | 5                        | 2300                                    | 3795                           | 2300                                   | 3542                            | -253   | -2                |                   |                  |
| 280                                  | 0.4                       | 3.3  | 0.72                       | 1.54  | -1.76  | 5                         | 5                        | 1400                                    | 4620                           | 1400                                   | 2156                            | -2464  | -32               |                   |                  |
| 1050                                 | 0.6                       | 2.2  | 0.72                       | 1.54  | -0.66  | 6                         | 5                        | 6300                                    | 13860                          | 5250                                   | 8085                            | -5775  | -12               |                   |                  |
| 250                                  | 0.4                       | 3.3  | 0.65                       | 1.925   | -1.375   | 6                         | 6                        | 1500                                    | 4950                           | 1500                                   | 2887.5                          | -2062.5                                      | -25               |                   |                  |
| 590                                  | 0.7                       | 1.65   | 0.65                       | 1.925   | 0.275  | 6                         | 6                        | 3540                                    | 5841                           | 3540                                   | 6814.5                          | 973.5  | 0                 |                   |                  |
| 130                                  | 0.5                       | 2.75   | 0.65                       | 1.925   | -0.825   | 7                         | 6                        | 910                                     | 2502.5                         | 780                                    | 1501.5                          | -1001  | -15               |                   |                  |
| 1040                                 | 0.8                       | 1.1  | 0.65                       | 1.925   | 0.825  | 7                         | 6                        | 7280                                    | 8008                           | 6240                                   | 12012                           | 4004   | 15                |                   |                  |
| 390                                  | 0.6                       | 2.2  | 0.6                        | 2.2   | 0  | 7                         | 7                        | 2730                                    | 6006                           | 2730                                   | 6006                            | 0  | 0                 |                   |                  |
| 160                                  | 0.5                       | 2.75   | 0.6                        | 2.2   | -0.55  | 7                         | 7                        | 1120                                    | 3080                           | 1120                                   | 2464                            | -616   | -10               |                   |                  |
| 200                                  | 0.7                       | 1.65   | 0.6                        | 2.2   | 0.55   | 8                         | 7                        | 1600                                    | 2640                           | 1400                                   | 3080                            | 440  | 0                 |                   |                  |
| 270                                  | 0.6                       | 2.2  | 0.6                        | 2.2   | 0  | 8                         | 7                        | 2160                                    | 4752                           | 1890                                   | 4158                            | -594   | 0                 |                   |                  |
| 250                                  | 0.9                       | 0.55   | 0.6                        | 2.2   | 1.65   | 8                         | 7                        | 2000                                    | 1100                           | 1750                                   | 3850                            | 2750   | 0                 |                   |                  |
| 780                                  | 0.8                       | 1.1  | 0.6                        | 2.2   | 1.1  | 8                         | 7                        | 6240                                    | 6864                           | 5460                                   | 12012                           | 5148   | 0                 |                   |                  |
| 400                                  | 0.6                       | 2.2  | 0.6                        | 2.2   | 0  | 9                         | 7                        | 3600                                    | 7920                           | 2800                                   | 6160                            | -1760  | 0                 |                   |                  |
| 180                                  | 0.8                       | 1.1  | 0.6                        | 2.2   | 1.1  | 9                         | 7                        | 1620                                    | 1782                           | 1260                                   | 2772                            | 990  | 0                 |                   |                  |
| 250                                  | 0.6                       | 2.2  | 0.6                        | 2.2   | 0  | 9                         | 7                        | 2250                                    | 4950                           | 1750                                   | 3850                            | -1100  | 0                 |                   |                  |
| 380                                  | 0.8                       | 1.1  | 0.6                        | 2.2   | 1.1  | 9                         | 7                        | 3420                                    | 3762                           | 2660                                   | 5852                            | 2090   | 0                 |                   |                  |
| 870                                  | 0.6                       | 2.2  | 0.55                       | 2.475   | 0.275  | 10                        | 8                        | 8700                                    | 19140                          | 6960                                   | 17226                           | -1914  | 0                 |                   |                  |
| 360                                  | 0.5                       | 2.75   | 0.55                       | 2.475   | -0.275   | 10                        | 8                        | 3600                                    | 9900                           | 2880                                   | 7128                            | -2772  | -5                |                   |                  |
| 450                                  | 0.6                       | 2.2  | 0.55                       | 2.475   | 0.275  | 10                        | 8                        | 4500                                    | 9900                           | 3600                                   | 8910                            | -990   | 0                 |                   |                  |
| 270                                  | 0.5                       | 2.75   | 0.55                       | 2.475   | -0.275   | 11                        | 8                        | 2970                                    | 8167.5                         | 2160                                   | 5346                            | -2821.5                                      | -5                |                   |                  |
| 280                                  | 0.7                       | 1.65   | 0.55                       | 2.475   | 0.825  | 11                        | 8                        | 3080                                    | 5082                           | 2240                                   | 5544                            | 462  | 0                 |                   |                  |
|                                      |                           |  |                            |   |  |                           | <b>Total</b>             | <b>111,170</b>                          | <b>169,439</b>                 | <b>100,020</b>                         | <b>143,683</b>                  | <b>-25,755</b>                               | <b>-10</b>        |                   |                  |

**Table F-16. Existing and potential solar loads for EF Eagle Creek.**

| Segment Length (meters)              | Existing Shade (fraction) | Existing Summer Load (kWh/m <sup>2</sup> /day) | Potential Shade (fraction) | Potential Summer Load (kWh/m <sup>2</sup> /day) | Potential Load minus Existing load (kWh/m <sup>2</sup> /day) | Existing Stream Width (m) | Natural Stream Width (m) | Existing Segment Area (m <sup>2</sup> ) | Existing Summer Load (kWh/day) | Natural Segment Area (m <sup>2</sup> ) | Potential Summer Load (kWh/day) | Potential Load minus Existing Load (kWh/day) | Lack of Shade (%) | EF Eagle Creek |
|--------------------------------------|---------------------------|--|----------------------------|---|--|---------------------------|--------------------------|---|--------------------------------|--|---------------------------------|--|-------------------|----------------|
| Assessment Unit # ID17010301PN007_02 |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |                |
| 450                                  | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 1                        | 900                                     | 495                            | 450                                    | 49.5                            | -445.5                                       | -8                | Group C        |
| 1330                                 | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 1                        | 2660                                    | 1463                           | 1330                                   | 146.3                           | -1316.7                                      | -8                | Group A        |
| 1300                                 | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 3                         | 2                        | 3900                                    | 4290                           | 2600                                   | 286                             | -4004  | -18               | Forest         |
| 270                                  | 0.7                       | 1.65   | 0.96                       | 0.22  | -1.43  | 4                         | 3                        | 1080                                    | 1782                           | 810                                    | 178.2                           | -1603.8                                      | -26               | Group B        |
| 410                                  | 0.8                       | 1.1  | 0.94                       | 0.33  | -0.77  | 5                         | 4                        | 2050                                    | 2255                           | 1640                                   | 541.2                           | -1713.8                                      | -14               |                |
| 340                                  | 0.4                       | 3.3  | 0.78                       | 1.21  | -2.09  | 6                         | 4                        | 2040                                    | 6732                           | 1360                                   | 1645.6                          | -5086.4                                      | -38               | Nonforest      |
| 580                                  | 0.4                       | 3.3  | 0.72                       | 1.54  | -1.76  | 7                         | 5                        | 4060                                    | 13398                          | 2900                                   | 4466                            | -8932  | -32               | Group 1        |
| 570                                  | 0.2                       | 4.4  | 0.65                       | 1.925   | -2.475   | 8                         | 6                        | 4560                                    | 20064                          | 3420                                   | 6583.5                          | -13480.5                                     | -45               |                |
| 2070                                 | 0.2                       | 4.4  | 0.6                        | 2.2   | -2.2   | 11                        | 7                        | 22770                                   | 100188                         | 14490                                  | 31878                           | -68310                                       | -40               |                |
| 840                                  | 0.5                       | 2.75   | 0.55                       | 2.475   | -0.275   | 12                        | 8                        | 10080                                   | 27720                          | 6720                                   | 16632                           | -11088                                       | -5                |                |
| 640                                  | 0.4                       | 3.3  | 0.55                       | 2.475   | -0.825   | 12                        | 8                        | 7680                                    | 25344                          | 5120                                   | 12672                           | -12672                                       | -15               |                |
| 420                                  | 0.6                       | 2.2  | 0.55                       | 2.475   | 0.275  | 12                        | 8                        | 5040                                    | 11088                          | 3360                                   | 8316                            | -2772  | 0                 |                |
| 540                                  | 0.5                       | 2.75   | 0.55                       | 2.475   | -0.275   | 12                        | 8                        | 6480                                    | 17820                          | 4320                                   | 10692                           | -7128  | -5                |                |
| 1800                                 | 0.3                       | 3.85   | 0.55                       | 2.475   | -1.375   | 12                        | 8                        | 21600                                   | 83160                          | 14400                                  | 35640                           | -47520                                       | -25               |                |
| 400                                  | 0.5                       | 2.75   | 0.52                       | 2.64  | -0.11  | 13                        | 9                        | 5200                                    | 14300                          | 3600                                   | 9504                            | -4796  | -2                |                |
| 980                                  | 0.4                       | 3.3  | 0.52                       | 2.64  | -0.66  | 13                        | 9                        | 12740                                   | 42042                          | 8820                                   | 23284.8                         | -18757.2                                     | -12               |                |
| 620                                  | 0.3                       | 3.85   | 0.52                       | 2.64  | -1.21  | 13                        | 9                        | 8060                                    | 31031                          | 5580                                   | 14731.2                         | -16299.8                                     | -22               |                |
| 1140                                 | 0.4                       | 3.3  | 0.52                       | 2.64  | -0.66  | 13                        | 9                        | 14820                                   | 48906                          | 10260                                  | 27086.4                         | -21819.6                                     | -12               |                |
| 340                                  | 0.2                       | 4.4  | 0.52                       | 2.64  | -1.76  | 13                        | 9                        | 4420                                    | 19448                          | 3060                                   | 8078.4                          | -11369.6                                     | -32               |                |
| <b>Total</b>                         |                           |  |                            |   |  |                           |                          | <b>140,140</b>                          | <b>471,526</b>                 | <b>94,240</b>                          | <b>212,411</b>                  | <b>-259,115</b>                              | <b>-19</b>        |                |

**Table F-17. Existing and potential solar loads for Eagle Creek.**

| Segment Length (meters)              | Existing Shade (fraction) | Existing Summer Load (kWh/m <sup>2</sup> /day) | Potential Shade (fraction) | Potential Summer Load (kWh/m <sup>2</sup> /day) | Potential Load minus Existing load (kWh/m <sup>2</sup> /day) | Existing Stream Width (m) | Natural Stream Width (m) | Existing Segment Area (m <sup>2</sup> ) | Existing Summer Load (kWh/day) | Natural Segment Area (m <sup>2</sup> ) | Potential Summer Load (kWh/day) | Potential Load minus Existing Load (kWh/day) | Lack of Shade (%) | Eagle Creek       |
|--------------------------------------|---------------------------|--|----------------------------|---|--|---------------------------|--------------------------|---|--------------------------------|--|---------------------------------|--|-------------------|-------------------|
| Assessment Unit # ID17010301PN007_03 |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |                   |
| 1320                                 | 0.2                       | 4.4  | 0.41                       | 3.245   | -1.155   | 21                        | 12                       | 27720                                   | 121968                         | 15840                                  | 51400.8                         | -70567.2                                     | -21               | Nonforest Group 1 |
| 320                                  | 0                         | 5.5  | 0.41                       | 3.245   | -2.255   | 21                        | 12                       | 6720                                    | 36960                          | 3840                                   | 12460.8                         | -24499.2                                     | -41               |                   |
| <b>Total</b>                         |                           |  |                            |   |  |                           |                          | <b>34,440</b>                           | <b>158,928</b>                 | <b>19,680</b>                          | <b>63,862</b>                   | <b>-95,066</b>                               |                   |                   |

**Table F-18. Existing and potential solar loads for Falls Creek and tributaries.**

| Segment Length (meters) | Existing Shade (fraction) | Existing Summer Load (kWh/m <sup>2</sup> /day) | Potential Shade (fraction) | Potential Summer Load (kWh/m <sup>2</sup> /day) | Potential Load minus Existing load (kWh/m <sup>2</sup> /day) | Existing Stream Width (m) | Natural Stream Width (m) | Existing Segment Area (m <sup>2</sup> ) | Existing Summer Load (kWh/day) | Natural Segment Area (m <sup>2</sup> ) | Potential Summer Load (kWh/day) | Potential Load minus Existing Load (kWh/day) | Lack of Shade (%) | Falls Creek    |
|-------------------------|---------------------------|--|----------------------------|---|--|---------------------------|--------------------------|---|--------------------------------|--|---------------------------------|--|-------------------|----------------|
| AU# ID17010301PN011_02  |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |                |
| 220                     | 0.5                       | 2.75   | 0.98                       | 0.11  | -2.64  | 1                         | 1                        | 220                                     | 605                            | 220                                    | 24.2                            | -580.8                                       | -48               | Forest Group B |
| 1500                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1500                                    | 825                            | 1500                                   | 165                             | -660   | -8                |                |
| 90                      | 0.7                       | 1.65   | 0.98                       | 0.11  | -1.54  | 2                         | 2                        | 180                                     | 297                            | 180                                    | 19.8                            | -277.2                                       | -28               |                |
| 180                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 360                                     | 198                            | 360                                    | 39.6                            | -158.4                                       | -8                |                |
| 80                      | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 160                                     | 176                            | 160                                    | 17.6                            | -158.4                                       | -18               |                |
| 440                     | 0.9                       | 0.55   | 0.97                       | 0.165   | -0.385   | 3                         | 3                        | 1320                                    | 726                            | 1320                                   | 217.8                           | -508.2                                       | -7                |                |
| 100                     | 0.5                       | 2.75   | 0.97                       | 0.165   | -2.585   | 3                         | 3                        | 300                                     | 825                            | 300                                    | 49.5                            | -775.5                                       | -47               |                |
| 220                     | 0.9                       | 0.55   | 0.97                       | 0.165   | -0.385   | 3                         | 3                        | 660                                     | 363                            | 660                                    | 108.9                           | -254.1                                       | -7                |                |
| 220                     | 0.7                       | 1.65   | 0.97                       | 0.165   | -1.485   | 3                         | 3                        | 660                                     | 1089                           | 660                                    | 108.9                           | -980.1                                       | -27               |                |
| 230                     | 0.8                       | 1.1  | 0.97                       | 0.165   | -0.935   | 3                         | 3                        | 690                                     | 759                            | 690                                    | 113.85                          | -645.15                                      | -17               |                |
| 370                     | 0.7                       | 1.65   | 0.98                       | 0.11  | -1.54  | 1                         | 1                        | 370                                     | 610.5                          | 370                                    | 40.7                            | -569.8                                       | -28               |                |
| 560                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 560                                     | 616                            | 560                                    | 61.6                            | -554.4                                       | -18               |                |
| 80                      | 0.3                       | 3.85   | 0.98                       | 0.11  | -3.74  | 2                         | 2                        | 160                                     | 616                            | 160                                    | 17.6                            | -598.4                                       | -68               |                |
| 570                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 1140                                    | 1254                           | 1140                                   | 125.4                           | -1128.6                                      | -18               |                |
| 180                     | 0.7                       | 1.65   | 0.98                       | 0.11  | -1.54  | 2                         | 2                        | 360                                     | 594                            | 360                                    | 39.6                            | -554.4                                       | -28               |                |
| 280                     | 0.8                       | 1.1  | 0.97                       | 0.165   | -0.935   | 3                         | 3                        | 840                                     | 924                            | 840                                    | 138.6                           | -785.4                                       | -17               |                |
| 380                     | 0.7                       | 1.65   | 0.97                       | 0.165   | -1.485   | 3                         | 3                        | 1140                                    | 1881                           | 1140                                   | 188.1                           | -1692.9                                      | -27               |                |
| 310                     | 0.9                       | 0.55   | 0.97                       | 0.165   | -0.385   | 3                         | 3                        | 930                                     | 511.5                          | 930                                    | 153.45                          | -358.05                                      | -7                |                |
| 760                     | 0.4                       | 3.3  | 0.94                       | 0.33  | -2.97  | 5                         | 5                        | 3800                                    | 12540                          | 3800                                   | 1254                            | -11286                                       | -54               |                |
| 930                     | 0.8                       | 1.1  | 0.94                       | 0.33  | -0.77  | 5                         | 5                        | 4650                                    | 5115                           | 4650                                   | 1534.5                          | -3580.5                                      | -14               |                |
| 910                     | 0.9                       | 0.55   | 0.94                       | 0.33  | -0.22  | 5                         | 5                        | 4550                                    | 2502.5                         | 4550                                   | 1501.5                          | -1001  | -4                |                |
| 550                     | 0.7                       | 1.65   | 0.93                       | 0.385   | -1.265   | 6                         | 6                        | 3300                                    | 5445                           | 3300                                   | 1270.5                          | -4174.5                                      | -23               |                |
| 850                     | 0.8                       | 1.1  | 0.93                       | 0.385   | -0.715   | 6                         | 6                        | 5100                                    | 5610                           | 5100                                   | 1963.5                          | -3646.5                                      | -13               |                |
| 310                     | 0.7                       | 1.65   | 0.93                       | 0.385   | -1.265   | 6                         | 6                        | 1860                                    | 3069                           | 1860                                   | 716.1                           | -2352.9                                      | -23               |                |
| 230                     | 0.5                       | 2.75   | 0.93                       | 0.385   | -2.365   | 6                         | 6                        | 1380                                    | 3795                           | 1380                                   | 531.3                           | -3263.7                                      | -43               |                |
| 140                     | 0.6                       | 2.2  | 0.93                       | 0.385   | -1.815   | 6                         | 6                        | 840                                     | 1848                           | 840                                    | 323.4                           | -1524.6                                      | -33               |                |
| 90                      | 0.5                       | 2.75   | 0.93                       | 0.385   | -2.365   | 6                         | 6                        | 540                                     | 1485                           | 540                                    | 207.9                           | -1277.1                                      | -43               |                |
| 360                     | 0.8                       | 1.1  | 0.91                       | 0.495   | -0.605   | 7                         | 7                        | 2520                                    | 2772                           | 2520                                   | 1247.4                          | -1524.6                                      | -11               |                |
| 520                     | 0.7                       | 1.65   | 0.91                       | 0.495   | -1.155   | 7                         | 7                        | 3640                                    | 6006                           | 3640                                   | 1801.8                          | -4204.2                                      | -21               |                |
| 220                     | 0.4                       | 3.3  | 0.91                       | 0.495   | -2.805   | 7                         | 7                        | 1540                                    | 5082                           | 1540                                   | 762.3                           | -4319.7                                      | -51               |                |
| 490                     | 0.6                       | 2.2  | 0.91                       | 0.495   | -1.705   | 7                         | 7                        | 3430                                    | 7546                           | 3430                                   | 1697.85                         | -5848.15                                     | -31               |                |
| 660                     | 0.5                       | 2.75   | 0.91                       | 0.495   | -2.255   | 7                         | 7                        | 4620                                    | 12705                          | 4620                                   | 2286.9                          | -10418.1                                     | -41               |                |
| <b>Total</b>            |                           |  |                            |   |  |                           |                          |   | <b>53,320</b>                  | <b>88,391</b>                          | <b>53,320</b>                   | <b>18,729</b>                                | <b>-69,661</b>    | <b>-26</b>     |

**Table F-19. Existing and potential solar loads for Flat Creek and tributaries.**

| Segment Length (meters) | Existing Shade (fraction) | Existing Summer Load (kWh/m <sup>2</sup> /day) | Potential Shade (fraction) | Potential Summer Load (kWh/m <sup>2</sup> /day) | Potential Load minus Existing load (kWh/m <sup>2</sup> /day) | Existing Stream Width (m) | Natural Stream Width (m) | Existing Segment Area (m <sup>2</sup> ) | Existing Summer Load (kWh/day) | Natural Segment Area (m <sup>2</sup> ) | Potential Summer Load (kWh/day) | Potential Load minus Existing Load (kWh/day) | Lack of Shade (%) | Flat Creek     |
|-------------------------|---------------------------|--|----------------------------|---|--|---------------------------|--------------------------|---|--------------------------------|--|---------------------------------|--|-------------------|----------------|
| AU# ID17010301PN023_02  |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |                |
| 1300                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 2600                                    | 1430                           | 2600                                   | 286                             | -1144  | -8                | Forest Group B |
| 1100                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1100                                    | 605                            | 1100                                   | 121                             | -484   | -8                |                |
| 100                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 100                                     | 110                            | 100                                    | 11                              | -99  | -18               |                |
| 660                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 660                                     | 363                            | 660                                    | 72.6                            | -290.4                                       | -8                |                |
| 100                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 100                                     | 110                            | 100                                    | 11                              | -99  | -18               |                |
| 240                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 240                                     | 132                            | 240                                    | 26.4                            | -105.6                                       | -8                |                |
| 420                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 420                                     | 462                            | 420                                    | 46.2                            | -415.8                                       | -18               |                |
| 910                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 1820                                    | 1001                           | 1820                                   | 200.2                           | -800.8                                       | -8                |                |
| 870                     | 0.8                       | 1.1  | 0.97                       | 0.165   | -0.935   | 3                         | 3                        | 2610                                    | 2871                           | 2610                                   | 430.65                          | -2440.35                                     | -17               |                |
| 1000                    | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 1000                                    | 1100                           | 1000                                   | 110                             | -990   | -18               |                |
| 1000                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1000                                    | 550                            | 1000                                   | 110                             | -440   | -8                |                |
| 3300                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 6600                                    | 3630                           | 6600                                   | 726                             | -2904  | -8                |                |
| 460                     | 0.8                       | 1.1  | 0.97                       | 0.165   | -0.935   | 3                         | 3                        | 1380                                    | 1518                           | 1380                                   | 227.7                           | -1290.3                                      | -17               |                |
| 140                     | 0.9                       | 0.55   | 0.97                       | 0.165   | -0.385   | 3                         | 3                        | 420                                     | 231                            | 420                                    | 69.3                            | -161.7                                       | -7                |                |
| 2400                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 4800                                    | 2640                           | 4800                                   | 528                             | -2112  | -8                |                |
| 1300                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1300                                    | 715                            | 1300                                   | 143                             | -572   | -8                |                |
| 330                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 660                                     | 726                            | 660                                    | 72.6                            | -653.4                                       | -18               |                |
| 200                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 400                                     | 220                            | 400                                    | 44                              | -176   | -8                |                |
| 1100                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1100                                    | 605                            | 1100                                   | 121                             | -484   | -8                |                |
| 140                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 140                                     | 154                            | 140                                    | 15.4                            | -138.6                                       | -18               |                |
| 780                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 1560                                    | 858                            | 1560                                   | 171.6                           | -686.4                                       | -8                |                |
| 190                     | 0.4                       | 3.3  | 0.98                       | 0.11  | -3.19  | 2                         | 2                        | 380                                     | 1254                           | 380                                    | 41.8                            | -1212.2                                      | -58               |                |
| 120                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 240                                     | 264                            | 240                                    | 26.4                            | -237.6                                       | -18               |                |
| 480                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 960                                     | 528                            | 960                                    | 105.6                           | -422.4                                       | -8                |                |
| 220                     | 0.8                       | 1.1  | 0.97                       | 0.165   | -0.935   | 3                         | 3                        | 660                                     | 726                            | 660                                    | 108.9                           | -617.1                                       | -17               |                |
| 460                     | 0.8                       | 1.1  | 0.97                       | 0.165   | -0.935   | 3                         | 3                        | 1380                                    | 1518                           | 1380                                   | 227.7                           | -1290.3                                      | -17               |                |
| 760                     | 0.7                       | 1.65   | 0.97                       | 0.165   | -1.485   | 3                         | 3                        | 2280                                    | 3762                           | 2280                                   | 376.2                           | -3385.8                                      | -27               |                |
|                         |                           |  |                            |   |  |                           |                          | <b>Subtotal</b>                         | <b>35,910</b>                  | <b>28,083</b>                          | <b>35,910</b>                   | <b>4,430</b>                                 | <b>-23,653</b>    | <b>-14</b>     |
| AU# ID17010301PN023_03  |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |                |
| 500                     | 0.9                       | 0.55   | 0.96                       | 0.22  | -0.33  | 4                         | 4                        | 2000                                    | 1100                           | 2000                                   | 440                             | -660   | -6                |                |
| 520                     | 0.8                       | 1.1  | 0.96                       | 0.22  | -0.88  | 4                         | 4                        | 2080                                    | 2288                           | 2080                                   | 457.6                           | -1830.4                                      | -16               |                |
| 1000                    | 0.9                       | 0.55   | 0.94                       | 0.33  | -0.22  | 5                         | 5                        | 5000                                    | 2750                           | 5000                                   | 1650                            | -1100  | -4                |                |
| 950                     | 0.8                       | 1.1  | 0.94                       | 0.33  | -0.77  | 5                         | 5                        | 4750                                    | 5225                           | 4750                                   | 1567.5                          | -3657.5                                      | -14               |                |
| 700                     | 0.7                       | 1.65   | 0.65                       | 1.925   | 0.275  | 6                         | 6                        | 4200                                    | 6930                           | 4200                                   | 808.5                           | 1155   | 0                 |                |
| 210                     | 0.7                       | 1.65   | 0.65                       | 1.925   | 0.275  | 6                         | 6                        | 1260                                    | 2079                           | 1260                                   | 2425.5                          | 346.5  | 0                 |                |
| 550                     | 0.6                       | 2.2  | 0.65                       | 1.925   | -0.275   | 6                         | 6                        | 3300                                    | 7260                           | 3300                                   | 6352.5                          | -907.5                                       | -5                |                |
| 600                     | 0.7                       | 1.65   | 0.65                       | 1.925   | 0.275  | 6                         | 6                        | 3600                                    | 5940                           | 3600                                   | 6930                            | 990  | 0                 |                |
| 820                     | 0.4                       | 3.3  | 0.6                        | 2.2   | -1.1   | 7                         | 7                        | 5740                                    | 18942                          | 5740                                   | 12628                           | -6314  | -20               |                |
| 370                     | 0.4                       | 3.3  | 0.6                        | 2.2   | -1.1   | 7                         | 7                        | 2590                                    | 8547                           | 2590                                   | 5698                            | -2849  | -20               |                |
| 670                     | 0.5                       | 2.75   | 0.6                        | 2.2   | -0.55  | 7                         | 7                        | 4690                                    | 12897.5                        | 4690                                   | 10318                           | -2579.5                                      | -10               |                |
| 620                     | 0.6                       | 2.2  | 0.6                        | 2.2   | 0  | 7                         | 7                        | 4340                                    | 9548                           | 4340                                   | 9548                            | 0  | 0                 |                |
|                         |                           |  |                            |   |  |                           |                          | <b>Subtotal</b>                         | <b>43,550</b>                  | <b>83,507</b>                          | <b>43,550</b>                   | <b>66,100</b>                                | <b>-17,406</b>    | <b>-8</b>      |
|                         |                           |  |                            |   |  |                           |                          | <b>Total</b>                            | <b>79,460</b>                  | <b>111,590</b>                         | <b>79,460</b>                   | <b>70,530</b>                                | <b>-41,059</b>    | <b>-12</b>     |

**Table F-20. Existing and potential solar loads for Graham Creek.**

| Segment Length (meters)              | Existing Shade (fraction) | Existing Summer Load (kWh/m <sup>2</sup> /day) | Potential Shade (fraction) | Potential Summer Load (kWh/m <sup>2</sup> /day) | Potential Load minus Existing load (kWh/m <sup>2</sup> /day) | Existing Stream Width (m) | Natural Stream Width (m) | Existing Segment Area (m <sup>2</sup> ) | Existing Summer Load (kWh/day) | Natural Segment Area (m <sup>2</sup> ) | Potential Summer Load (kWh/day) | Potential Load minus Existing Load (kWh/day) | Lack of Shade (%) | Graham Creek      |
|--------------------------------------|---------------------------|--|----------------------------|---|--|---------------------------|--------------------------|---|--------------------------------|--|---------------------------------|--|-------------------|-------------------|
| Assessment Unit # ID17010301PN002_02 |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |                   |
| 2140                                 | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 2140                                    | 1177                           | 2140                                   | 235.4                           | -941.6                                       | -8                | Forest Group B    |
| 280                                  | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 560                                     | 616                            | 560                                    | 61.6                            | -554.4                                       | -18               |                   |
| 3270                                 | 0.9                       | 0.55   | 0.96                       | 0.22  | -0.33  | 3                         | 3                        | 9810                                    | 5395.5                         | 9810                                   | 2158.2                          | -3237.3                                      | -6                |                   |
| 330                                  | 0.8                       | 1.1  | 0.94                       | 0.33  | -0.77  | 4                         | 4                        | 1320                                    | 1452                           | 1320                                   | 435.6                           | -1016.4                                      | -14               |                   |
| 270                                  | 0.9                       | 0.55   | 0.94                       | 0.33  | -0.22  | 4                         | 4                        | 1080                                    | 594                            | 1080                                   | 356.4                           | -237.6                                       | -4                |                   |
| <b>Subtotal</b>                      |                           |  |                            |   |  |                           |                          | <b>14,910</b>                           | <b>9,235</b>                   | <b>14,910</b>                          | <b>3,247</b>                    | <b>-5,987</b>                                | <b>-10</b>        |                   |
| Assessment Unit # ID17010301PN002_03 |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |                   |
| 440                                  | 0.8                       | 1.1  | 0.72                       | 1.54  | 0.44   | 5                         | 5                        | 2200                                    | 2420                           | 2200                                   | 3388                            | 968  | 0                 | Nonforest Group 1 |
| 310                                  | 0.9                       | 0.55   | 0.72                       | 1.54  | 0.99   | 5                         | 5                        | 1550                                    | 852.5                          | 1550                                   | 2387                            | 1534.5                                       | 0                 |                   |
| 490                                  | 0.6                       | 2.2  | 0.65                       | 1.925   | -0.275   | 6                         | 6                        | 2940                                    | 6468                           | 2940                                   | 5659.5                          | -808.5                                       | -5                |                   |
| 120                                  | 0.5                       | 2.75   | 0.65                       | 1.925   | -0.825   | 6                         | 6                        | 720                                     | 1980                           | 720                                    | 1386                            | -594   | -15               |                   |
| 370                                  | 0.8                       | 1.1  | 0.65                       | 1.925   | 0.825  | 6                         | 6                        | 2220                                    | 2442                           | 2220                                   | 4273.5                          | 1831.5                                       | 0                 |                   |
| <b>Subtotal</b>                      |                           |  |                            |   |  |                           |                          | <b>9,630</b>                            | <b>14,163</b>                  | <b>9,630</b>                           | <b>17,094</b>                   | <b>2,932</b>                                 | <b>-4</b>         |                   |
| <b>Total</b>                         |                           |  |                            |   |  |                           |                          | <b>24,540</b>                           | <b>23,397</b>                  | <b>24,540</b>                          | <b>20,341</b>                   | <b>-3,056</b>                                |                   |                   |

**Table F-21. Existing and potential solar loads for Grizzly Creek and tributaries.**

| Segment Length (meters) | Existing Shade (fraction) | Existing Summer Load (kWh/m <sup>2</sup> /day) | Potential Shade (fraction) | Potential Summer Load (kWh/m <sup>2</sup> /day) | Potential Load minus Existing load (kWh/m <sup>2</sup> /day) | Existing Stream Width (m) | Natural Stream Width (m) | Existing Segment Area (m <sup>2</sup> ) | Existing Summer Load (kWh/day) | Natural Segment Area (m <sup>2</sup> ) | Potential Summer Load (kWh/day) | Potential Load minus Existing Load (kWh/day) | Lack of Shade (%) | Grizzly Creek  |
|-------------------------|---------------------------|--|----------------------------|---|--|---------------------------|--------------------------|---|--------------------------------|--|---------------------------------|--|-------------------|--|
| AU# ID17010301PN001_02  |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |  |
| 1600                    | 0.8                       | 1.1  | 0.95                       | 0.275   | -0.825   | 1                         | 1                        | 1600                                    | 1760                           | 1600                                   | 440                             | -1320  | -15               | Forest Group B<br>Group A<br>Group B<br>Group A<br>Group B<br>Group A<br>Group B<br>Group B<br>Group A<br>Group B<br>Group B |
| 2000                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 4000                                    | 2200                           | 4000                                   | 440                             | -1760  | -8                |  |
| 1400                    | 0.8                       | 1.1  | 0.95                       | 0.275   | -0.825   | 1                         | 1                        | 1400                                    | 1540                           | 1400                                   | 385                             | -1155  | -15               |  |
| 1300                    | 0.9                       | 0.55   | 0.94                       | 0.33  | -0.22  | 2                         | 2                        | 2600                                    | 1430                           | 2600                                   | 858                             | -572   | -4                |  |
| 1500                    | 0.9                       | 0.55   | 0.97                       | 0.165   | -0.385   | 3                         | 3                        | 4500                                    | 2475                           | 4500                                   | 742.5                           | -1732.5                                      | -7                |  |
| 570                     | 0.8                       | 1.1  | 0.97                       | 0.165   | -0.935   | 3                         | 3                        | 1710                                    | 1881                           | 1710                                   | 282.15                          | -1598.85                                     | -17               |  |
| 190                     | 0.9                       | 0.55   | 0.97                       | 0.165   | -0.385   | 3                         | 3                        | 570                                     | 313.5                          | 570                                    | 94.05                           | -219.45                                      | -7                |  |
| 2100                    | 0.8                       | 1.1  | 0.95                       | 0.275   | -0.825   | 1                         | 1                        | 2100                                    | 2310                           | 2100                                   | 577.5                           | -1732.5                                      | -15               |  |
| 570                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 1140                                    | 627                            | 1140                                   | 125.4                           | -501.6                                       | -8                |  |
| 710                     | 0.9                       | 0.55   | 0.95                       | 0.275   | -0.275   | 1                         | 1                        | 710                                     | 390.5                          | 710                                    | 195.25                          | -195.25                                      | -5                |  |
| 660                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 660                                     | 363                            | 660                                    | 72.6                            | -290.4                                       | -8                |  |
| 1800                    | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 3600                                    | 3960                           | 3600                                   | 396                             | -3564  | -18               |  |
| 1400                    | 0.8                       | 1.1  | 0.97                       | 0.165   | -0.935   | 3                         | 3                        | 4200                                    | 4620                           | 4200                                   | 693                             | -3927  | -17               |  |
| <b>Subtotal</b>         |                           |  |                            |   |  |                           |                          | <b>28,790</b>                           | <b>23,870</b>                  | <b>28,790</b>                          | <b>5,301</b>                    | <b>-18,569</b>                               | <b>-11</b>        |  |
| AU# ID17010301PN027_03  |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |  |
| 310                     | 0.8                       | 1.1  | 0.94                       | 0.33  | -0.77  | 5                         | 5                        | 1550                                    | 1705                           | 1550                                   | 511.5                           | -1193.5                                      | -14               | Grizzly Creek  |
| 620                     | 0.9                       | 0.55   | 0.94                       | 0.33  | -0.22  | 5                         | 5                        | 3100                                    | 1705                           | 3100                                   | 1023                            | -682   | -4                |  |
| 530                     | 0.8                       | 1.1  | 0.94                       | 0.33  | -0.77  | 5                         | 5                        | 2650                                    | 2915                           | 2650                                   | 874.5                           | -2040.5                                      | -14               |  |
| 350                     | 0.9                       | 0.55   | 0.94                       | 0.33  | -0.22  | 5                         | 5                        | 1750                                    | 962.5                          | 1750                                   | 577.5                           | -385   | -4                |  |
| <b>Subtotal</b>         |                           |  |                            |   |  |                           |                          | <b>9,050</b>                            | <b>7,288</b>                   | <b>9,050</b>                           | <b>2,987</b>                    | <b>-4,301</b>                                | <b>-9</b>         |  |
| <b>Total</b>            |                           |  |                            |   |  |                           |                          | <b>37,840</b>                           | <b>31,158</b>                  | <b>37,840</b>                          | <b>8,288</b>                    | <b>-22,870</b>                               | <b>-11</b>        |  |

**Table F-22. Existing and potential solar loads for Independence Creek and tributaries.**

| Segment Length (meters)               | Existing Shade (fraction) | Existing Summer Load (kWh/m <sup>2</sup> /day) | Potential Shade (fraction) | Potential Summer Load (kWh/m <sup>2</sup> /day) | Potential Load minus Existing load (kWh/m <sup>2</sup> /day) | Existing Stream Width (m) | Natural Stream Width (m) | Existing Segment Area (m <sup>2</sup> ) | Existing Summer Load (kWh/day) | Natural Segment Area (m <sup>2</sup> ) | Potential Summer Load (kWh/day) | Potential Load minus Existing Load (kWh/day) | Lack of Shade (%) | Independence Creek & Tributaries                            |  |
|---------------------------------------|---------------------------|--|----------------------------|---|--|---------------------------|--------------------------|---|--------------------------------|--|---------------------------------|--|-------------------|---|--|
| Assessment Unit # ID17010301PN018_02  |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |   |  |
| 1910                                  | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1910                                    | 1050.5                         | 1910                                   | 210.1                           | -840.4                                       | -8                | Forest Group B  | Goose Creek  |
| 230                                   | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 460                                     | 506                            | 460                                    | 50.6                            | -455.4                                       | -18               |   |  |
| 310                                   | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 620                                     | 341                            | 620                                    | 68.2                            | -272.8                                       | -8                |   |  |
| 900                                   | 0.7                       | 1.65   | 0.86                       | 0.77  | -0.88  | 3                         | 3                        | 2700                                    | 4455                           | 2700                                   | 2079                            | -2376  | -16               | Nonforest Group 1   |  |
| 420                                   | 0.9                       | 0.55   | 0.86                       | 0.77  | 0.22   | 3                         | 3                        | 1260                                    | 693                            | 1260                                   | 970.2                           | 277.2  | 0                 |   |  |
| 270                                   | 0.7                       | 1.65   | 0.86                       | 0.77  | -0.88  | 3                         | 3                        | 810                                     | 1336.5                         | 810                                    | 623.7                           | -712.8                                       | -16               |   |  |
| 530                                   | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 530                                     | 583                            | 530                                    | 58.3                            | -524.7                                       | -18               | Forest Group B  | Gosling Creek<br>Snowshoe Cr                       |
| 850                                   | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 850                                     | 467.5                          | 850                                    | 93.5                            | -374   | -8                |   |  |
| 2850                                  | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 5700                                    | 3135                           | 5700                                   | 627                             | -2508  | -8                |   |  |
| 2180                                  | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 4360                                    | 2398                           | 4360                                   | 479.6                           | -1918.4                                      | -8                | Ellis Creek   |  |
| 480                                   | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 960                                     | 528                            | 960                                    | 105.6                           | -422.4                                       | -8                |   |  |
| 680                                   | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 1360                                    | 1496                           | 1360                                   | 149.6                           | -1346.4                                      | -18               |   |  |
| 260                                   | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 520                                     | 286                            | 520                                    | 57.2                            | -228.8                                       | -8                | Trib to Ellis Creek Declaration                             |  |
| 300                                   | 0.7                       | 1.65   | 0.98                       | 0.11  | -1.54  | 1                         | 1                        | 300                                     | 495                            | 300                                    | 33                              | -462   | -28               |   |  |
| 1360                                  | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1360                                    | 748                            | 1360                                   | 149.6                           | -598.4                                       | -8                |   |  |
| 3510                                  | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 7020                                    | 3861                           | 7020                                   | 772.2                           | -3088.8                                      | -8                | Trib to Ellis Creek Declaration                             |  |
| 490                                   | 0.8                       | 1.1  | 0.96                       | 0.22  | -0.88  | 3                         | 3                        | 1470                                    | 1617                           | 1470                                   | 323.4                           | -1293.6                                      | -16               |   |  |
| 310                                   | 0.9                       | 0.55   | 0.96                       | 0.22  | -0.33  | 3                         | 3                        | 930                                     | 511.5                          | 930                                    | 204.6                           | -306.9                                       | -6                |   |  |
| 160                                   | 0.8                       | 1.1  | 0.96                       | 0.22  | -0.88  | 3                         | 3                        | 480                                     | 528                            | 480                                    | 105.6                           | -422.4                                       | -16               | Nonforest Group 1   |  |
| 560                                   | 0.7                       | 1.65   | 0.78                       | 1.21  | -0.44  | 4                         | 4                        | 2240                                    | 3696                           | 2240                                   | 2710.4                          | -985.6                                       | -8                |   |  |
|                                       |                           |  |                            |   |  | <b>Subtotal</b>           | <b>4</b>                 | <b>2240</b>                             | <b>3696</b>                    | <b>2240</b>                            | <b>2710.4</b>                   | <b>-985.6</b>                                | <b>-8</b>         |   |  |
| Assessment Unit # ID17010301PN018_03a |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |   |  |
| 340                                   | 0.7                       | 1.65   | 0.72                       | 1.54  | -0.11  | 5                         | 5                        | 1700                                    | 2805                           | 1700                                   | 2618                            | -187   | -2                | Nonforest Group 1   |  |
| 1000                                  | 0.6                       | 2.2  | 0.72                       | 1.54  | -0.66  | 5                         | 5                        | 5000                                    | 11000                          | 5000                                   | 7700                            | -3300  | -12               |   |  |
| 1020                                  | 0.7                       | 1.65   | 0.72                       | 1.54  | -0.11  | 5                         | 5                        | 5100                                    | 8415                           | 5100                                   | 7854                            | -561   | -2                |   |  |
| 100                                   | 0.6                       | 2.2  | 0.72                       | 1.54  | -0.66  | 5                         | 5                        | 500                                     | 1100                           | 500                                    | 770                             | -330   | -12               |   |  |
|                                       |                           |  |                            |   |  | <b>Subtotal</b>           | <b>5</b>                 | <b>12,300</b>                           | <b>23,320</b>                  | <b>12,300</b>                          | <b>18,942</b>                   | <b>-4,378</b>                                | <b>-7</b>         |   |  |
| Assessment Unit # ID17010301PN018_02  |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |   |  |
| 2730                                  | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 5460                                    | 3003                           | 5460                                   | 600.6                           | -2402.4                                      | -8                | Forest Group B  | 1st Trib to Declaration<br>2nd Trib to Declaration |
| 770                                   | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 1540                                    | 1694                           | 1540                                   | 169.4                           | -1524.6                                      | -18               |   |  |
| 2300                                  | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 4600                                    | 2530                           | 4600                                   | 506                             | -2024  | -8                |   |  |
| 990                                   | 0.8                       | 1.1  | 0.96                       | 0.22  | -0.88  | 3                         | 3                        | 2970                                    | 3267                           | 2970                                   | 653.4                           | -2613.6                                      | -16               | Group 1   |  |
| 230                                   | 0.7                       | 1.65   | 0.96                       | 0.22  | -1.43  | 3                         | 3                        | 690                                     | 1138.5                         | 690                                    | 151.8                           | -986.7                                       | -26               |   |  |
| 1480                                  | 0.7                       | 1.65   | 0.86                       | 0.77  | -0.88  | 3                         | 3                        | 4440                                    | 7326                           | 4440                                   | 3418.8                          | -3907.2                                      | -16               |   |  |
| 2370                                  | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 4740                                    | 2607                           | 4740                                   | 521.4                           | -2085.6                                      | -8                | Forest Group B  | Trib to 2nd Trib<br>3rd Trib                       |
| 1370                                  | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1370                                    | 753.5                          | 1370                                   | 150.7                           | -602.8                                       | -8                |   |  |
| 2030                                  | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 2030                                    | 1116.5                         | 2030                                   | 223.3                           | -893.2                                       | -8                |   |  |
| 1590                                  | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1590                                    | 874.5                          | 1590                                   | 174.9                           | -699.6                                       | -8                | Snowbird Creek  |  |
| 1180                                  | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 2360                                    | 2596                           | 2360                                   | 259.6                           | -2336.4                                      | -18               |   |  |
| 4050                                  | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 8100                                    | 4455                           | 8100                                   | 891                             | -3564  | -8                |   |  |
| 2310                                  | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 2310                                    | 1270.5                         | 2310                                   | 254.1                           | -1016.4                                      | -8                | Surprise Cr<br>1st Trib bl Surprise<br>2nd Trib bl Surprise |  |
| 1770                                  | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1770                                    | 973.5                          | 1770                                   | 194.7                           | -778.8                                       | -8                |   |  |
| 4300                                  | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 8600                                    | 4730                           | 8600                                   | 946                             | -3784  | -8                |   |  |
| 410                                   | 0.8                       | 1.1  | 0.86                       | 0.77  | -0.33  | 3                         | 3                        | 1230                                    | 1353                           | 1230                                   | 947.1                           | -405.9                                       | -6                | Group 1<br>Ermine Creek                                     |  |
| 2430                                  | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 2430                                    | 1336.5                         | 2430                                   | 267.3                           | -1069.2                                      | -8                |   |  |
| 1870                                  | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1870                                    | 1028.5                         | 1870                                   | 205.7                           | -822.8                                       | -8                |   |  |
| 200                                   | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 400                                     | 440                            | 400                                    | 44                              | -396   | -18               | Forest Group B  | Trib to Ermine<br>Snow Creek                       |
| 710                                   | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 1420                                    | 781                            | 1420                                   | 156.2                           | -624.8                                       | -8                |   |  |
| 1160                                  | 0.8                       | 1.1  | 0.86                       | 0.77  | -0.33  | 3                         | 3                        | 3480                                    | 3828                           | 3480                                   | 2679.6                          | -1148.4                                      | -6                |   |  |
| 300                                   | 0.8                       | 1.1  | 0.96                       | 0.22  | -0.88  | 3                         | 3                        | 900                                     | 990                            | 900                                    | 198                             | -792   | -16               | Group 1<br>Forest Group B                                   |  |
| 370                                   | 0.9                       | 0.55   | 0.96                       | 0.22  | -0.33  | 3                         | 3                        | 1110                                    | 610.5                          | 1110                                   | 244.2                           | -366.3                                       | -6                |   |  |
|                                       |                           |  |                            |   |  | <b>Subtotal</b>           | <b>65,410</b>            | <b>48,703</b>                           | <b>65,410</b>                  | <b>13,858</b>                          | <b>-34,845</b>                  | <b>-11</b>                                   |                   |   |  |
| Assessment Unit # ID17010301PN018_03b |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |   |  |
| 330                                   | 0.7                       | 1.65   | 0.78                       | 1.21  | -0.44  | 4                         | 4                        | 1320                                    | 2178                           | 1320                                   | 1597.2                          | -580.8                                       | 0                 | Nonforest Group 1   |  |
| 1710                                  | 0.8                       | 1.1  | 0.78                       | 1.21  | 0.11   | 4                         | 4                        | 6840                                    | 7524                           | 6840                                   | 8276.4                          | 752.4  | 0                 |   |  |
| 190                                   | 0.8                       | 1.1  | 0.78                       | 1.21  | 0.11   | 4                         | 4                        | 760                                     | 836                            | 760                                    | 919.6                           | 83.6   | 0                 |   |  |
| 220                                   | 0.7                       | 1.65   | 0.72                       | 1.54  | -0.11  | 5                         | 5                        | 1100                                    | 1815                           | 1100                                   | 1694                            | -121   | -2                |   |  |
| 390                                   | 0.6                       | 2.2  | 0.72                       | 1.54  | -0.66  | 5                         | 5                        | 1950                                    | 4290                           | 1950                                   | 3003                            | -1287  | -12               |   |  |
| 890                                   | 0.5                       | 2.75   | 0.72                       | 1.54  | -1.21  | 5                         | 5                        | 4450                                    | 12237.5                        | 4450                                   | 6853                            | -5384.5                                      | -22               |   |  |
| 330                                   | 0.6                       | 2.2  | 0.72                       | 1.54  | -0.66  | 5                         | 5                        | 1650                                    | 3630                           | 1650                                   | 2541                            | -1089  | -12               |   |  |
| 390                                   | 0.7                       | 1.65   | 0.72                       | 1.54  | -0.11  | 5                         | 5                        | 1950                                    | 3217.5                         | 1950                                   | 3003                            | -214.5                                       | -2                |   |  |
|                                       |                           |  |                            |   |  | <b>Subtotal</b>           | <b>20,020</b>            | <b>35,728</b>                           | <b>20,020</b>                  | <b>27,887</b>                          | <b>-7,841</b>                   | <b>-6</b>                                    |                   |   |  |

**Table F-22 (cont.). Existing and potential solar loads for Independence Creek (cont.).**

| Segment Length (meters)                          | Existing Shade (fraction) | Existing Summer Load (kWh/m <sup>2</sup> /day) | Potential Shade (fraction) | Potential Summer Load (kWh/m <sup>2</sup> /day) | Potential Load minus Existing load (kWh/m <sup>2</sup> /day) | Existing Stream Width (m) | Natural Stream Width (m) | Existing Segment Area (m <sup>2</sup> ) | Existing Summer Load (kWh/day) | Natural Segment Area (m <sup>2</sup> ) | Potential Summer Load (kWh/day) | Potential Load minus Existing Load (kWh/day) | Lack of Shade (%) | Independence Creek & Tributaries |                     |                |                |                 |            |  |
|--|---------------------------|--|----------------------------|---|--|---------------------------|--------------------------|---|--------------------------------|--|---------------------------------|--|-------------------|----------------------------------|---------------------|----------------|----------------|-----------------|------------|--|
| Assessment Unit # ID17010301PN018_02             |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |                                  |                     |                |                |                 |            |  |
| 1700   | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1700                                    | 935                            | 1700                                   | 187                             | -748   | -8                | Forest Group B                   | 1st Trib to Snow    |                |                |                 |            |  |
| 1870   | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 3740                                    | 2057                           | 3740                                   | 411.4                           | -1645.6                                      | -8                |                                  | 2nd Trib to Snow    |                |                |                 |            |  |
| 1590   | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1590                                    | 874.5                          | 1590                                   | 174.9                           | -699.6                                       | -8                |                                  | 3rd Trib to Snow    |                |                |                 |            |  |
| 1450   | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 2900                                    | 3190                           | 2900                                   | 319                             | -2871  | -18               | Forest Group B                   | Trib to 3rd Trib    |                |                |                 |            |  |
| 1410   | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1410                                    | 775.5                          | 1410                                   | 155.1                           | -620.4                                       | -8                |                                  | North Creek         |                |                |                 |            |  |
| 1780   | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1780                                    | 979                            | 1780                                   | 195.8                           | -783.2                                       | -8                |                                  |                     |                |                |                 |            |  |
| 440  | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 880                                     | 968                            | 880                                    | 96.8                            | -871.2                                       | -18               | Nonforest Group 1                |                     |                |                |                 |            |  |
| 1660   | 0.7                       | 1.65   | 0.96                       | 0.22  | -1.43  | 3                         | 3                        | 4980                                    | 8217                           | 4980                                   | 1095.6                          | -7121.4                                      | -26               |                                  |                     |                |                |                 |            |  |
| 620  | 0.7                       | 1.65   | 0.78                       | 1.21  | -0.44  | 4                         | 4                        | 2480                                    | 4092                           | 2480                                   | 3000.8                          | -1091.2                                      | -8                |                                  |                     |                |                |                 |            |  |
| 1050   | 0.8                       | 1.1  | 0.78                       | 1.21  | 0.11   | 4                         | 4                        | 4200                                    | 4620                           | 4200                                   | 5082                            | 462  | 0                 | Group B                          | Trib to North Cr    |                |                |                 |            |  |
| 210  | 0.7                       | 1.65   | 0.78                       | 1.21  | -0.44  | 4                         | 4                        | 840                                     | 1386                           | 840                                    | 1016.4                          | -369.6                                       | -8                |                                  | Griffith Creek      |                |                |                 |            |  |
| 1460   | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1460                                    | 803                            | 1460                                   | 160.6                           | -642.4                                       | -8                |                                  | Green Creek         |                |                |                 |            |  |
| 1220   | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1220                                    | 671                            | 1220                                   | 134.2                           | -536.8                                       | -8                | Forest Group A                   |                     |                |                |                 |            |  |
| 1220   | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 1220                                    | 1342                           | 1220                                   | 134.2                           | -1207.8                                      | -18               |                                  |                     |                |                |                 |            |  |
| 1070   | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1070                                    | 588.5                          | 1070                                   | 117.7                           | -470.8                                       | -8                |                                  |                     |                |                |                 |            |  |
| 1320   | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 2640                                    | 2904                           | 2640                                   | 290.4                           | -2613.6                                      | -18               | Forest Group A                   |                     |                |                |                 |            |  |
| 1350   | 0.7                       | 1.65   | 0.96                       | 0.22  | -1.43  | 3                         | 3                        | 4050                                    | 6682.5                         | 4050                                   | 891                             | -5791.5                                      | -26               |                                  |                     |                |                |                 |            |  |
| 290  | 0.8                       | 1.1  | 0.96                       | 0.22  | -0.88  | 3                         | 3                        | 870                                     | 957                            | 870                                    | 191.4                           | -765.6                                       | -16               |                                  |                     |                |                |                 |            |  |
| 1810   | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1810                                    | 995.5                          | 1810                                   | 199.1                           | -796.4                                       | -8                | Forest Group B                   | Trib bl Green       |                |                |                 |            |  |
| 1630   | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 3260                                    | 1793                           | 3260                                   | 358.6                           | -1434.4                                      | -8                |                                  | Emerson Creek       |                |                |                 |            |  |
| 2050   | 0.8                       | 1.1  | 0.86                       | 0.77  | -0.33  | 3                         | 3                        | 6150                                    | 6765                           | 6150                                   | 4735.5                          | -2029.5                                      | -6                |                                  |                     |                |                |                 |            |  |
| 1220   | 0.7                       | 1.65   | 0.78                       | 1.21  | -0.44  | 4                         | 4                        | 4880                                    | 8052                           | 4880                                   | 5904.8                          | -2147.2                                      | -8                | Nonforest Group 1                |                     |                |                |                 |            |  |
| 790  | 0.8                       | 1.1  | 0.78                       | 1.21  | 0.11   | 4                         | 4                        | 3160                                    | 3476                           | 3160                                   | 3823.6                          | 347.6  | 0                 |                                  |                     |                |                |                 |            |  |
| 2400   | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 4800                                    | 2640                           | 4800                                   | 528                             | -2112  | -8                |                                  |                     |                |                |                 |            |  |
| 1480   | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1480                                    | 814                            | 1480                                   | 162.8                           | -651.2                                       | -8                | Forest Group B                   | Trib to Emerson     |                |                |                 |            |  |
| 330  | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 660                                     | 726                            | 660                                    | 72.6                            | -653.4                                       | -18               |                                  | Owl Creek           |                |                |                 |            |  |
| 400  | 0.7                       | 1.65   | 0.98                       | 0.11  | -1.54  | 2                         | 2                        | 800                                     | 1320                           | 800                                    | 88                              | -1232  | -28               |                                  |                     |                |                |                 |            |  |
| 590  | 0.6                       | 2.2  | 0.98                       | 0.11  | -2.09  | 2                         | 2                        | 1180                                    | 2596                           | 1180                                   | 129.8                           | -2466.2                                      | -38               | Forest Group B                   |                     |                |                |                 |            |  |
| 1750   | 0.7                       | 1.65   | 0.96                       | 0.22  | -1.43  | 3                         | 3                        | 5250                                    | 8662.5                         | 5250                                   | 1155                            | -7507.5                                      | -26               |                                  |                     |                |                |                 |            |  |
| 2610   | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 2610                                    | 1435.5                         | 2610                                   | 287.1                           | -1148.4                                      | -8                |                                  | Minor Cr            |                |                |                 |            |  |
| 1750   | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1750                                    | 962.5                          | 1750                                   | 192.5                           | -770   | -8                | Group A                          | Trident Creek       |                |                |                 |            |  |
| 280  | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 280                                     | 308                            | 280                                    | 30.8                            | -277.2                                       | -18               |                                  |                     |                |                |                 |            |  |
| 360  | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 720                                     | 792                            | 720                                    | 79.2                            | -712.8                                       | -18               |                                  |                     |                |                |                 |            |  |
| 1590   | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1590                                    | 874.5                          | 1590                                   | 174.9                           | -699.6                                       | -8                | Forest Group B                   | Trib to Trident     |                |                |                 |            |  |
| 700  | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 700                                     | 385                            | 700                                    | 77                              | -308   | -8                |                                  | 1st Trib bl Trident |                |                |                 |            |  |
| 930  | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 930                                     | 1023                           | 930                                    | 102.3                           | -920.7                                       | -18               |                                  |                     |                |                |                 |            |  |
| 110  | 0.6                       | 2.2  | 0.98                       | 0.11  | -2.09  | 1                         | 1                        | 110                                     | 242                            | 110                                    | 12.1                            | -229.9                                       | -38               | Forest Group B                   |                     |                |                |                 |            |  |
| 1220   | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1220                                    | 671                            | 1220                                   | 134.2                           | -536.8                                       | -8                |                                  | 2nd Trib bl Trident |                |                |                 |            |  |
| 600  | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 600                                     | 660                            | 600                                    | 66                              | -594   | -18               |                                  |                     |                |                |                 |            |  |
| 370  | 0.7                       | 1.65   | 0.98                       | 0.11  | -1.54  | 1                         | 1                        | 370                                     | 610.5                          | 370                                    | 40.7                            | -569.8                                       | -28               | Forest Group B                   |                     |                |                |                 |            |  |
| 1250   | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1250                                    | 687.5                          | 1250                                   | 137.5                           | -550   | -8                |                                  | Independence Creek  |                |                |                 |            |  |
| 330  | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 660                                     | 726                            | 660                                    | 72.6                            | -653.4                                       | -18               |                                  |                     |                |                |                 |            |  |
| 370  | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 3                         | 2                        | 1110                                    | 610.5                          | 740                                    | 81.4                            | -529.1                                       | -8                | Nonforest Group 1                |                     |                |                |                 |            |  |
| 770  | 0.8                       | 1.1  | 0.96                       | 0.22  | -0.88  | 4                         | 3                        | 3080                                    | 3388                           | 2310                                   | 508.2                           | -2879.8                                      | -16               |                                  |                     |                |                |                 |            |  |
| 300  | 0.9                       | 0.55   | 0.96                       | 0.22  | -0.33  | 5                         | 3                        | 1500                                    | 825                            | 900                                    | 198                             | -627   | -6                |                                  |                     |                |                |                 |            |  |
| 620  | 0.6                       | 2.2  | 0.86                       | 0.77  | -1.43  | 6                         | 4                        | 3720                                    | 8184                           | 2480                                   | 1909.6                          | -6274.4                                      | -26               | Nonforest Group 1                |                     |                |                |                 |            |  |
| 2590   | 0.7                       | 1.65   | 0.72                       | 1.54  | -0.11  | 7                         | 5                        | 18130                                   | 29914.5                        | 12950                                  | 19943                           | -9971.5                                      | -2                |                                  |                     |                |                |                 |            |  |
| 810  | 0.5                       | 2.75   | 0.65                       | 1.925   | -0.83  | 8                         | 6                        | 6480                                    | 17820                          | 4860                                   | 9355.5                          | -8464.5                                      | -15               |                                  |                     |                |                |                 |            |  |
| <b>Subtotal</b>                                  |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   | <b>119,270</b>                   | <b>150,002</b>      | <b>109,490</b> | <b>64,215</b>  | <b>-85,787</b>  | <b>-14</b> |  |
| Assessment Unit # ID17010301PN018_03             |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |                                  |                     |                |                |                 |            |  |
| 2790   | 0.6                       | 2.2  | 0.6                        | 2.2   | 0.00   | 10                        | 7                        | 27,900                                  | 61,380                         | 19,530                                 | 42,966                          | -18,414                                      | 0                 |                                  |                     |                |                |                 |            |  |
| Assessment Unit # ID17010301PN018_02             |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |                                  |                     |                |                |                 |            |  |
| 950  | 0.5                       | 2.75   | 0.52                       | 2.64  | -0.11  | 12                        | 9                        | 11400                                   | 31350                          | 8550                                   | 22572                           | -8778  | -2                | Nonforest Group 1                |                     |                |                |                 |            |  |
| 360  | 0.6                       | 2.2  | 0.52                       | 2.64  | 0.44   | 12                        | 9                        | 4320                                    | 9504                           | 3240                                   | 8553.6                          | -950.4                                       | 0                 |                                  |                     |                |                |                 |            |  |
| 1700   | 0.3                       | 3.85   | 0.48                       | 2.86  | -0.99  | 12                        | 10                       | 20400                                   | 78540                          | 17000                                  | 48620                           | -29920                                       | -18               |                                  |                     |                |                |                 |            |  |
| 2020   | 0.6                       | 2.2  | 0.45                       | 3.025   | 0.83   | 13                        | 11                       | 26260                                   | 57772                          | 22220                                  | 67215.5                         | 9443.5                                       | 0                 |                                  |                     |                |                |                 |            |  |
| 530  | 0.4                       | 3.3  | 0.41                       | 3.245   | -0.05  | 14                        | 12                       | 7420                                    | 24486                          | 6360                                   | 20638.2                         | -3847.8                                      | -1                |                                  |                     |                |                |                 |            |  |
| 760  | 0.3                       | 3.85   | 0.41                       | 3.245   | -0.60  | 14                        | 12                       | 10640                                   | 40964                          | 9120                                   | 29594.4                         | -11369.6                                     | -11               |                                  |                     |                |                |                 |            |  |
| 1680   | 0.1                       | 4.95   | 0.41                       | 3.245   | -1.71  | 14                        | 12                       | 23520                                   | 116424                         | 20160                                  | 65419.2                         | -51004.8                                     | -31               |                                  |                     |                |                |                 |            |  |
| 1290   | 0.2                       | 4.4  | 0.39                       | 3.355   | -1.05  | 15                        | 13                       | 19350                                   | 85140                          | 16770                                  | 56263.35                        | -28876.65                                    | -19               |                                  |                     |                |                |                 |            |  |
| 440  | 0.1                       | 4.95   | 0.39                       | 3.355   | -1.60  | 15                        | 13                       | 6600                                    | 32670                          | 5720                                   | 19190.6                         | -13479.4                                     | -29               |                                  |                     |                |                |                 |            |  |
| 310  | 0.2                       | 4.4  | 0.39                       | 3.355   | -1.05  | 15                        | 13                       | 4650                                    | 20460                          | 4030                                   | 13520.65                        | -6939.35                                     | -19               |                                  |                     |                |                |                 |            |  |
| 790  | 0.1                       | 4.95   | 0.39                       | 3.355   | -1.60  | 16                        | 13                       | 12640                                   | 62568                          | 10270                                  | 34455.85                        | -28112.15                                    | -29               |                                  |                     |                |                |                 |            |  |
| 500  | 0.2                       | 4.4  | 0.39                       | 3.355   | -1.05  | 16                        | 13                       | 8000                                    | 35200                          | 6500                                   | 21807.5                         | -13392.5                                     | -19               |                                  |                     |                |                |                 |            |  |
| 220  | 0.1                       | 4.95   | 0.39                       | 3.355   | -1.60  | 16                        | 13                       | 3520                                    | 17424                          | 2860                                   | 9595.3                          | -7828.7                                      | -29               |                                  |                     |                |                |                 |            |  |
| 2300   | 0                         | 5.5  | 0.37                       | 3.465   | -2.04  | 17                        | 14                       | 39100                                   | 215050                         | 32200                                  | 111573                          | -103477                                      | -37               |                                  |                     |                |                |                 |            |  |
| 340  | 0.1                       | 4.95   | 0.37                       | 3.465   | -1.49  | 18                        | 14                       | 6120                                    | 30294                          | 4760                                   | 16493.4                         | -13800.6                                     | -27               |                                  |                     |                |                |                 |            |  |
| 730  | 0                         | 5.5  | 0.37                       | 3.465   | -2.04  | 18                        | 14                       | 13140                                   | 72270                          | 10220                                  | 35412.3                         | -36857.7                                     | -37               |                                  |                     |                |                |                 |            |  |
| 170  | 0.1                       | 4.95   | 0.37                       | 3.465   | -1.49  | 18                        | 14                       | 3060                                    | 15147                          | 2380                                   | 8246.7                          | -6900.3                                      | -27               |                                  |                     |                |                |                 |            |  |
| 630  | 0                         | 5.5  | 0.37                       | 3.465   | -2.04  | 18                        | 14                       | 11340                                   | 62370                          | 8820                                   | 30561.3                         | -31808.7                                     | -37               |                                  |                     |                |                |                 |            |  |
| <b>Subtotal</b>                                  |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   | <b>231,480</b>                   | <b>1,007,633</b>    | <b>191,180</b> | <b>619,733</b> | <b>-387,900</b> | <b>-21</b> |  |
| <b>Total</b>                                     |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   | <b>452,000</b>                   | <b>1,235,069</b>    | <b>401,920</b> | <b>707,677</b> | <b>-527,392</b> | <b>-14</b> |  |
| <b>Total</b>                                     |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   | <b>60,220</b>                    | <b>120,428</b>      | <b>51,850</b>  | <b>89,795</b>  | <b>-30,633</b>  | <b>-6</b>  |  |
| Assessment Unit # ID17010301PN018_02             |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |                                  |                     |                |                |                 |            |  |
| Assessment Unit # ID17010301PN018_03 & 03a & 03b |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |                                  |                     |                |                |                 |            |  |

**Table F-23. Existing and potential solar loads for Iron Creek and tributaries.**

| Segment Length (meters) | Existing Shade (fraction) | Existing Summer Load (kWh/m <sup>2</sup> /day) | Potential Shade (fraction) | Potential Summer Load (kWh/m <sup>2</sup> /day) | Potential Load minus Existing load (kWh/m <sup>2</sup> /day) | Existing Stream Width (m) | Natural Stream Width (m) | Existing Segment Area (m <sup>2</sup> ) | Existing Summer Load (kWh/day) | Natural Segment Area (m <sup>2</sup> ) | Potential Summer Load (kWh/day) | Potential Load minus Existing Load (kWh/day) | Lack of Shade (%) | Iron Creek        |              |
|-------------------------|---------------------------|--|----------------------------|---|--|---------------------------|--------------------------|---|--------------------------------|--|---------------------------------|--|-------------------|-------------------|--------------|
| AU# ID17010301PN035_02  |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |                   |              |
| 1500                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1500                                    | 825                            | 1500                                   | 165                             | -660   | -8                | Forest Group B    | Rabiens Fork |
| 160                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 320                                     | 352                            | 320                                    | 35.2                            | -316.8                                       | -18               |                   | Fork         |
| 1600                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 3200                                    | 1760                           | 3200                                   | 352                             | -1408  | -8                |                   | Silver Run   |
| 1800                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1800                                    | 990                            | 1800                                   | 198                             | -792   | -8                |                   | Cataract Cr  |
| 3400                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 3400                                    | 1870                           | 3400                                   | 374                             | -1496  | -8                |                   | Rusty Creek  |
| 1600                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1600                                    | 880                            | 1600                                   | 176                             | -704   | -8                |                   | Moose Creek  |
| 1800                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1800                                    | 990                            | 1800                                   | 198                             | -792   | -8                |                   | Iron Creek   |
| 210                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 210                                     | 231                            | 210                                    | 23.1                            | -207.9                                       | -18               |                   |              |
| 290                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 290                                     | 159.5                          | 290                                    | 31.9                            | -127.6                                       | -8                |                   |              |
| 550                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 550                                     | 605                            | 550                                    | 60.5                            | -544.5                                       | -18               |                   |              |
| 1200                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1200                                    | 660                            | 1200                                   | 132                             | -528   | -8                |                   |              |
| 180                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 360                                     | 198                            | 360                                    | 39.6                            | -158.4                                       | -8                |                   |              |
| 320                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 640                                     | 704                            | 640                                    | 70.4                            | -633.6                                       | -18               |                   |              |
| 1500                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 3000                                    | 1650                           | 3000                                   | 330                             | -1320  | -8                |                   |              |
| 520                     | 0.7                       | 1.65   | 0.97                       | 0.165   | -1.485   | 3                         | 3                        | 1560                                    | 2574                           | 1560                                   | 257.4                           | -2316.6                                      | -27               |                   |              |
| 260                     | 0.8                       | 1.1  | 0.97                       | 0.165   | -0.935   | 3                         | 3                        | 780                                     | 858                            | 780                                    | 128.7                           | -729.3                                       | -17               |                   |              |
| 450                     | 0.9                       | 0.55   | 0.97                       | 0.165   | -0.385   | 3                         | 3                        | 1350                                    | 742.5                          | 1350                                   | 222.75                          | -519.75                                      | -7                |                   |              |
| 210                     | 0.8                       | 1.1  | 0.96                       | 0.22  | -0.88  | 4                         | 4                        | 840                                     | 924                            | 840                                    | 184.8                           | -739.2                                       | -16               |                   |              |
| 150                     | 0.7                       | 1.65   | 0.96                       | 0.22  | -1.43  | 4                         | 4                        | 600                                     | 990                            | 600                                    | 132                             | -858   | -26               |                   |              |
| 110                     | 0.8                       | 1.1  | 0.96                       | 0.22  | -0.88  | 4                         | 4                        | 440                                     | 484                            | 440                                    | 96.8                            | -387.2                                       | -16               |                   |              |
| 330                     | 0.5                       | 2.75   | 0.78                       | 1.21  | -1.54  | 4                         | 4                        | 1320                                    | 3630                           | 1320                                   | 1597.2                          | -2032.8                                      | -28               | Nonforest Group 1 |              |
| 120                     | 0.6                       | 2.2  | 0.78                       | 1.21  | -0.99  | 4                         | 4                        | 480                                     | 1056                           | 480                                    | 580.8                           | -475.2                                       | -18               |                   |              |
| 410                     | 0.4                       | 3.3  | 0.78                       | 1.21  | -2.09  | 4                         | 4                        | 1640                                    | 5412                           | 1640                                   | 1984.4                          | -3427.6                                      | -38               |                   |              |
| 230                     | 0.5                       | 2.75   | 0.78                       | 1.21  | -1.54  | 4                         | 4                        | 920                                     | 2530                           | 920                                    | 1113.2                          | -1416.8                                      | -28               |                   |              |
| 420                     | 0.5                       | 2.75   | 0.72                       | 1.54  | -1.21  | 5                         | 5                        | 2100                                    | 5775                           | 2100                                   | 3234                            | -2541  | -22               |                   |              |
| 780                     | 0.7                       | 1.65   | 0.72                       | 1.54  | -0.11  | 5                         | 5                        | 3900                                    | 6435                           | 3900                                   | 6006                            | -429   | -2                |                   |              |
| 540                     | 0.4                       | 3.3  | 0.65                       | 1.925   | -1.375   | 6                         | 6                        | 3240                                    | 10692                          | 3240                                   | 6237                            | -4455  | -25               |                   |              |
| 540                     | 0.6                       | 2.2  | 0.65                       | 1.925   | -0.275   | 6                         | 6                        | 3240                                    | 7128                           | 3240                                   | 6237                            | -891   | -5                |                   |              |
| 230                     | 0.1                       | 4.95   | 0.65                       | 1.925   | -3.025   | 6                         | 6                        | 1380                                    | 6831                           | 1380                                   | 2656.5                          | -4174.5                                      | -55               |                   |              |
| 440                     | 0.6                       | 2.2  | 0.65                       | 1.925   | -0.275   | 6                         | 6                        | 2640                                    | 5808                           | 2640                                   | 5082                            | -726   | -5                |                   |              |
| <b>Total</b>            |                           |  |                            |   |  |                           |                          | <b>46,300</b>                           | <b>73,744</b>                  | <b>46,300</b>                          | <b>37,936</b>                   | <b>-35,808</b>                               | <b>-16</b>        |                   |              |

**Table F-24. Existing and potential solar loads for Jordan Creek and tributaries.**

| Segment Length (meters) | Existing Shade (fraction) | Existing Summer Load (kWh/m <sup>2</sup> /day) | Potential Shade (fraction) | Potential Summer Load (kWh/m <sup>2</sup> /day) | Potential Load minus Existing load (kWh/m <sup>2</sup> /day) | Existing Stream Width (m) | Natural Stream Width (m) | Existing Segment Area (m <sup>2</sup> ) | Existing Summer Load (kWh/day) | Natural Segment Area (m <sup>2</sup> ) | Potential Summer Load (kWh/day) | Potential Load minus Existing Load (kWh/day) | Lack of Shade (%) | Jordan Creek |
|-------------------------|---------------------------|--|----------------------------|---|--|---------------------------|--------------------------|---|--------------------------------|--|---------------------------------|--|-------------------|--------------|
| AU# ID17010301PN014_02  |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |              |
| 1400                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1400                                    | 770                            | 1400                                   | 154                             | -616   | -8                | Group B      |
| 240                     | 0.8                       | 1.1  | 0.94                       | 0.33  | -0.77  | 2                         | 2                        | 480                                     | 528                            | 480                                    | 158.4                           | -369.6                                       | -14               | Group A      |
| 1300                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1300                                    | 715                            | 1300                                   | 143                             | -572   | -8                | Forest       |
| 510                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 1020                                    | 1122                           | 1020                                   | 112.2                           | -1009.8                                      | -18               | Group B      |
| 580                     | 0.8                       | 1.1  | 0.94                       | 0.33  | -0.77  | 2                         | 2                        | 1160                                    | 1276                           | 1160                                   | 382.8                           | -893.2                                       | -14               | Group 1      |
| 750                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 750                                     | 412.5                          | 750                                    | 82.5                            | -330   | -8                |              |
| 780                     | 0.9                       | 0.55   | 0.95                       | 0.275   | -0.275   | 1                         | 1                        | 780                                     | 429                            | 780                                    | 214.5                           | -214.5                                       | -5                | Group A      |
| 1800                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1800                                    | 990                            | 1800                                   | 198                             | -792   | -8                | Group B      |
| 150                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 300                                     | 330                            | 300                                    | 33                              | -297   | -18               |              |
| 350                     | 0.7                       | 1.65   | 0.94                       | 0.33  | -1.32  | 2                         | 2                        | 700                                     | 1155                           | 700                                    | 231                             | -924   | -24               | Nonforest    |
| 1500                    | 0.7                       | 1.65   | 0.86                       | 0.77  | -0.88  | 3                         | 3                        | 4500                                    | 7425                           | 4500                                   | 3465                            | -3960  | -16               | Group 1      |
| 2200                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 2200                                    | 1210                           | 2200                                   | 242                             | -968   | -8                |              |
| 110                     | 0.7                       | 1.65   | 0.94                       | 0.33  | -1.32  | 2                         | 2                        | 220                                     | 363                            | 220                                    | 72.6                            | -290.4                                       | -24               | Group 1      |
| 300                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 300                                     | 330                            | 300                                    | 33                              | -297   | -18               |              |
| 990                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 990                                     | 544.5                          | 990                                    | 108.9                           | -435.6                                       | -8                |              |
| 660                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 660                                     | 726                            | 660                                    | 72.6                            | -653.4                                       | -18               |              |
| 250                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 500                                     | 550                            | 500                                    | 55                              | -495   | -18               |              |
| 600                     | 0.8                       | 1.1  | 0.94                       | 0.33  | -0.77  | 2                         | 2                        | 1200                                    | 1320                           | 1200                                   | 396                             | -924   | -14               | Group 1      |
| 370                     | 0.6                       | 2.2  | 0.86                       | 0.77  | -1.43  | 3                         | 3                        | 1110                                    | 2442                           | 1110                                   | 854.7                           | -1587.3                                      | -26               |              |
| 580                     | 0.5                       | 2.75   | 0.86                       | 0.77  | -1.98  | 3                         | 3                        | 1740                                    | 4785                           | 1740                                   | 1339.8                          | -3445.2                                      | -36               |              |
| 170                     | 0.7                       | 1.65   | 0.78                       | 1.21  | -0.44  | 4                         | 4                        | 680                                     | 1122                           | 680                                    | 822.8                           | -299.2                                       | -8                |              |
| 210                     | 0.5                       | 2.75   | 0.78                       | 1.21  | -1.54  | 4                         | 4                        | 840                                     | 2310                           | 840                                    | 1016.4                          | -1293.6                                      | -28               |              |
|                         |                           |  |                            |   |  |                           |                          | <b>Subtotal</b>                         | <b>24,630</b>                  | <b>30,855</b>                          | <b>24,630</b>                   | <b>10,188</b>                                | <b>-20,667</b>    | <b>-16</b>   |
| AU# ID17010301PN014_03  |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |              |
| 510                     | 0.5                       | 2.75   | 0.65                       | 1.925   | -0.825   | 6                         | 6                        | 3060                                    | 8415                           | 3060                                   | 5890.5                          | -2524.5                                      | -15               |              |
| 640                     | 0.3                       | 3.85   | 0.65                       | 1.925   | -1.925   | 6                         | 6                        | 3840                                    | 14784                          | 3840                                   | 7392                            | -7392  | -35               |              |
| 400                     | 0.3                       | 3.85   | 0.6                        | 2.2   | -1.65  | 7                         | 7                        | 2800                                    | 10780                          | 2800                                   | 6160                            | -4620  | -30               |              |
| 1200                    | 0.5                       | 2.75   | 0.6                        | 2.2   | -0.55  | 7                         | 7                        | 8400                                    | 23100                          | 8400                                   | 18480                           | -4620  | -10               |              |
| 430                     | 0.5                       | 2.75   | 0.55                       | 2.475   | -0.275   | 8                         | 8                        | 3440                                    | 9460                           | 3440                                   | 8514                            | -946   | -5                |              |
|                         |                           |  |                            |   |  |                           |                          | <b>Subtotal</b>                         | <b>21,540</b>                  | <b>66,539</b>                          | <b>21,540</b>                   | <b>46,437</b>                                | <b>-20,103</b>    | <b>-19</b>   |
|                         |                           |  |                            |   |  |                           |                          | <b>Total</b>                            | <b>46,170</b>                  | <b>97,394</b>                          | <b>46,170</b>                   | <b>56,625</b>                                | <b>-40,769</b>    | <b>-16</b>   |

**Table F-25. Existing and potential solar loads for Laverne Creek.**

| Segment Length (meters)              | Existing Shade (fraction) | Existing Summer Load (kWh/m <sup>2</sup> /day) | Potential Shade (fraction) | Potential Summer Load (kWh/m <sup>2</sup> /day) | Potential Load minus Existing load (kWh/m <sup>2</sup> /day) | Existing Stream Width (m) | Natural Stream Width (m) | Existing Segment Area (m <sup>2</sup> ) | Existing Summer Load (kWh/day) | Natural Segment Area (m <sup>2</sup> ) | Potential Summer Load (kWh/day) | Potential Load minus Existing Load (kWh/day) | Lack of Shade (%) | Laverne Creek  |                   |         |
|--------------------------------------|---------------------------|--|----------------------------|---|--|---------------------------|--------------------------|---|--------------------------------|--|---------------------------------|--|-------------------|----------------|-------------------|---------|
| Assessment Unit # ID17010301PN032_02 |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |                |                   |         |
| 2250                                 | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 2250                                    | 1237.5                         | 2250                                   | 247.5                           | -990   | -8                | Forest Group B | Trib #1           |         |
| 320                                  | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 320                                     | 352                            | 320                                    | 35.2                            | -316.8                                       | -18               |                |                   | Trib #2 |
| 1800                                 | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1800                                    | 990                            | 1800                                   | 198                             | -792   | -8                |                |                   |         |
| 1650                                 | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1650                                    | 907.5                          | 1650                                   | 181.5                           | -726   | -8                |                | Laverne Creek     |         |
| 660                                  | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 1320                                    | 1452                           | 1320                                   | 145.2                           | -1306.8                                      | -18               |                |                   |         |
| 370                                  | 0.7                       | 1.65   | 0.98                       | 0.11  | -1.54  | 2                         | 2                        | 740                                     | 1221                           | 740                                    | 81.4                            | -1139.6                                      | -28               |                |                   |         |
| 2120                                 | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 2120                                    | 1166                           | 2120                                   | 233.2                           | -932.8                                       | -8                |                |                   |         |
| 1090                                 | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 3                         | 2                        | 3270                                    | 3597                           | 2180                                   | 239.8                           | -3357.2                                      | -18               |                | Nonforest Group 1 |         |
| 290                                  | 0.7                       | 1.65   | 0.96                       | 0.22  | -1.43  | 4                         | 3                        | 1160                                    | 1914                           | 870                                    | 191.4                           | -1722.6                                      | -26               |                |                   |         |
| 250                                  | 0.5                       | 2.75   | 0.86                       | 0.77  | -1.98  | 4                         | 3                        | 1000                                    | 2750                           | 750                                    | 577.5                           | -2172.5                                      | -36               |                |                   |         |
| 1270                                 | 0.7                       | 1.65   | 0.78                       | 1.21  | -0.44  | 5                         | 4                        | 6350                                    | 10477.5                        | 5080                                   | 6146.8                          | -4330.7                                      | -8                |                |                   |         |
| 270                                  | 0.8                       | 1.1  | 0.78                       | 1.21  | 0.11   | 6                         | 4                        | 1620                                    | 1782                           | 1080                                   | 1306.8                          | -475.2                                       | 0                 |                |                   |         |
| 310                                  | 0.7                       | 1.65   | 0.91                       | 0.495   | -1.16  | 6                         | 5                        | 1860                                    | 3069                           | 1550                                   | 767.25                          | -2301.75                                     | -21               |                |                   |         |
| 520                                  | 0.8                       | 1.1  | 0.91                       | 0.495   | -0.605   | 7                         | 5                        | 3640                                    | 4004                           | 2600                                   | 1287                            | -2717  | -11               |                |                   |         |
| 620                                  | 0.6                       | 2.2  | 0.91                       | 0.495   | -1.705   | 7                         | 5                        | 4340                                    | 9548                           | 3100                                   | 1534.5                          | -8013.5                                      | -31               |                |                   |         |
| 360                                  | 0.8                       | 1.1  | 0.91                       | 0.495   | -0.605   | 8                         | 5                        | 2880                                    | 3168                           | 1800                                   | 891                             | -2277  | -11               |                |                   |         |
| 90                                   | 0.4                       | 3.3  | 0.91                       | 0.495   | -2.805   | 8                         | 5                        | 720                                     | 2376                           | 450                                    | 222.75                          | -2153.25                                     | -51               |                |                   |         |
| <b>Total</b>                         |                           |  |                            |   |  |                           |                          | <b>37,040</b>                           | <b>50,012</b>                  | <b>29,660</b>                          | <b>14,287</b>                   | <b>-35,725</b>                               | <b>-18</b>        |                |                   |         |

**Table F-26. Existing and potential solar loads for Leiberg Creek.**

| Segment Length (meters)              | Existing Shade (fraction) | Existing Summer Load (kWh/m <sup>2</sup> /day) | Potential Shade (fraction) | Potential Summer Load (kWh/m <sup>2</sup> /day) | Potential Load minus Existing load (kWh/m <sup>2</sup> /day) | Existing Stream Width (m) | Natural Stream Width (m) | Existing Segment Area (m <sup>2</sup> ) | Existing Summer Load (kWh/day) | Natural Segment Area (m <sup>2</sup> ) | Potential Summer Load (kWh/day) | Potential Load minus Existing Load (kWh/day) | Lack of Shade (%) | Leiberg Creek     |               |
|--------------------------------------|---------------------------|--|----------------------------|---|--|---------------------------|--------------------------|---|--------------------------------|--|---------------------------------|--|-------------------|-------------------|---------------|
| Assessment Unit # ID17010301PN033_02 |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |                   |               |
| 680                                  | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 680                                     | 374                            | 680                                    | 74.8                            | -299.2                                       | -8                | Forest Group B    | Stull Creek   |
| 1090                                 | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 2180                                    | 2398                           | 2180                                   | 239.8                           | -2158.2                                      | -18               |                   |               |
| 650                                  | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 1300                                    | 715                            | 1300                                   | 143                             | -572   | -8                |                   | Tie Creek     |
| 3170                                 | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 6340                                    | 3487                           | 6340                                   | 697.4                           | -2789.6                                      | -8                |                   |               |
| 2580                                 | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 5160                                    | 2838                           | 5160                                   | 567.6                           | -2270.4                                      | -8                |                   | Leiberg Creek |
| 420                                  | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 840                                     | 924                            | 840                                    | 92.4                            | -831.6                                       | -18               |                   |               |
| 2250                                 | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 4500                                    | 2475                           | 4500                                   | 495                             | -1980  | -8                |                   |               |
| 620                                  | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 1240                                    | 1364                           | 1240                                   | 136.4                           | -1227.6                                      | -18               |                   |               |
| 510                                  | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 510                                     | 280.5                          | 510                                    | 56.1                            | -224.4                                       | -8                |                   |               |
| 570                                  | 0.7                       | 1.65   | 0.98                       | 0.11  | -1.54  | 1                         | 1                        | 570                                     | 940.5                          | 570                                    | 62.7                            | -877.8                                       | -28               |                   |               |
| 1020                                 | 0.7                       | 1.65   | 0.98                       | 0.11  | -1.54  | 2                         | 2                        | 2040                                    | 3366                           | 2040                                   | 224.4                           | -3141.6                                      | -28               | Nonforest Group 1 |               |
| 430                                  | 0.6                       | 2.2  | 0.96                       | 0.22  | -1.98  | 3                         | 3                        | 1290                                    | 2838                           | 1290                                   | 283.8                           | -2554.2                                      | -36               |                   |               |
| 360                                  | 0.6                       | 2.2  | 0.86                       | 0.77  | -1.43  | 3                         | 3                        | 1080                                    | 2376                           | 1080                                   | 831.6                           | -1544.4                                      | -26               |                   |               |
| 1490                                 | 0.5                       | 2.75   | 0.86                       | 0.77  | -1.98  | 4                         | 3                        | 5960                                    | 16390                          | 4470                                   | 3441.9                          | -12948.1                                     | -36               |                   |               |
| 500                                  | 0.3                       | 3.85   | 0.78                       | 1.21  | -2.64  | 5                         | 4                        | 2500                                    | 9625                           | 2000                                   | 2420                            | -7205  | -48               |                   |               |
| 750                                  | 0.5                       | 2.75   | 0.78                       | 1.21  | -1.54  | 6                         | 4                        | 4500                                    | 12375                          | 3000                                   | 3630                            | -8745  | -28               |                   |               |
| 390                                  | 0.3                       | 3.85   | 0.78                       | 1.21  | -2.64  | 7                         | 4                        | 2730                                    | 10510.5                        | 1560                                   | 1887.6                          | -8622.9                                      | -48               |                   |               |
| 1350                                 | 0.4                       | 3.3  | 0.72                       | 1.54  | -1.76  | 8                         | 5                        | 10800                                   | 35640                          | 6750                                   | 10395                           | -25245                                       | -32               |                   |               |
| 1250                                 | 0.3                       | 3.85   | 0.72                       | 1.54  | -2.31  | 9                         | 5                        | 11250                                   | 43312.5                        | 6250                                   | 9625                            | -33687.5                                     | -42               |                   |               |
| 590                                  | 0.2                       | 4.4  | 0.65                       | 1.925   | -2.475   | 10                        | 6                        | 5900                                    | 25960                          | 3540                                   | 6814.5                          | -19145.5                                     | -45               |                   |               |
| <b>Total</b>                         |                           |  |                            |   |  |                           |                          | <b>71,370</b>                           | <b>178,189</b>                 | <b>55,300</b>                          | <b>42,119</b>                   | <b>-136,070</b>                              | <b>-25</b>        |                   |               |

**Table F-27. Existing and potential solar loads for Lost Creek.**

| Segment Length (meters)              | Existing Shade (fraction) | Existing Summer Load (kWh/m <sup>2</sup> /day) | Potential Shade (fraction) | Potential Summer Load (kWh/m <sup>2</sup> /day) | Potential Load minus Existing load (kWh/m <sup>2</sup> /day) | Existing Stream Width (m) | Natural Stream Width (m) | Existing Segment Area (m <sup>2</sup> ) | Existing Summer Load (kWh/day) | Natural Segment Area (m <sup>2</sup> ) | Potential Summer Load (kWh/day) | Potential Load minus Existing Load (kWh/day) | Lack of Shade (%) | Lost Creek |           |         |
|--------------------------------------|---------------------------|--|----------------------------|---|--|---------------------------|--------------------------|---|--------------------------------|--|---------------------------------|--|-------------------|------------|-----------|---------|
| Assessment Unit # ID17010301PN009_02 |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |            |           |         |
| 480                                  | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 480                                     | 264                            | 480                                    | 52.8                            | -211.2                                       | -8                | Group C    |           |         |
| 520                                  | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 520                                     | 286                            | 520                                    | 57.2                            | -228.8                                       | -8                |            | Forest    |         |
| 980                                  | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 980                                     | 1078                           | 980                                    | 107.8                           | -970.2                                       | -18               | Group B    |           |         |
| 1420                                 | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 2840                                    | 1562                           | 2840                                   | 312.4                           | -1249.6                                      | -8                |            |           |         |
| 890                                  | 0.8                       | 1.1  | 0.96                       | 0.22  | -0.88  | 3                         | 3                        | 2670                                    | 2937                           | 2670                                   | 587.4                           | -2349.6                                      | -16               |            |           |         |
| 670                                  | 0.9                       | 0.55   | 0.96                       | 0.22  | -0.33  | 3                         | 3                        | 2010                                    | 1105.5                         | 2010                                   | 442.2                           | -663.3                                       | -6                |            |           |         |
| 1530                                 | 0.8                       | 1.1  | 0.94                       | 0.33  | -0.77  | 4                         | 4                        | 6120                                    | 6732                           | 6120                                   | 2019.6                          | -4712.4                                      | -14               |            |           |         |
| 860                                  | 0.7                       | 1.65   | 0.94                       | 0.33  | -1.32  | 4                         | 4                        | 3440                                    | 5676                           | 3440                                   | 1135.2                          | -4540.8                                      | -24               |            |           |         |
| 350                                  | 0.5                       | 2.75   | 0.91                       | 0.495   | -2.255   | 5                         | 5                        | 1750                                    | 4812.5                         | 1750                                   | 866.25                          | -3946.25                                     | -41               |            |           |         |
| 840                                  | 0.6                       | 2.2  | 0.91                       | 0.495   | -1.705   | 5                         | 5                        | 4200                                    | 9240                           | 4200                                   | 2079                            | -7161  | -31               |            |           |         |
| 150                                  | 0.5                       | 2.75   | 0.91                       | 0.495   | -2.255   | 5                         | 5                        | 750                                     | 2062.5                         | 750                                    | 371.25                          | -1691.25                                     | -41               |            |           |         |
| 1020                                 | 0.7                       | 1.65   | 0.91                       | 0.495   | -1.155   | 5                         | 5                        | 5100                                    | 8415                           | 5100                                   | 2524.5                          | -5890.5                                      | -21               |            |           |         |
| 1050                                 | 0.6                       | 2.2  | 0.65                       | 1.925   | -0.275   | 6                         | 6                        | 6300                                    | 13860                          | 6300                                   | 12127.5                         | -1732.5                                      | -5                |            | Nonforest |         |
| 140                                  | 0.4                       | 3.3  | 0.6                        | 2.2   | -1.1   | 7                         | 7                        | 980                                     | 3234                           | 980                                    | 2156                            | -1078  | -20               |            |           | Group 1 |
| 510                                  | 0.7                       | 1.65   | 0.6                        | 2.2   | 0.55   | 7                         | 7                        | 3570                                    | 5890.5                         | 3570                                   | 7854                            | 1963.5                                       | 0                 |            |           |         |
|                                      |                           |  |                            |   |  | <b>Subtotal</b>           |                          | <b>41,710</b>                           | <b>67,155</b>                  | <b>41,710</b>                          | <b>32,693</b>                   | <b>-34,462</b>                               | <b>-17</b>        |            |           |         |
| Assessment Unit # ID17010301PN009_03 |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |            |           |         |
| 340                                  | 0.4                       | 3.3  | 0.6                        | 2.2   | -1.1   | 7                         | 7                        | 2380                                    | 7854                           | 2380                                   | 5236                            | -2618  | -20               | Group 1    |           |         |
| 290                                  | 0.6                       | 2.2  | 0.55                       | 2.475   | 0.275  | 8                         | 8                        | 2320                                    | 5104                           | 2320                                   | 5742                            | 638  | 0                 |            |           |         |
| 420                                  | 0.4                       | 3.3  | 0.55                       | 2.475   | -0.825   | 8                         | 8                        | 3360                                    | 11088                          | 3360                                   | 8316                            | -2772  | -15               |            |           |         |
| 700                                  | 0.8                       | 1.1  | 0.52                       | 2.64  | 1.54   | 9                         | 9                        | 6300                                    | 6930                           | 6300                                   | 16632                           | 9702   | 0                 |            |           |         |
| 250                                  | 0.7                       | 1.65   | 0.52                       | 2.64  | 0.99   | 9                         | 9                        | 2250                                    | 3712.5                         | 2250                                   | 5940                            | 2227.5                                       | 0                 |            |           |         |
| 130                                  | 0.6                       | 2.2  | 0.52                       | 2.64  | 0.44   | 9                         | 9                        | 1170                                    | 2574                           | 1170                                   | 3088.8                          | 514.8  | 0                 |            |           |         |
|                                      |                           |  |                            |   |  | <b>Subtotal</b>           |                          | <b>17,780</b>                           | <b>37,263</b>                  | <b>17,780</b>                          | <b>44,955</b>                   | <b>7,692</b>                                 | <b>-6</b>         |            |           |         |
|                                      |                           |  |                            |   |  | <b>Total</b>              |                          | <b>59,490</b>                           | <b>104,418</b>                 | <b>59,490</b>                          | <b>77,648</b>                   | <b>-26,770</b>                               | <b>-14</b>        |            |           |         |

**Table F-28. Existing and potential solar loads for Lost Fork and tributaries.**

| Segment Length (meters) | Existing Shade (fraction) | Existing Summer Load (kWh/m <sup>2</sup> /day) | Potential Shade (fraction) | Potential Summer Load (kWh/m <sup>2</sup> /day) | Potential Load minus Existing load (kWh/m <sup>2</sup> /day) | Existing Stream Width (m) | Natural Stream Width (m) | Existing Segment Area (m <sup>2</sup> ) | Existing Summer Load (kWh/day) | Natural Segment Area (m <sup>2</sup> ) | Potential Summer Load (kWh/day) | Potential Load minus Existing Load (kWh/day) | Lack of Shade (%) | Lost Fork  |  |
|-------------------------|---------------------------|--|----------------------------|---|--|---------------------------|--------------------------|---|--------------------------------|--|---------------------------------|--|-------------------|------------|--|
| AU# ID17010301PN014_02  |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |            |  |
| 1600                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1600                                    | 880                            | 1600                                   | 176                             | -704   | -8                | Forest     |  |
| 1300                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1300                                    | 715                            | 1300                                   | 143                             | -572   | -8                | Group B    |  |
| 1400                    | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 2800                                    | 3080                           | 2800                                   | 308                             | -2772  | -18               | Group B    |  |
| 420                     | 0.8                       | 1.1  | 0.94                       | 0.33  | -0.77  | 2                         | 2                        | 840                                     | 924                            | 840                                    | 277.2                           | -646.8                                       | -14               | Group 1    |  |
| 1800                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1800                                    | 990                            | 1800                                   | 198                             | -792   | -8                | Group B    |  |
| 770                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 770                                     | 423.5                          | 770                                    | 84.7                            | -338.8                                       | -8                | Group C    |  |
| 840                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 840                                     | 924                            | 840                                    | 92.4                            | -831.6                                       | -18               | Group B    |  |
| 170                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 170                                     | 187                            | 170                                    | 18.7                            | -168.3                                       | -18               | Group B    |  |
| 1200                    | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 2400                                    | 2640                           | 2400                                   | 264                             | -2376  | -18               | Group B    |  |
| 230                     | 0.8                       | 1.1  | 0.94                       | 0.33  | -0.77  | 2                         | 2                        | 460                                     | 506                            | 460                                    | 151.8                           | -354.2                                       | -14               | Group 1    |  |
| 520                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 520                                     | 286                            | 520                                    | 57.2                            | -228.8                                       | -8                | Group B    |  |
| 980                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 980                                     | 1078                           | 980                                    | 107.8                           | -970.2                                       | -18               | Group B    |  |
| 1700                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1700                                    | 935                            | 1700                                   | 187                             | -748   | -8                | Group B    |  |
| 600                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 1200                                    | 1320                           | 1200                                   | 132                             | -1188  | -18               | Group B    |  |
| 110                     | 0.8                       | 1.1  | 0.94                       | 0.33  | -0.77  | 2                         | 2                        | 220                                     | 242                            | 220                                    | 72.6                            | -169.4                                       | -14               | Group 1    |  |
| 1300                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1300                                    | 715                            | 1300                                   | 143                             | -572   | -8                | Group B    |  |
| 260                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 520                                     | 572                            | 520                                    | 57.2                            | -514.8                                       | -18               | Group B    |  |
| 240                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 480                                     | 264                            | 480                                    | 52.8                            | -211.2                                       | -8                | Group B    |  |
| 830                     | 0.8                       | 1.1  | 0.86                       | 0.77  | -0.33  | 3                         | 3                        | 2490                                    | 2739                           | 2490                                   | 1917.3                          | -821.7                                       | -6                | Nonforest  |  |
| 490                     | 0.7                       | 1.65   | 0.78                       | 1.21  | -0.44  | 4                         | 4                        | 1960                                    | 3234                           | 1960                                   | 2371.6                          | -862.4                                       | -8                | Group 1    |  |
| 140                     | 0.8                       | 1.1  | 0.78                       | 1.21  | 0.11   | 4                         | 4                        | 560                                     | 616                            | 560                                    | 677.6                           | 61.6   | 0                 | Group 1    |  |
| 510                     | 0.6                       | 2.2  | 0.78                       | 1.21  | -0.99  | 4                         | 4                        | 2040                                    | 4488                           | 2040                                   | 2468.4                          | -2019.6                                      | -18               | Group 1    |  |
|                         |                           |  |                            |   |  |                           |                          | <b>Subtotal</b>                         | <b>26,950</b>                  | <b>27,759</b>                          | <b>26,950</b>                   | <b>9,958</b>                                 | <b>-17,800</b>    | <b>-12</b> |  |
| AU# ID17010301PN014_03  |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |            |  |
| 80                      | 0.8                       | 1.1  | 0.72                       | 1.54  | 0.44   | 5                         | 5                        | 400                                     | 440                            | 400                                    | 616                             | 176  | 0                 |            |  |
| 290                     | 0.7                       | 1.65   | 0.72                       | 1.54  | -0.11  | 5                         | 5                        | 1450                                    | 2392.5                         | 1450                                   | 2233                            | -159.5                                       | -2                |            |  |
| 170                     | 0.7                       | 1.65   | 0.72                       | 1.54  | -0.11  | 5                         | 5                        | 850                                     | 1402.5                         | 850                                    | 1309                            | -93.5  | -2                |            |  |
| 510                     | 0.6                       | 2.2  | 0.72                       | 1.54  | -0.66  | 5                         | 5                        | 2550                                    | 5610                           | 2550                                   | 3927                            | -1683  | -12               |            |  |
| 190                     | 0.4                       | 3.3  | 0.72                       | 1.54  | -1.76  | 5                         | 5                        | 950                                     | 3135                           | 950                                    | 1463                            | -1672  | -32               |            |  |
| 410                     | 0.6                       | 2.2  | 0.72                       | 1.54  | -0.66  | 5                         | 5                        | 2050                                    | 4510                           | 2050                                   | 3157                            | -1353  | -12               |            |  |
| 440                     | 0.5                       | 2.75   | 0.72                       | 1.54  | -1.21  | 5                         | 5                        | 2200                                    | 6050                           | 2200                                   | 3388                            | -2662  | -22               |            |  |
| 210                     | 0.4                       | 3.3  | 0.72                       | 1.54  | -1.76  | 5                         | 5                        | 1050                                    | 3465                           | 1050                                   | 1617                            | -1848  | -32               |            |  |
|                         |                           |  |                            |   |  |                           |                          | <b>Subtotal</b>                         | <b>11,500</b>                  | <b>27,005</b>                          | <b>11,500</b>                   | <b>17,710</b>                                | <b>-9,295</b>     | <b>-14</b> |  |
|                         |                           |  |                            |   |  |                           |                          | <b>Total</b>                            | <b>38,450</b>                  | <b>54,764</b>                          | <b>38,450</b>                   | <b>27,668</b>                                | <b>-27,095</b>    | <b>-13</b> |  |

**Table F-29. Existing and potential solar loads for Miners Creek and tributaries.**

| Segment Length (meters) | Existing Shade (fraction) | Existing Summer Load (kWh/m <sup>2</sup> /day) | Potential Shade (fraction) | Potential Summer Load (kWh/m <sup>2</sup> /day) | Potential Load minus Existing load (kWh/m <sup>2</sup> /day) | Existing Stream Width (m) | Natural Stream Width (m) | Existing Segment Area (m <sup>2</sup> ) | Existing Summer Load (kWh/day) | Natural Segment Area (m <sup>2</sup> ) | Potential Summer Load (kWh/day) | Potential Load minus Existing Load (kWh/day) | Lack of Shade (%) | Miners Creek   |               |
|-------------------------|---------------------------|--|----------------------------|---|--|---------------------------|--------------------------|---|--------------------------------|--|---------------------------------|--|-------------------|----------------|---------------|
| AU# ID17010301PN022_02  |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |                |               |
| 400                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 400                                     | 220                            | 400                                    | 44                              | -176   | -8                | Forest Group B | 1st to Miners |
| 190                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 190                                     | 209                            | 190                                    | 20.9                            | -188.1                                       | -18               |                |               |
| 170                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 170                                     | 93.5                           | 170                                    | 18.7                            | -74.8  | -8                |                |               |
| 490                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 490                                     | 539                            | 490                                    | 53.9                            | -485.1                                       | -18               |                |               |
| 690                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 690                                     | 379.5                          | 690                                    | 75.9                            | -303.6                                       | -8                |                |               |
| 60                      | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 60                                      | 66                             | 60                                     | 6.6                             | -59.4  | -18               |                |               |
| 2000                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 4000                                    | 2200                           | 4000                                   | 440                             | -1760  | -8                |                |               |
| 490                     | 0.7                       | 1.65   | 0.97                       | 0.165   | -1.485   | 3                         | 3                        | 1470                                    | 2425.5                         | 1470                                   | 242.55                          | -2182.95                                     | -27               |                |               |
| 350                     | 0.8                       | 1.1  | 0.97                       | 0.165   | -0.935   | 3                         | 3                        | 1050                                    | 1155                           | 1050                                   | 173.25                          | -981.75                                      | -17               |                |               |
| 520                     | 0.7                       | 1.65   | 0.97                       | 0.165   | -1.485   | 3                         | 3                        | 1560                                    | 2574                           | 1560                                   | 257.4                           | -2316.6                                      | -27               |                |               |
| 1600                    | 0.9                       | 0.55   | 0.96                       | 0.22  | -0.33  | 4                         | 4                        | 6400                                    | 3520                           | 6400                                   | 1408                            | -2112  | -6                |                |               |
| 1000                    | 0.8                       | 1.1  | 0.96                       | 0.22  | -0.88  | 4                         | 4                        | 4000                                    | 4400                           | 4000                                   | 880                             | -3520  | -16               |                |               |
| <b>Total</b>            |                           |  |                            |   |  |                           |                          | <b>20,480</b>                           | <b>17,782</b>                  | <b>20,480</b>                          | <b>3,621</b>                    | <b>-14,160</b>                               | <b>-15</b>        |                |               |

**Table F-30. Existing and potential solar loads for Potter Creek and tributaries.**

| Segment Length (meters) | Existing Shade (fraction) | Existing Summer Load (kWh/m <sup>2</sup> /day) | Potential Shade (fraction) | Potential Summer Load (kWh/m <sup>2</sup> /day) | Potential Load minus Existing load (kWh/m <sup>2</sup> /day) | Existing Stream Width (m) | Natural Stream Width (m) | Existing Segment Area (m <sup>2</sup> ) | Existing Summer Load (kWh/day) | Natural Segment Area (m <sup>2</sup> ) | Potential Summer Load (kWh/day) | Potential Load minus Existing Load (kWh/day) | Lack of Shade (%) | Potter Creek   |                 |
|-------------------------|---------------------------|--|----------------------------|---|--|---------------------------|--------------------------|---|--------------------------------|--|---------------------------------|--|-------------------|----------------|-----------------|
| AU# ID17010301PN019_02  |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |                |                 |
| 1600                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1600                                    | 880                            | 1600                                   | 176                             | -704   | -8                | Forest Group B | SF Potter Creek |
| 1400                    | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 2800                                    | 3080                           | 2800                                   | 308                             | -2772  | -18               |                |                 |
| 1800                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1800                                    | 990                            | 1800                                   | 198                             | -792   | -8                |                |                 |
| 280                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 560                                     | 616                            | 560                                    | 61.6                            | -554.4                                       | -18               |                |                 |
| 330                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 660                                     | 363                            | 660                                    | 72.6                            | -290.4                                       | -8                |                |                 |
| 1300                    | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 2600                                    | 2860                           | 2600                                   | 286                             | -2574  | -18               |                |                 |
| 270                     | 0.7                       | 1.65   | 0.98                       | 0.11  | -1.54  | 2                         | 2                        | 540                                     | 891                            | 540                                    | 59.4                            | -831.6                                       | -28               |                |                 |
| 1700                    | 0.7                       | 1.65   | 0.86                       | 0.77  | -0.88  | 3                         | 3                        | 5100                                    | 8415                           | 5100                                   | 3927                            | -4488  | -16               |                |                 |
| 320                     | 0.5                       | 2.75   | 0.78                       | 1.21  | -1.54  | 4                         | 4                        | 1280                                    | 3520                           | 1280                                   | 1548.8                          | -1971.2                                      | -28               |                |                 |
| 320                     | 0.8                       | 1.1  | 0.78                       | 1.21  | 0.11   | 4                         | 4                        | 1280                                    | 1408                           | 1280                                   | 1548.8                          | 140.8  | 0                 |                |                 |
| 220                     | 0.7                       | 1.65   | 0.78                       | 1.21  | -0.44  | 4                         | 4                        | 880                                     | 1452                           | 880                                    | 1064.8                          | -387.2                                       | -8                |                |                 |
| <b>Total</b>            |                           |  |                            |   |  |                           |                          | <b>19,100</b>                           | <b>24,475</b>                  | <b>19,100</b>                          | <b>9,251</b>                    | <b>-15,224</b>                               | <b>-14</b>        |                |                 |

**Table F-31. Existing and potential solar loads for Prichard Creek headwaters (AU# 005\_02).**

| Segment Length (meters)              | Existing Shade (fraction) | Existing Summer Load (kWh/m <sup>2</sup> /day) | Potential Shade (fraction) | Potential Summer Load (kWh/m <sup>2</sup> /day) | Potential Load minus Existing load (kWh/m <sup>2</sup> /day) | Existing Stream Width (m) | Natural Stream Width (m) | Existing Segment Area (m <sup>2</sup> ) | Existing Summer Load (kWh/day) | Natural Segment Area (m <sup>2</sup> ) | Potential Summer Load (kWh/day) | Potential Load minus Existing Load (kWh/day) | Lack of Shade (%) | Prichard Creek |               |
|--------------------------------------|---------------------------|--|----------------------------|---|--|---------------------------|--------------------------|---|--------------------------------|--|---------------------------------|--|-------------------|----------------|---------------|
| Assessment Unit # ID17010301PN005_02 |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |                |               |
| 110                                  | 0.6                       | 2.2  | 0.98                       | 0.11  | -2.09  | 1                         | 1                        | 110                                     | 242                            | 110                                    | 12.1                            | -229.9                                       | -38               | Forest Group C | Cascade Gulch |
| 2200                                 | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 2200                                    | 1210                           | 2200                                   | 242                             | -968   | -8                |                |               |
| 370                                  | 0.8                       | 1.1  | 0.97                       | 0.165   | -0.93  | 2                         | 2                        | 740                                     | 814                            | 740                                    | 122.1                           | -691.9                                       | -17               |                |               |
| 990                                  | 0.9                       | 0.55   | 0.97                       | 0.165   | -0.39  | 2                         | 2                        | 1980                                    | 1089                           | 1980                                   | 326.7                           | -762.3                                       | -7                | Forest Group B | Granite Gulch |
| 3540                                 | 0.9                       | 0.55   | 0.96                       | 0.22  | -0.33  | 3                         | 3                        | 10620                                   | 5841                           | 10620                                  | 2336.4                          | -3504.6                                      | -6                |                |               |
| 1840                                 | 0.9                       | 0.55   | 0.91                       | 0.495   | -0.06  | 5                         | 5                        | 9200                                    | 5060                           | 9200                                   | 4554                            | -506   | -1                |                |               |
| 240                                  | 0.9                       | 0.55   | 0.91                       | 0.495   | -0.06  | 5                         | 5                        | 1200                                    | 660                            | 1200                                   | 594                             | -66  | -1                | Forest Group B | Barton Gulch  |
| 2760                                 | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 5520                                    | 3036                           | 5520                                   | 607.2                           | -2428.8                                      | -8                |                |               |
| 3150                                 | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 6300                                    | 3465                           | 6300                                   | 693                             | -2772  | -8                |                |               |
| 580                                  | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 580                                     | 319                            | 580                                    | 63.8                            | -255.2                                       | -8                | Group C        | Moonshine     |
| 2250                                 | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 4500                                    | 2475                           | 4500                                   | 495                             | -1980  | -8                | Group B        | Gulch         |
| 740                                  | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 740                                     | 407                            | 740                                    | 81.4                            | -325.6                                       | -8                | Group C        | Bear          |
| 1510                                 | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1510                                    | 830.5                          | 1510                                   | 166.1                           | -664.4                                       | -8                | Forest         | Gulch         |
| 370                                  | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 740                                     | 814                            | 740                                    | 81.4                            | -732.6                                       | -18               | Group B        |               |
| 1240                                 | 0.9                       | 0.55   | 0.97                       | 0.165   | -0.39  | 2                         | 2                        | 2480                                    | 1364                           | 2480                                   | 409.2                           | -954.8                                       | -7                | Forest         |               |
| 2080                                 | 0.7                       | 1.65   | 0.95                       | 0.275   | -1.38  | 3                         | 3                        | 6240                                    | 10296                          | 6240                                   | 1716                            | -8580  | -25               | Group C        |               |
| 850                                  | 0.9                       | 0.55   | 0.94                       | 0.33  | -0.22  | 4                         | 4                        | 3400                                    | 1870                           | 3400                                   | 1122                            | -748   | -4                | Forest         |               |
| 1070                                 | 0.8                       | 1.1  | 0.94                       | 0.33  | -0.77  | 4                         | 4                        | 4280                                    | 4708                           | 4280                                   | 1412.4                          | -3295.6                                      | -14               | Group B        |               |
| 1170                                 | 0.7                       | 1.65   | 0.91                       | 0.495   | -1.16  | 5                         | 5                        | 5850                                    | 9652.5                         | 5850                                   | 2895.75                         | -6756.75                                     | -21               |                |               |
| 190                                  | 0.6                       | 2.2  | 0.91                       | 0.495   | -1.71  | 5                         | 5                        | 950                                     | 2090                           | 950                                    | 470.25                          | -1619.75                                     | -31               |                |               |
| 300                                  | 0.7                       | 1.65   | 0.98                       | 0.11  | -1.54  | 1                         | 1                        | 300                                     | 495                            | 300                                    | 33                              | -462   | -28               | Idaho Gulch    |               |
| 280                                  | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 280                                     | 308                            | 280                                    | 30.8                            | -277.2                                       | -18               |                |               |
| 460                                  | 0.7                       | 1.65   | 0.98                       | 0.11  | -1.54  | 1                         | 1                        | 460                                     | 759                            | 460                                    | 50.6                            | -708.4                                       | -28               |                |               |
| 2270                                 | 0.9                       | 0.55   | 0.96                       | 0.22  | -0.33  | 3                         | 3                        | 6810                                    | 3745.5                         | 6810                                   | 1498.2                          | -2247.3                                      | -6                | Prichard Creek |               |
| 1160                                 | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1160                                    | 638                            | 1160                                   | 127.6                           | -510.4                                       | -8                |                |               |
| 150                                  | 0.3                       | 3.85   | 0.98                       | 0.11  | -3.74  | 2                         | 1                        | 300                                     | 1155                           | 150                                    | 16.5                            | -1138.5                                      | -68               |                |               |
| 770                                  | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 3                         | 1                        | 2310                                    | 1270.5                         | 770                                    | 84.7                            | -1185.8                                      | -8                |                |               |
| 1500                                 | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 5                         | 2                        | 7500                                    | 8250                           | 3000                                   | 330                             | -7920  | -18               |                |               |
| 530                                  | 0.9                       | 0.55   | 0.96                       | 0.22  | -0.33  | 6                         | 3                        | 3180                                    | 1749                           | 1590                                   | 349.8                           | -1399.2                                      | -6                |                |               |
| 370                                  | 0.8                       | 1.1  | 0.96                       | 0.22  | -0.88  | 6                         | 3                        | 2220                                    | 2442                           | 1110                                   | 244.2                           | -2197.8                                      | -16               |                |               |
| 790                                  | 0.9                       | 0.55   | 0.96                       | 0.22  | -0.33  | 7                         | 3                        | 5530                                    | 3041.5                         | 2370                                   | 521.4                           | -2520.1                                      | -6                |                |               |
| 160                                  | 0.3                       | 3.85   | 0.94                       | 0.33  | -3.52  | 8                         | 4                        | 1280                                    | 4928                           | 640                                    | 211.2                           | -4716.8                                      | -64               |                |               |
| 210                                  | 0.8                       | 1.1  | 0.94                       | 0.33  | -0.77  | 8                         | 4                        | 1680                                    | 1848                           | 840                                    | 277.2                           | -1570.8                                      | -14               |                |               |
| 100                                  | 0.5                       | 2.75   | 0.94                       | 0.33  | -2.42  | 8                         | 4                        | 800                                     | 2200                           | 400                                    | 132                             | -2068  | -44               |                |               |
| 630                                  | 0.8                       | 1.1  | 0.94                       | 0.33  | -0.77  | 9                         | 4                        | 5670                                    | 6237                           | 2520                                   | 831.6                           | -5405.4                                      | -14               |                |               |
| 120                                  | 0.4                       | 3.3  | 0.91                       | 0.495   | -2.805   | 10                        | 5                        | 1200                                    | 3960                           | 600                                    | 297                             | -3663  | -51               |                |               |
| 190                                  | 0.8                       | 1.1  | 0.91                       | 0.495   | -0.605   | 10                        | 5                        | 1900                                    | 2090                           | 950                                    | 470.25                          | -1619.75                                     | -11               |                |               |
| 550                                  | 0.7                       | 1.65   | 0.91                       | 0.495   | -1.155   | 11                        | 5                        | 6050                                    | 9982.5                         | 2750                                   | 1361.25                         | -8621.25                                     | -21               |                |               |
| 410                                  | 0.4                       | 3.3  | 0.89                       | 0.605   | -2.695   | 12                        | 6                        | 4920                                    | 16236                          | 2460                                   | 1488.3                          | -14747.7                                     | -49               |                |               |
| 160                                  | 0.5                       | 2.75   | 0.89                       | 0.605   | -2.145   | 13                        | 6                        | 2080                                    | 5720                           | 960                                    | 580.8                           | -5139.2                                      | -39               |                |               |
| 870                                  | 0.4                       | 3.3  | 0.89                       | 0.605   | -2.695   | 14                        | 6                        | 12180                                   | 40194                          | 5220                                   | 3158.1                          | -37035.9                                     | -49               |                |               |
| <b>Total</b>                         |                           |  |                            |   |  |                           |                          |   | <b>136,950</b>                 | <b>173,492</b>                         | <b>104,480</b>                  | <b>30,495</b>                                | <b>-142,997</b>   | <b>-20</b>     |               |

**Table F-32. Existing and potential solar loads for Prichard Creek (AU# 005\_03).**

| Segment Length (meters)              | Existing Shade (fraction) | Existing Summer Load (kWh/m <sup>2</sup> /day) | Potential Shade (fraction) | Potential Summer Load (kWh/m <sup>2</sup> /day) | Potential Load minus Existing load (kWh/m <sup>2</sup> /day) | Existing Stream Width (m) | Natural Stream Width (m) | Existing Segment Area (m <sup>2</sup> ) | Existing Summer Load (kWh/day) | Natural Segment Area (m <sup>2</sup> ) | Potential Summer Load (kWh/day) | Potential Load minus Existing Load (kWh/day) | Lack of Shade (%) | Prichard Creek    |
|--------------------------------------|---------------------------|--|----------------------------|---|--|---------------------------|--------------------------|---|--------------------------------|--|---------------------------------|--|-------------------|-------------------|
| Assessment Unit # ID17010301PN005_03 |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |                   |
| 440                                  | 0.3                       | 3.85   | 0.6                        | 2.2   | -1.65  | 13                        | 7                        | 5720                                    | 22022                          | 3080                                   | 6776                            | -15246                                       | -30               | Nonforest Group 1 |
| 530                                  | 0.1                       | 4.95   | 0.55                       | 2.475   | -2.475   | 13                        | 8                        | 6890                                    | 34105.5                        | 4240                                   | 10494                           | -23611.5                                     | -45               |                   |
| 580                                  | 0.2                       | 4.4  | 0.52                       | 2.64  | -1.76  | 13                        | 9                        | 7540                                    | 33176                          | 5220                                   | 13780.8                         | -19395.2                                     | -32               |                   |
| 1160                                 | 0.4                       | 3.3  | 0.48                       | 2.86  | -0.44  | 12                        | 10                       | 13920                                   | 45936                          | 11600                                  | 33176                           | -12760                                       | -8                |                   |
| 460                                  | 0.3                       | 3.85   | 0.45                       | 3.025   | -0.825   | 12                        | 11                       | 5520                                    | 21252                          | 5060                                   | 15306.5                         | -5945.5                                      | -15               |                   |
| <b>Total</b>                         |                           |  |                            |   |  |                           |                          | <b>39,590</b>                           | <b>156,492</b>                 | <b>29,200</b>                          | <b>79,533</b>                   | <b>-76,958</b>                               | <b>-26</b>        |                   |

**Table F-33. Existing and potential solar loads for Prichard Creek (AU# 004\_03).**

| Segment Length (meters)              | Existing Shade (fraction) | Existing Summer Load (kWh/m <sup>2</sup> /day) | Potential Shade (fraction) | Potential Summer Load (kWh/m <sup>2</sup> /day) | Potential Load minus Existing load (kWh/m <sup>2</sup> /day) | Existing Stream Width (m) | Natural Stream Width (m) | Existing Segment Area (m <sup>2</sup> ) | Existing Summer Load (kWh/day) | Natural Segment Area (m <sup>2</sup> ) | Potential Summer Load (kWh/day) | Potential Load minus Existing Load (kWh/day) | Lack of Shade (%) | Prichard Creek    |  |
|--------------------------------------|---------------------------|--|----------------------------|---|--|---------------------------|--------------------------|---|--------------------------------|--|---------------------------------|--|-------------------|-------------------|--|
| Assessment Unit # ID17010301PN004_03 |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |                   |  |
| 410                                  | 0.4                       | 3.3  | 0.41                       | 3.245   | -0.055   | 12                        | 12                       | 4920                                    | 16236                          | 4920                                   | 15965.4                         | -270.6                                       | -1                | Nonforest Group 1 |  |
| 500                                  | 0.1                       | 4.95   | 0.41                       | 3.245   | -1.705   | 13                        | 12                       | 6500                                    | 32175                          | 6000                                   | 19470                           | -12705                                       | -31               |                   |  |
| 620                                  | 0.2                       | 4.4  | 0.41                       | 3.245   | -1.155   | 13                        | 12                       | 8060                                    | 35464                          | 7440                                   | 24142.8                         | -11321.2                                     | -21               |                   |  |
| 800                                  | 0.1                       | 4.95   | 0.41                       | 3.245   | -1.705   | 13                        | 12                       | 10400                                   | 51480                          | 9600                                   | 31152                           | -20328                                       | -31               |                   |  |
| 530                                  | 0.3                       | 3.85   | 0.41                       | 3.245   | -0.605   | 14                        | 12                       | 7420                                    | 28567                          | 6360                                   | 20638.2                         | -7928.8                                      | -11               |                   |  |
| 440                                  | 0.1                       | 4.95   | 0.41                       | 3.245   | -1.705   | 14                        | 12                       | 6160                                    | 30492                          | 5280                                   | 17133.6                         | -13358.4                                     | -31               |                   |  |
| 380                                  | 0                         | 5.5  | 0.41                       | 3.245   | -2.255   | 14                        | 12                       | 5320                                    | 29260                          | 4560                                   | 14797.2                         | -14462.8                                     | -41               |                   |  |
| 830                                  | 0.1                       | 4.95   | 0.41                       | 3.245   | -1.705   | 14                        | 12                       | 11620                                   | 57519                          | 9960                                   | 32320.2                         | -25198.8                                     | -31               |                   |  |
| 280                                  | 0.2                       | 4.4  | 0.39                       | 3.355   | -1.045   | 15                        | 13                       | 4200                                    | 18480                          | 3640                                   | 12212.2                         | -6267.8                                      | -19               |                   |  |
| 540                                  | 0                         | 5.5  | 0.39                       | 3.355   | -2.145   | 15                        | 13                       | 8100                                    | 44550                          | 7020                                   | 23552.1                         | -20997.9                                     | -39               |                   |  |
| 810                                  | 0.1                       | 4.95   | 0.39                       | 3.355   | -1.595   | 15                        | 13                       | 12150                                   | 60142.5                        | 10530                                  | 35328.15                        | -24814.35                                    | -29               |                   |  |
| 300                                  | 0.7                       | 1.65   | 0.39                       | 3.355   | 1.705  | 15                        | 13                       | 4500                                    | 7425                           | 3900                                   | 13084.5                         | 5659.5                                       | 0                 |                   |  |
| 360                                  | 0.6                       | 2.2  | 0.39                       | 3.355   | 1.155  | 15                        | 13                       | 5400                                    | 11880                          | 4680                                   | 15701.4                         | 3821.4                                       | 0                 |                   |  |
| 720                                  | 0.5                       | 2.75   | 0.39                       | 3.355   | 0.605  | 16                        | 13                       | 11520                                   | 31680                          | 9360                                   | 31402.8                         | -277.2                                       | 0                 |                   |  |
| 400                                  | 0.6                       | 2.2  | 0.39                       | 3.355   | 1.155  | 16                        | 13                       | 6400                                    | 14080                          | 5200                                   | 17446                           | 3366   | 0                 |                   |  |
| 160                                  | 0.5                       | 2.75   | 0.39                       | 3.355   | 0.605  | 16                        | 13                       | 2560                                    | 7040                           | 2080                                   | 6978.4                          | -61.6  | 0                 |                   |  |
| 490                                  | 0.6                       | 2.2  | 0.39                       | 3.355   | 1.155  | 16                        | 13                       | 7840                                    | 17248                          | 6370                                   | 21371.35                        | 4123.35                                      | 0                 |                   |  |
| 270                                  | 0.4                       | 3.3  | 0.39                       | 3.355   | 0.055  | 16                        | 13                       | 4320                                    | 14256                          | 3510                                   | 11776.05                        | -2479.95                                     | 0                 |                   |  |
| <b>Total</b>                         |                           |  |                            |   |  |                           |                          | <b>127,390</b>                          | <b>507,975</b>                 | <b>110,410</b>                         | <b>364,472</b>                  | <b>-143,502</b>                              | <b>-16</b>        |                   |  |

**Table F-34. Existing and potential solar loads for Prichard Creek (AU# 004\_04).**

| Segment Length (meters)              | Existing Shade (fraction) | Existing Summer Load (kWh/m <sup>2</sup> /day) | Potential Shade (fraction) | Potential Summer Load (kWh/m <sup>2</sup> /day) | Potential Load minus Existing load (kWh/m <sup>2</sup> /day) | Existing Stream Width (m) | Natural Stream Width (m) | Existing Segment Area (m <sup>2</sup> ) | Existing Summer Load (kWh/day) | Natural Segment Area (m <sup>2</sup> ) | Potential Summer Load (kWh/day) | Potential Load minus Existing Load (kWh/day) | Lack of Shade (%) | Prichard Creek    |
|--------------------------------------|---------------------------|--|----------------------------|---|--|---------------------------|--------------------------|---|--------------------------------|--|---------------------------------|--|-------------------|-------------------|
| Assessment Unit # ID17010301PN004_04 |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |                   |
| 390                                  | 0.1                       | 4.95   | 0.37                       | 3.465   | -1.485   | 16                        | 14                       | 6240                                    | 30888                          | 5460                                   | 18918.9                         | -11969.1                                     | -27               | Nonforest Group 1 |
| 430                                  | 0.2                       | 4.4  | 0.37                       | 3.465   | -0.935   | 16                        | 14                       | 6880                                    | 30272                          | 6020                                   | 20859.3                         | -9412.7                                      | -17               |                   |
| 440                                  | 0                         | 5.5  | 0.37                       | 3.465   | -2.035   | 16                        | 14                       | 7040                                    | 38720                          | 6160                                   | 21344.4                         | -17375.6                                     | -37               |                   |
| 1020                                 | 0.1                       | 4.95   | 0.35                       | 3.575   | -1.375   | 16                        | 15                       | 16320                                   | 80784                          | 15300                                  | 54697.5                         | -26086.5                                     | -25               |                   |
| 220                                  | 0.2                       | 4.4  | 0.35                       | 3.575   | -0.825   | 16                        | 15                       | 3520                                    | 15488                          | 3300                                   | 11797.5                         | -3690.5                                      | -15               |                   |
| 1410                                 | 0.1                       | 4.95   | 0.33                       | 3.685   | -1.265   | 16                        | 16                       | 22560                                   | 111672                         | 22560                                  | 83133.6                         | -28538.4                                     | -23               |                   |
| 490                                  | 0.2                       | 4.4  | 0.33                       | 3.685   | -0.715   | 16                        | 16                       | 7840                                    | 34496                          | 7840                                   | 28890.4                         | -5605.6                                      | -13               |                   |
| <b>Total</b>                         |                           |  |                            |   |  |                           |                          | <b>70,400</b>                           | <b>342,320</b>                 | <b>66,640</b>                          | <b>239,642</b>                  | <b>-102,678</b>                              | <b>-22</b>        |                   |

**Table F-35. Existing and potential solar loads for Shoshone Creek.**

| Segment Length (meters) | Existing Shade (fraction) | Existing Summer Load (kWh/m <sup>2</sup> /day) | Potential Shade (fraction) | Potential Summer Load (kWh/m <sup>2</sup> /day) | Potential Load minus Existing load (kWh/m <sup>2</sup> /day) | Existing Stream Width (m) | Natural Stream Width (m) | Existing Segment Area (m <sup>2</sup> ) | Existing Summer Load (kWh/day) | Natural Segment Area (m <sup>2</sup> ) | Potential Summer Load (kWh/day) | Potential Load minus Existing Load (kWh/day) | Lack of Shade (%) | Shoshone Creek |
|-------------------------|---------------------------|--|----------------------------|---|--|---------------------------|--------------------------|---|--------------------------------|--|---------------------------------|--|-------------------|----------------|
| AU# ID17010301PN012_02  |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |                |
| 240                     | 0.9                       | 0.55   | 0.96                       | 0.22  | -0.33  | 1                         | 1                        | 240                                     | 132                            | 240                                    | 52.8                            | -79.2  | -6                | Group D        |
| 1040                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1040                                    | 572                            | 1040                                   | 114.4                           | -457.6                                       | -8                | Group C        |
| 820                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 1640                                    | 902                            | 1640                                   | 180.4                           | -721.6                                       | -8                | Group B        |
| 270                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 540                                     | 594                            | 540                                    | 59.4                            | -534.6                                       | -18               | Forest         |
| 330                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 660                                     | 363                            | 660                                    | 72.6                            | -290.4                                       | -8                |                |
| 710                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 1420                                    | 1562                           | 1420                                   | 156.2                           | -1405.8                                      | -18               |                |
| 660                     | 0.8                       | 1.1  | 0.97                       | 0.165   | -0.935   | 3                         | 3                        | 1980                                    | 2178                           | 1980                                   | 326.7                           | -1851.3                                      | -17               |                |
| 270                     | 0.9                       | 0.55   | 0.97                       | 0.165   | -0.385   | 3                         | 3                        | 810                                     | 445.5                          | 810                                    | 133.65                          | -311.85                                      | -7                |                |
| 540                     | 0.7                       | 1.65   | 0.78                       | 1.21  | -0.44  | 4                         | 4                        | 2160                                    | 3564                           | 2160                                   | 2613.6                          | -950.4                                       | -8                | Nonforest      |
| 100                     | 0.8                       | 1.1  | 0.78                       | 1.21  | 0.11   | 4                         | 4                        | 400                                     | 440                            | 400                                    | 484                             | 44   | 0                 | Group 1        |
| 60                      | 0.8                       | 1.1  | 0.78                       | 1.21  | 0.11   | 4                         | 4                        | 240                                     | 264                            | 240                                    | 290.4                           | 26.4   | 0                 |                |
| 510                     | 0.7                       | 1.65   | 0.78                       | 1.21  | -0.44  | 4                         | 4                        | 2040                                    | 3366                           | 2040                                   | 2468.4                          | -897.6                                       | -8                |                |
| 190                     | 0.5                       | 2.75   | 0.78                       | 1.21  | -1.54  | 4                         | 4                        | 760                                     | 2090                           | 760                                    | 919.6                           | -1170.4                                      | -28               |                |
| 120                     | 0.8                       | 1.1  | 0.78                       | 1.21  | 0.11   | 4                         | 4                        | 480                                     | 528                            | 480                                    | 580.8                           | 52.8   | 0                 |                |
| 140                     | 0.7                       | 1.65   | 0.78                       | 1.21  | -0.44  | 4                         | 4                        | 560                                     | 924                            | 560                                    | 677.6                           | -246.4                                       | -8                |                |
| 1160                    | 0.6                       | 2.2  | 0.72                       | 1.54  | -0.66  | 5                         | 5                        | 5800                                    | 12760                          | 5800                                   | 8932                            | -3828  | -12               |                |
| 270                     | 0.5                       | 2.75   | 0.72                       | 1.54  | -1.21  | 5                         | 5                        | 1350                                    | 3712.5                         | 1350                                   | 2079                            | -1633.5                                      | -22               |                |
| 290                     | 0.7                       | 1.65   | 0.72                       | 1.54  | -0.11  | 5                         | 5                        | 1450                                    | 2392.5                         | 1450                                   | 2233                            | -159.5                                       | -2                |                |
|                         |                           |  |                            |   |  |                           |                          | <b>Subtotal</b>                         | <b>23,570</b>                  | <b>36,790</b>                          | <b>22,375</b>                   | <b>-14,415</b>                               | <b>-10</b>        |                |
| AU# ID17010301PN012_03  |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |                |
| 180                     | 0.7                       | 1.65   | 0.6                        | 2.2   | 0.55   | 7                         | 7                        | 1260                                    | 2079                           | 1260                                   | 2772                            | 693  | 0                 |                |
| 420                     | 0.6                       | 2.2  | 0.6                        | 2.2   | 0  | 7                         | 7                        | 2940                                    | 6468                           | 2940                                   | 6468                            | 0  | 0                 |                |
| 720                     | 0.5                       | 2.75   | 0.6                        | 2.2   | -0.55  | 7                         | 7                        | 5040                                    | 13860                          | 5040                                   | 11088                           | -2772  | -10               |                |
| 1400                    | 0.4                       | 3.3  | 0.55                       | 2.475   | -0.825   | 8                         | 8                        | 11200                                   | 36960                          | 11200                                  | 27720                           | -9240  | -15               |                |
| 300                     | 0.5                       | 2.75   | 0.55                       | 2.475   | -0.275   | 8                         | 8                        | 2400                                    | 6600                           | 2400                                   | 5940                            | -660   | -5                |                |
| 180                     | 0.4                       | 3.3  | 0.52                       | 2.64  | -0.66  | 9                         | 9                        | 1620                                    | 5346                           | 1620                                   | 4276.8                          | -1069.2                                      | -12               |                |
| 530                     | 0.5                       | 2.75   | 0.52                       | 2.64  | -0.11  | 9                         | 9                        | 4770                                    | 13117.5                        | 4770                                   | 12592.8                         | -524.7                                       | -2                |                |
| 520                     | 0.4                       | 3.3  | 0.52                       | 2.64  | -0.66  | 9                         | 9                        | 4680                                    | 15444                          | 4680                                   | 12355.2                         | -3088.8                                      | -12               |                |
| 390                     | 0.3                       | 3.85   | 0.48                       | 2.86  | -0.99  | 10                        | 10                       | 3900                                    | 15015                          | 3900                                   | 11154                           | -3861  | -18               |                |
| 240                     | 0.6                       | 2.2  | 0.48                       | 2.86  | 0.66   | 10                        | 10                       | 2400                                    | 5280                           | 2400                                   | 6864                            | 1584   | 0                 |                |
| 390                     | 0.5                       | 2.75   | 0.48                       | 2.86  | 0.11   | 10                        | 10                       | 3900                                    | 10725                          | 3900                                   | 11154                           | 429  | 0                 |                |
| 790                     | 0.4                       | 3.3  | 0.48                       | 2.86  | -0.44  | 10                        | 10                       | 7900                                    | 26070                          | 7900                                   | 22594                           | -3476  | -8                |                |
| 230                     | 0.5                       | 2.75   | 0.45                       | 3.025   | 0.275  | 11                        | 11                       | 2530                                    | 6957.5                         | 2530                                   | 7653.25                         | 695.75                                       | 0                 |                |
| 330                     | 0.6                       | 2.2  | 0.45                       | 3.025   | 0.825  | 11                        | 11                       | 3630                                    | 7986                           | 3630                                   | 10980.75                        | 2994.75                                      | 0                 |                |
| 510                     | 0.5                       | 2.75   | 0.45                       | 3.025   | 0.275  | 11                        | 11                       | 5610                                    | 15427.5                        | 5610                                   | 16970.25                        | 1542.75                                      | 0                 |                |
| 50                      | 0.3                       | 3.85   | 0.45                       | 3.025   | -0.825   | 11                        | 11                       | 550                                     | 2117.5                         | 550                                    | 1663.75                         | -453.75                                      | -15               |                |
| 260                     | 0.3                       | 3.85   | 0.45                       | 3.025   | -0.825   | 11                        | 11                       | 2860                                    | 11011                          | 2860                                   | 8651.5                          | -2359.5                                      | -15               |                |
| 190                     | 0.3                       | 3.85   | 0.45                       | 3.025   | -0.825   | 11                        | 11                       | 2090                                    | 8046.5                         | 2090                                   | 6322.25                         | -1724.25                                     | -15               |                |
| 750                     | 0.4                       | 3.3  | 0.41                       | 3.245   | -0.055   | 12                        | 12                       | 9000                                    | 29700                          | 9000                                   | 29205                           | -495   | -1                |                |
| 300                     | 0.5                       | 2.75   | 0.41                       | 3.245   | 0.495  | 12                        | 12                       | 3600                                    | 9900                           | 3600                                   | 11682                           | 1782   | 0                 |                |
| 320                     | 0.5                       | 2.75   | 0.41                       | 3.245   | 0.495  | 12                        | 12                       | 3840                                    | 10560                          | 3840                                   | 12460.8                         | 1900.8                                       | 0                 |                |
| 1100                    | 0.4                       | 3.3  | 0.41                       | 3.245   | -0.055   | 12                        | 12                       | 13200                                   | 43560                          | 13200                                  | 42834                           | -726   | -1                |                |
| 280                     | 0.5                       | 2.75   | 0.41                       | 3.245   | 0.495  | 12                        | 12                       | 3360                                    | 9240                           | 3360                                   | 10903.2                         | 1663.2                                       | 0                 |                |
| 260                     | 0.4                       | 3.3  | 0.41                       | 3.245   | -0.055   | 12                        | 12                       | 3120                                    | 10296                          | 3120                                   | 10124.4                         | -171.6                                       | -1                |                |
| 170                     | 0.3                       | 3.85   | 0.41                       | 3.245   | -0.605   | 12                        | 12                       | 2040                                    | 7854                           | 2040                                   | 6619.8                          | -1234.2                                      | -11               |                |
| 210                     | 0.5                       | 2.75   | 0.41                       | 3.245   | 0.495  | 12                        | 12                       | 2520                                    | 6930                           | 2520                                   | 8177.4                          | 1247.4                                       | 0                 |                |
| 440                     | 0.3                       | 3.85   | 0.41                       | 3.245   | -0.605   | 12                        | 12                       | 5280                                    | 20328                          | 5280                                   | 17133.6                         | -3194.4                                      | -11               |                |
|                         |                           |  |                            |   |  |                           |                          | <b>Subtotal</b>                         | <b>115,240</b>                 | <b>356,879</b>                         | <b>115,240</b>                  | <b>336,361</b>                               | <b>-20,518</b>    | <b>-6</b>      |
| AU# ID17010301PN010_03  |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |                |
| 600                     | 0.2                       | 4.4  | 0.37                       | 3.465   | -0.935   | 14                        | 14                       | 8400                                    | 36960                          | 8400                                   | 29106                           | -7854  | -17               |                |
| 270                     | 0.3                       | 3.85   | 0.37                       | 3.465   | -0.385   | 14                        | 14                       | 3780                                    | 14553                          | 3780                                   | 13097.7                         | -1455.3                                      | -7                |                |
| 320                     | 0.1                       | 4.95   | 0.37                       | 3.465   | -1.485   | 14                        | 14                       | 4480                                    | 22176                          | 4480                                   | 15523.2                         | -6652.8                                      | -27               |                |
| 210                     | 0.2                       | 4.4  | 0.37                       | 3.465   | -0.935   | 14                        | 14                       | 2940                                    | 12936                          | 2940                                   | 10187.1                         | -2748.9                                      | -17               |                |
| 800                     | 0.5                       | 2.75   | 0.37                       | 3.465   | 0.715  | 14                        | 14                       | 11200                                   | 30800                          | 11200                                  | 38808                           | 8008   | 0                 |                |
| 420                     | 0.4                       | 3.3  | 0.37                       | 3.465   | 0.165  | 14                        | 14                       | 5880                                    | 19404                          | 5880                                   | 20374.2                         | 970.2  | 0                 |                |
| 260                     | 0.6                       | 2.2  | 0.64                       | 1.98  | -0.22  | 14                        | 14                       | 3640                                    | 8008                           | 3640                                   | 7207.2                          | -800.8                                       | -4                | Group B        |
| 1000                    | 0.4                       | 3.3  | 0.37                       | 3.465   | 0.165  | 14                        | 14                       | 14000                                   | 46200                          | 14000                                  | 48510                           | 2310   | 0                 | Group 1        |
| 240                     | 0.2                       | 4.4  | 0.35                       | 3.575   | -0.825   | 15                        | 15                       | 3600                                    | 15840                          | 3600                                   | 12870                           | -2970  | -15               |                |
| 170                     | 0.5                       | 2.75   | 0.35                       | 3.575   | 0.825  | 15                        | 15                       | 2550                                    | 7012.5                         | 2550                                   | 9116.25                         | 2103.75                                      | 0                 |                |
| 120                     | 0.4                       | 3.3  | 0.35                       | 3.575   | 0.275  | 15                        | 15                       | 1800                                    | 5940                           | 1800                                   | 6435                            | 495  | 0                 |                |
| 730                     | 0.6                       | 2.2  | 0.61                       | 2.145   | -0.055   | 15                        | 15                       | 10950                                   | 24090                          | 10950                                  | 23487.75                        | -602.25                                      | -1                | Group B        |
| 1400                    | 0.4                       | 3.3  | 0.35                       | 3.575   | 0.275  | 15                        | 15                       | 21000                                   | 69300                          | 21000                                  | 75075                           | 5775   | 0                 | Group 1        |
| 730                     | 0.3                       | 3.85   | 0.35                       | 3.575   | -0.275   | 15                        | 15                       | 10950                                   | 42157.5                        | 10950                                  | 39146.25                        | -3011.25                                     | -5                |                |
| 880                     | 0.4                       | 3.3  | 0.33                       | 3.685   | 0.385  | 16                        | 16                       | 14080                                   | 46464                          | 14080                                  | 51884.8                         | 5420.8                                       | 0                 |                |
| 540                     | 0.3                       | 3.85   | 0.33                       | 3.685   | -0.165   | 16                        | 16                       | 8640                                    | 33264                          | 8640                                   | 31838.4                         | -1425.6                                      | -3                |                |
| 990                     | 0.4                       | 3.3  | 0.33                       | 3.685   | 0.385  | 16                        | 16                       | 15840                                   | 52272                          | 15840                                  | 58370.4                         | 6098.4                                       | 0                 |                |
| 1200                    | 0.2                       | 4.4  | 0.33                       | 3.685   | -0.715   | 16                        | 16                       | 19200                                   | 84480                          | 19200                                  | 70752                           | -13728                                       | -13               |                |
|                         |                           |  |                            |   |  |                           |                          | <b>Subtotal</b>                         | <b>162,930</b>                 | <b>571,857</b>                         | <b>162,930</b>                  | <b>561,789</b>                               | <b>-10,068</b>    | <b>-6</b>      |
|                         |                           |  |                            |   |  |                           |                          | <b>Total</b>                            | <b>301,740</b>                 | <b>965,525</b>                         | <b>301,740</b>                  | <b>920,525</b>                               | <b>-45,000</b>    | <b>-7</b>      |

**Table F-36. Existing and potential solar loads for Shoshone Creek tributaries.**

| Segment Length (meters) | Existing Shade (fraction) | Existing Summer Load (kWh/m <sup>2</sup> /day) | Potential Shade (fraction) | Potential Summer Load (kWh/m <sup>2</sup> /day) | Potential Load minus Existing load (kWh/m <sup>2</sup> /day) | Existing Stream Width (m) | Natural Stream Width (m) | Existing Segment Area (m <sup>2</sup> ) | Existing Summer Load (kWh/day) | Natural Segment Area (m <sup>2</sup> ) | Potential Summer Load (kWh/day) | Potential Load minus Existing Load (kWh/day) | Lack of Shade (%) | Shoshone Creek Tributaries |
|-------------------------|---------------------------|--|----------------------------|---|--|---------------------------|--------------------------|---|--------------------------------|--|---------------------------------|--|-------------------|----------------------------|
| AU# ID17010301PN012_02  |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |                            |
| 650                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 650                                     | 357.5                          | 650                                    | 71.5                            | -286   | -8                | Forest                     |
| 610                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 610                                     | 671                            | 610                                    | 67.1                            | -603.9                                       | -18               | Group B                    |
| 460                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 460                                     | 253                            | 460                                    | 50.6                            | -202.4                                       | -8                | Group B                    |
| 500                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 500                                     | 275                            | 500                                    | 55                              | -220   | -8                | Group C                    |
| 970                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 970                                     | 533.5                          | 970                                    | 106.7                           | -426.8                                       | -8                | Group B                    |
| 1600                    | 0.9                       | 0.55   | 0.94                       | 0.33  | -0.22  | 2                         | 2                        | 3200                                    | 1760                           | 3200                                   | 1056                            | -704   | -4                | Group A                    |
| 400                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 800                                     | 440                            | 800                                    | 88                              | -352   | -8                | Group B                    |
| 1300                    | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 1300                                    | 1430                           | 1300                                   | 143                             | -1287  | -18               | Hemlock Creek              |
| 760                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 760                                     | 418                            | 760                                    | 83.6                            | -334.4                                       | -8                |                            |
| 460                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 920                                     | 1012                           | 920                                    | 101.2                           | -910.8                                       | -18               |                            |
| 220                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 440                                     | 242                            | 440                                    | 48.4                            | -193.6                                       | -8                |                            |
| 470                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 940                                     | 1034                           | 940                                    | 103.4                           | -930.6                                       | -18               |                            |
| 220                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 440                                     | 242                            | 440                                    | 48.4                            | -193.6                                       | -8                |                            |
| 1500                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1500                                    | 825                            | 1500                                   | 165                             | -660   | -8                |                            |
| 1700                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1700                                    | 935                            | 1700                                   | 187                             | -748   | -8                |                            |
| 2200                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 2200                                    | 1210                           | 2200                                   | 242                             | -968   | -8                |                            |
| 1100                    | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 2200                                    | 2420                           | 2200                                   | 242                             | -2178  | -18               |                            |
| 270                     | 0.9                       | 0.55   | 0.97                       | 0.165   | -0.385   | 3                         | 3                        | 810                                     | 445.5                          | 810                                    | 133.65                          | -311.85                                      | -7                |                            |
| 2000                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 2000                                    | 1100                           | 2000                                   | 220                             | -880   | -8                |                            |
| 320                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 640                                     | 704                            | 640                                    | 70.4                            | -633.6                                       | -18               |                            |
| 700                     | 0.8                       | 1.1  | 0.97                       | 0.165   | -0.935   | 3                         | 3                        | 2100                                    | 2310                           | 2100                                   | 346.5                           | -1963.5                                      | -17               |                            |
| 590                     | 0.8                       | 1.1  | 0.97                       | 0.165   | -0.935   | 3                         | 3                        | 1770                                    | 1947                           | 1770                                   | 292.05                          | -1654.95                                     | -17               |                            |
| 290                     | 0.9                       | 0.55   | 0.97                       | 0.165   | -0.385   | 3                         | 3                        | 870                                     | 478.5                          | 870                                    | 143.55                          | -334.95                                      | -7                |                            |
| 900                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 900                                     | 495                            | 900                                    | 99                              | -396   | -8                |                            |
| 1300                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 2600                                    | 1430                           | 2600                                   | 286                             | -1144  | -8                |                            |
| 910                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 910                                     | 1001                           | 910                                    | 100.1                           | -900.9                                       | -18               |                            |
| 1100                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1100                                    | 605                            | 1100                                   | 121                             | -484   | -8                |                            |
| 780                     | 0.8                       | 1.1  | 0.95                       | 0.275   | -0.825   | 1                         | 1                        | 780                                     | 858                            | 780                                    | 214.5                           | -643.5                                       | -15               |                            |
| 2000                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 4000                                    | 2200                           | 4000                                   | 440                             | -1760  | -8                |                            |
| 400                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 400                                     | 220                            | 400                                    | 44                              | -176   | -8                |                            |
| 2800                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 5600                                    | 3080                           | 5600                                   | 616                             | -2464  | -8                |                            |
| 2000                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 2000                                    | 1100                           | 2000                                   | 220                             | -880   | -8                |                            |
| 2100                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 4200                                    | 2310                           | 4200                                   | 462                             | -1848  | -8                |                            |
| 900                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 900                                     | 495                            | 900                                    | 99                              | -396   | -8                |                            |
| 1700                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1700                                    | 935                            | 1700                                   | 187                             | -748   | -8                |                            |
| 800                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 1600                                    | 880                            | 1600                                   | 176                             | -704   | -8                |                            |
| 610                     | 0.8                       | 1.1  | 0.97                       | 0.165   | -0.935   | 3                         | 3                        | 1830                                    | 2013                           | 1830                                   | 301.95                          | -1711.05                                     | -17               |                            |
| 280                     | 0.9                       | 0.55   | 0.97                       | 0.165   | -0.385   | 3                         | 3                        | 840                                     | 462                            | 840                                    | 138.6                           | -323.4                                       | -7                |                            |

**Table F-36 (cont). Existing and potential solar loads for Shoshone Creek tributaries.**

| Segment Length (meters) | Existing Shade (fraction) | Existing Summer Load (kWh/m <sup>2</sup> /day) | Potential Shade (fraction) | Potential Summer Load (kWh/m <sup>2</sup> /day) | Potential Load minus Existing load (kWh/m <sup>2</sup> /day) | Existing Stream Width (m) | Natural Stream Width (m) | Existing Segment Area (m <sup>2</sup> ) | Existing Summer Load (kWh/day) | Natural Segment Area (m <sup>2</sup> ) | Potential Summer Load (kWh/day) | Potential Load minus Existing Load (kWh/day) | Lack of Shade (%) | Shoshone Creek Tributaries |
|-------------------------|---------------------------|--|----------------------------|---|--|---------------------------|--------------------------|---|--------------------------------|--|---------------------------------|--|-------------------|----------------------------|
| 300                     | 0.9                       | 0.55   | 0.97                       | 0.165   | -0.385   | 2                         | 2                        | 600                                     | 330                            | 600                                    | 99                              | -231   | -7                | Group C SF Hells Gulch     |
| 1300                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 2600                                    | 1430                           | 2600                                   | 286                             | -1144  | -8                | Group B                    |
| 860                     | 0.5                       | 2.75   | 0.95                       | 0.275   | -2.475   | 1                         | 1                        | 860                                     | 2365                           | 860                                    | 236.5                           | -2128.5                                      | -45               | Group A Clinton Creek      |
| 460                     | 0.7                       | 1.65   | 0.95                       | 0.275   | -1.375   | 1                         | 1                        | 460                                     | 759                            | 460                                    | 126.5                           | -632.5                                       | -25               | Group B                    |
| 330                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 330                                     | 181.5                          | 330                                    | 36.3                            | -145.2                                       | -8                | Group B                    |
| 470                     | 0.7                       | 1.65   | 0.98                       | 0.11  | -1.54  | 2                         | 2                        | 940                                     | 1551                           | 940                                    | 103.4                           | -1447.6                                      | -28               | Group B                    |
| 820                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 1640                                    | 902                            | 1640                                   | 180.4                           | -721.6                                       | -8                | Group B                    |
| 370                     | 0.5                       | 2.75   | 0.98                       | 0.11  | -2.64  | 2                         | 2                        | 740                                     | 2035                           | 740                                    | 81.4                            | -1953.6                                      | -48               | Group B                    |
| 1600                    | 0.9                       | 0.55   | 0.97                       | 0.165   | -0.385   | 3                         | 3                        | 4800                                    | 2640                           | 4800                                   | 792                             | -1848  | -7                | Group B                    |
| 600                     | 0.8                       | 1.1  | 0.96                       | 0.22  | -0.88  | 4                         | 4                        | 2400                                    | 2640                           | 2400                                   | 528                             | -2112  | -16               | Group B                    |
| 910                     | 0.7                       | 1.65   | 0.78                       | 1.21  | -0.44  | 4                         | 4                        | 3640                                    | 6006                           | 3640                                   | 4404.4                          | -1601.6                                      | -8                | Nonforest 1                |
| 2000                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 2000                                    | 1100                           | 2000                                   | 220                             | -880   | -8                | Group B                    |
| 1700                    | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 3400                                    | 3740                           | 3400                                   | 374                             | -3366  | -18               | Group B Rampike Creek      |
| 540                     | 0.7                       | 1.65   | 0.97                       | 0.165   | -1.485   | 3                         | 3                        | 1620                                    | 2673                           | 1620                                   | 267.3                           | -2405.7                                      | -27               | Group B                    |
| 690                     | 0.6                       | 2.2  | 0.97                       | 0.165   | -2.035   | 3                         | 3                        | 2070                                    | 4554                           | 2070                                   | 341.55                          | -4212.45                                     | -37               | Group B                    |
| 210                     | 0.7                       | 1.65   | 0.97                       | 0.165   | -1.485   | 3                         | 3                        | 630                                     | 1039.5                         | 630                                    | 103.95                          | -935.55                                      | -27               | Group B                    |
| 200                     | 0.8                       | 1.1  | 0.97                       | 0.165   | -0.935   | 3                         | 3                        | 600                                     | 660                            | 600                                    | 99                              | -561   | -17               | Group B                    |
| 60                      | 0.4                       | 3.3  | 0.86                       | 0.77  | -2.53  | 3                         | 3                        | 180                                     | 594                            | 180                                    | 138.6                           | -455.4                                       | -46               | Nonforest 1                |
| 610                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 610                                     | 671                            | 610                                    | 67.1                            | -603.9                                       | -18               | Group C                    |
| 2000                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 2000                                    | 1100                           | 2000                                   | 220                             | -880   | -8                | Group B Pine Flat Creek    |
| 1100                    | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 2200                                    | 2420                           | 2200                                   | 242                             | -2178  | -18               | Group B                    |
| 550                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 1100                                    | 605                            | 1100                                   | 121                             | -484   | -8                | Group B                    |
| 140                     | 0.7                       | 1.65   | 0.94                       | 0.33  | -1.32  | 2                         | 2                        | 280                                     | 462                            | 280                                    | 92.4                            | -369.6                                       | -24               | Nonforest 1                |
| 450                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 450                                     | 495                            | 450                                    | 49.5                            | -445.5                                       | -18               | Group B                    |
| 1500                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1500                                    | 825                            | 1500                                   | 165                             | -660   | -8                | Group B Cabin Creek        |
| 810                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 1620                                    | 1782                           | 1620                                   | 178.2                           | -1603.8                                      | -18               | Group B                    |
| 1500                    | 0.6                       | 2.2  | 0.98                       | 0.11  | -2.09  | 2                         | 2                        | 3000                                    | 6600                           | 3000                                   | 330                             | -6270  | -38               | Group B                    |
| 510                     | 0.7                       | 1.65   | 0.97                       | 0.165   | -1.485   | 3                         | 3                        | 1530                                    | 2524.5                         | 1530                                   | 252.45                          | -2272.05                                     | -27               | Group B                    |
| 250                     | 0.8                       | 1.1  | 0.97                       | 0.165   | -0.935   | 3                         | 3                        | 750                                     | 825                            | 750                                    | 123.75                          | -701.25                                      | -17               | Group B                    |
| 110                     | 0.9                       | 0.55   | 0.97                       | 0.165   | -0.385   | 3                         | 3                        | 330                                     | 181.5                          | 330                                    | 54.45                           | -127.05                                      | -7                | Group B                    |
| 310                     | 0.8                       | 1.1  | 0.97                       | 0.165   | -0.935   | 3                         | 3                        | 930                                     | 1023                           | 930                                    | 153.45                          | -869.55                                      | -17               | Group B                    |
| 580                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 1160                                    | 638                            | 1160                                   | 127.6                           | -510.4                                       | -8                | Group B SF Cabin Creek     |
| 2500                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 5000                                    | 2750                           | 5000                                   | 550                             | -2200  | -8                | Group B Chute Creek        |
| 730                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 730                                     | 803                            | 730                                    | 80.3                            | -722.7                                       | -18               | Group B Pipe Creek         |
| 2100                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 2100                                    | 1155                           | 2100                                   | 231                             | -924   | -8                | Group B                    |
| <b>Total</b>            |                           |  |                            |   |  |                           |                          | <b>111,940</b>                          | <b>99,187</b>                  | <b>111,940</b>                         | <b>19,027</b>                   | <b>-80,160</b>                               | <b>-14</b>        |                            |

**Table F-37. Existing and potential solar loads for Skookum Creek.**

| Segment Length (meters)              | Existing Shade (fraction) | Existing Summer Load (kWh/m <sup>2</sup> /day) | Potential Shade (fraction) | Potential Summer Load (kWh/m <sup>2</sup> /day) | Potential Load minus Existing load (kWh/m <sup>2</sup> /day) | Existing Stream Width (m) | Natural Stream Width (m) | Existing Segment Area (m <sup>2</sup> ) | Existing Summer Load (kWh/day) | Natural Segment Area (m <sup>2</sup> ) | Potential Summer Load (kWh/day) | Potential Load minus Existing Load (kWh/day) | Lack of Shade (%) | Skookum Creek  |  |
|--------------------------------------|---------------------------|--|----------------------------|---|--|---------------------------|--------------------------|---|--------------------------------|--|---------------------------------|--|-------------------|----------------|--|
| Assessment Unit # ID17010301PN038_02 |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |                |  |
| 2040                                 | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 2040                                    | 1122                           | 2040                                   | 224.4                           | -897.6                                       | -8                | Forest Group B |  |
| 560                                  | 0.7                       | 1.65   | 0.96                       | 0.22  | -1.43  | 3                         | 3                        | 1680                                    | 2772                           | 1680                                   | 369.6                           | -2402.4                                      | -26               |                |  |
| 350                                  | 0.4                       | 3.3  | 0.86                       | 0.77  | -2.53  | 4                         | 3                        | 1400                                    | 4620                           | 1050                                   | 808.5                           | -3811.5                                      | -46               |                |  |
| 430                                  | 0.5                       | 2.75   | 0.78                       | 1.21  | -1.54  | 5                         | 4                        | 2150                                    | 5912.5                         | 1720                                   | 2081.2                          | -3831.3                                      | -28               |                |  |
|                                      |                           |  |                            |   |  |                           |                          | <b>Subtotal</b>                         | <b>7,270</b>                   | <b>14,427</b>                          | <b>6,490</b>                    | <b>3,484</b>                                 | <b>-10,943</b>    | <b>-27</b>     |  |
| Assessment Unit # ID17010301PN038_03 |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |                |  |
| 1110                                 | 0.5                       | 2.75   | 0.94                       | 0.33  | -2.42  | 6                         | 4                        | 6660                                    | 18315                          | 4440                                   | 1465.2                          | -16849.8                                     | -44               | Forest Group B |  |
| 440                                  | 0.4                       | 3.3  | 0.94                       | 0.33  | -2.97  | 7                         | 4                        | 3080                                    | 10164                          | 1760                                   | 580.8                           | -9583.2                                      | -54               |                |  |
|                                      |                           |  |                            |   |  |                           |                          | <b>Subtotal</b>                         | <b>9,740</b>                   | <b>28,479</b>                          | <b>6,200</b>                    | <b>2,046</b>                                 | <b>-26,433</b>    | <b>-49</b>     |  |
|                                      |                           |  |                            |   |  |                           |                          | <b>Total</b>                            | <b>17,010</b>                  | <b>42,906</b>                          | <b>12,690</b>                   | <b>5,530</b>                                 | <b>-37,376</b>    | <b>-34</b>     |  |

**Table F-38. Existing and potential solar loads for Steamboat Creek.**

| Segment Length (meters)              | Existing Shade (fraction) | Existing Summer Load (kWh/m <sup>2</sup> /day) | Potential Shade (fraction) | Potential Summer Load (kWh/m <sup>2</sup> /day) | Potential Load minus Existing load (kWh/m <sup>2</sup> /day) | Existing Stream Width (m) | Natural Stream Width (m) | Existing Segment Area (m <sup>2</sup> ) | Existing Summer Load (kWh/day) | Natural Segment Area (m <sup>2</sup> ) | Potential Summer Load (kWh/day) | Potential Load minus Existing Load (kWh/day) | Lack of Shade (%) | Steamboat Creek   |
|--------------------------------------|---------------------------|--|----------------------------|---|--|---------------------------|--------------------------|---|--------------------------------|--|---------------------------------|--|-------------------|-------------------|
| Assessment Unit # ID17010301PN028_03 |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |                   |
| 930                                  | 0.5                       | 2.75   | 0.52                       | 2.64  | -0.11  | 11                        | 9                        | 10230                                   | 28132.5                        | 8370                                   | 22096.8                         | -6035.7                                      | -2                | Nonforest Group 1 |
| 200                                  | 0.5                       | 2.75   | 0.48                       | 2.86  | 0.11   | 11                        | 10                       | 2200                                    | 6050                           | 2000                                   | 5720                            | -330   | 0                 |                   |
| 280                                  | 0.7                       | 1.65   | 0.48                       | 2.86  | 1.21   | 11                        | 10                       | 3080                                    | 5082                           | 2800                                   | 8008                            | 2926   | 0                 |                   |
| 510                                  | 0.6                       | 2.2  | 0.48                       | 2.86  | 0.66   | 11                        | 10                       | 5610                                    | 12342                          | 5100                                   | 14586                           | 2244   | 0                 |                   |
| 930                                  | 0.5                       | 2.75   | 0.45                       | 3.025   | 0.275  | 11                        | 11                       | 10230                                   | 28132.5                        | 10230                                  | 30945.75                        | 2813.25                                      | 0                 |                   |
| 430                                  | 0.7                       | 1.65   | 0.45                       | 3.025   | 1.375  | 11                        | 11                       | 4730                                    | 7804.5                         | 4730                                   | 14308.25                        | 6503.75                                      | 0                 |                   |
| 1220                                 | 0.5                       | 2.75   | 0.45                       | 3.025   | 0.275  | 12                        | 11                       | 14640                                   | 40260                          | 13420                                  | 40595.5                         | 335.5  | 0                 |                   |
| 540                                  | 0.7                       | 1.65   | 0.45                       | 3.025   | 1.375  | 12                        | 11                       | 6480                                    | 10692                          | 5940                                   | 17968.5                         | 7276.5                                       | 0                 |                   |
| 520                                  | 0.5                       | 2.75   | 0.41                       | 3.245   | 0.495  | 12                        | 12                       | 6240                                    | 17160                          | 6240                                   | 20248.8                         | 3088.8                                       | 0                 |                   |
| 300                                  | 0.4                       | 3.3  | 0.41                       | 3.245   | -0.055   | 12                        | 12                       | 3600                                    | 11880                          | 3600                                   | 11682                           | -198   | -1                |                   |
| 1040                                 | 0.3                       | 3.85   | 0.41                       | 3.245   | -0.605   | 12                        | 12                       | 12480                                   | 48048                          | 12480                                  | 40497.6                         | -7550.4                                      | -11               |                   |
| 570                                  | 0.4                       | 3.3  | 0.41                       | 3.245   | -0.055   | 12                        | 12                       | 6840                                    | 22572                          | 6840                                   | 22195.8                         | -376.2                                       | -1                |                   |
| 770                                  | 0.2                       | 4.4  | 0.41                       | 3.245   | -1.155   | 12                        | 12                       | 9240                                    | 40656                          | 9240                                   | 29983.8                         | -10672.2                                     | -21               |                   |
|                                      |                           |  |                            |   |  |                           |                          | <b>Total</b>                            | <b>95,600</b>                  | <b>278,812</b>                         | <b>90,990</b>                   | <b>278,837</b>                               | <b>25</b>         |                   |

**Table F-39. Existing and potential solar loads for EF Steamboat Creek.**

| Segment Length (meters)              | Existing Shade (fraction) | Existing Summer Load (kWh/m <sup>2</sup> /day) | Potential Shade (fraction) | Potential Summer Load (kWh/m <sup>2</sup> /day) | Potential Load minus Existing load (kWh/m <sup>2</sup> /day) | Existing Stream Width (m) | Natural Stream Width (m) | Existing Segment Area (m <sup>2</sup> ) | Existing Summer Load (kWh/day) | Natural Segment Area (m <sup>2</sup> ) | Potential Summer Load (kWh/day) | Potential Load minus Existing Load (kWh/day) | Lack of Shade (%) | EF Steamboat Creek |  |
|--------------------------------------|---------------------------|--|----------------------------|---|--|---------------------------|--------------------------|---|--------------------------------|--|---------------------------------|--|-------------------|--------------------|--|
| Assessment Unit # ID17010301PN028_02 |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |                    |  |
| 680                                  | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 680                                     | 374                            | 680                                    | 74.8                            | -299.2                                       | -8                | Forest Group B     |  |
| 980                                  | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 1960                                    | 1078                           | 1960                                   | 215.6                           | -862.4                                       | -8                |                    |  |
| 290                                  | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 580                                     | 638                            | 580                                    | 63.8                            | -574.2                                       | -18               |                    |  |
| 1760                                 | 0.7                       | 1.65   | 0.96                       | 0.22  | -1.43  | 3                         | 3                        | 5280                                    | 8712                           | 5280                                   | 1161.6                          | -7550.4                                      | -26               |                    |  |
| 1460                                 | 0.7                       | 1.65   | 0.94                       | 0.33  | -1.32  | 4                         | 4                        | 5840                                    | 9636                           | 5840                                   | 1927.2                          | -7708.8                                      | -24               |                    |  |
| 270                                  | 0.9                       | 0.55   | 0.91                       | 0.495   | -0.055   | 5                         | 5                        | 1350                                    | 742.5                          | 1350                                   | 668.25                          | -74.25                                       | -1                |                    |  |
| 370                                  | 0.8                       | 1.1  | 0.91                       | 0.495   | -0.605   | 5                         | 5                        | 1850                                    | 2035                           | 1850                                   | 915.75                          | -1119.25                                     | -11               |                    |  |
| 780                                  | 0.9                       | 0.55   | 0.91                       | 0.495   | -0.055   | 5                         | 5                        | 3900                                    | 2145                           | 3900                                   | 1930.5                          | -214.5                                       | -1                |                    |  |
| 360                                  | 0.7                       | 1.65   | 0.65                       | 1.925   | 0.275  | 6                         | 6                        | 2160                                    | 3564                           | 2160                                   | 4158                            | 594  | 0                 | Nonforest Group 1  |  |
| 1010                                 | 0.5                       | 2.75   | 0.65                       | 1.925   | -0.825   | 6                         | 6                        | 6060                                    | 16665                          | 6060                                   | 11665.5                         | -4999.5                                      | -15               |                    |  |
| 780                                  | 0.6                       | 2.2  | 0.65                       | 1.925   | -0.275   | 6                         | 6                        | 4680                                    | 10296                          | 4680                                   | 9009                            | -1287  | -5                |                    |  |
|                                      |                           |  |                            |   |  |                           |                          | <b>Total</b>                            | <b>34,340</b>                  | <b>55,886</b>                          | <b>34,340</b>                   | <b>31,790</b>                                | <b>-24,096</b>    | <b>-11</b>         |  |

**Table F-40. Existing and potential solar loads for WF Steamboat Creek.**

| Segment Length (meters)              | Existing Shade (fraction) | Existing Summer Load (kWh/m <sup>2</sup> /day) | Potential Shade (fraction) | Potential Summer Load (kWh/m <sup>2</sup> /day) | Potential Load minus Existing load (kWh/m <sup>2</sup> /day) | Existing Stream Width (m) | Natural Stream Width (m) | Existing Segment Area (m <sup>2</sup> ) | Existing Summer Load (kWh/day) | Natural Segment Area (m <sup>2</sup> ) | Potential Summer Load (kWh/day) | Potential Load minus Existing Load (kWh/day) | Lack of Shade (%) | WF Steamboat Creek |  |
|--------------------------------------|---------------------------|--|----------------------------|---|--|---------------------------|--------------------------|---|--------------------------------|--|---------------------------------|--|-------------------|--------------------|--|
| Assessment Unit # ID17010301PN028_02 |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |                    |  |
| 530                                  | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 530                                     | 291.5                          | 530                                    | 58.3                            | -233.2                                       | -8                | Forest Group B     |  |
| 1070                                 | 0.7                       | 1.65   | 0.98                       | 0.11  | -1.54  | 2                         | 2                        | 2140                                    | 3531                           | 2140                                   | 235.4                           | -3295.6                                      | -28               |                    |  |
| 340                                  | 0.8                       | 1.1  | 0.96                       | 0.22  | -0.88  | 3                         | 3                        | 1020                                    | 1122                           | 1020                                   | 224.4                           | -897.6                                       | -16               |                    |  |
| 720                                  | 0.7                       | 1.65   | 0.96                       | 0.22  | -1.43  | 3                         | 3                        | 2160                                    | 3564                           | 2160                                   | 475.2                           | -3088.8                                      | -26               |                    |  |
| 1430                                 | 0.9                       | 0.55   | 0.94                       | 0.33  | -0.22  | 4                         | 4                        | 5720                                    | 3146                           | 5720                                   | 1887.6                          | -1258.4                                      | -4                |                    |  |
|                                      |                           |  |                            |   |  |                           |                          | <b>Subtotal</b>                         | <b>11,570</b>                  | <b>11,655</b>                          | <b>11,570</b>                   | <b>2,881</b>                                 | <b>-8,774</b>     | <b>-16</b>         |  |
| Assessment Unit # ID17010301PN028_03 |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |                    |  |
| 390                                  | 0.8                       | 1.1  | 0.72                       | 1.54  | 0.44   | 5                         | 5                        | 1950                                    | 2145                           | 1950                                   | 3003                            | 858  | 0                 | Nonforest Group 1  |  |
| 1790                                 | 0.7                       | 1.65   | 0.65                       | 1.925   | 0.275  | 6                         | 6                        | 10740                                   | 17721                          | 10740                                  | 20674.5                         | 2953.5                                       | 0                 |                    |  |
| 670                                  | 0.6                       | 2.2  | 0.65                       | 1.925   | -0.275   | 6                         | 6                        | 4020                                    | 8844                           | 4020                                   | 7738.5                          | -1105.5                                      | -5                |                    |  |
|                                      |                           |  |                            |   |  |                           |                          | <b>Subtotal</b>                         | <b>16,710</b>                  | <b>28,710</b>                          | <b>16,710</b>                   | <b>31,416</b>                                | <b>2,706</b>      | <b>-2</b>          |  |
|                                      |                           |  |                            |   |  |                           |                          | <b>Total</b>                            | <b>28,280</b>                  | <b>40,365</b>                          | <b>28,280</b>                   | <b>34,297</b>                                | <b>-6,068</b>     | <b>-11</b>         |  |

**Table F-41. Existing and potential solar loads for Steamboat Creek tributaries.**

| Segment Length (meters) | Existing Shade (fraction) | Existing Summer Load (kWh/m <sup>2</sup> /day) | Potential Shade (fraction) | Potential Summer Load (kWh/m <sup>2</sup> /day) | Potential Load minus Existing load (kWh/m <sup>2</sup> /day) | Existing Stream Width (m) | Natural Stream Width (m) | Existing Segment Area (m <sup>2</sup> ) | Existing Summer Load (kWh/day) | Natural Segment Area (m <sup>2</sup> ) | Potential Summer Load (kWh/day) | Potential Load minus Existing Load (kWh/day) | Lack of Shade (%) | Steamboat Creek Tributaries |                |
|-------------------------|---------------------------|--|----------------------------|---|--|---------------------------|--------------------------|---|--------------------------------|--|---------------------------------|--|-------------------|-----------------------------|----------------|
| AU# ID17010301PN028_02  |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |                             |                |
| 1500                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1500                                    | 825                            | 1500                                   | 165                             | -660   | -8                | Forest Group B              | Martin Creek   |
| 440                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 440                                     | 484                            | 440                                    | 48.4                            | -435.6                                       | -18               |                             | Clay Creek     |
| 1600                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 3200                                    | 1760                           | 3200                                   | 352                             | -1408  | -8                |                             | Cabin Creek    |
| 2800                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 5600                                    | 3080                           | 5600                                   | 616                             | -2464  | -8                |                             | Little EF      |
| 3900                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 7800                                    | 4290                           | 7800                                   | 858                             | -3432  | -8                |                             | Steamboat      |
| 1000                    | 0.8                       | 1.1  | 0.97                       | 0.165   | -0.935   | 3                         | 3                        | 3000                                    | 3300                           | 3000                                   | 495                             | -2805  | -17               |                             | Long Tom Creek |
| 1800                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1800                                    | 990                            | 1800                                   | 198                             | -792   | -8                |                             | Betty Creek    |
| 350                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 350                                     | 385                            | 350                                    | 38.5                            | -346.5                                       | -18               |                             |                |
| 680                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 680                                     | 374                            | 680                                    | 74.8                            | -299.2                                       | -8                |                             |                |
| 380                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 380                                     | 418                            | 380                                    | 41.8                            | -376.2                                       | -18               |                             |                |
| 380                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 380                                     | 209                            | 380                                    | 41.8                            | -167.2                                       | -8                |                             |                |
| 1100                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1100                                    | 605                            | 1100                                   | 121                             | -484   | -8                | Un-named                    |                |
| 110                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 220                                     | 242                            | 220                                    | 24.2                            | -217.8                                       | -18               |                             |                |
| 680                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 1360                                    | 748                            | 1360                                   | 149.6                           | -598.4                                       | -8                |                             |                |
| 590                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 590                                     | 324.5                          | 590                                    | 64.9                            | -259.6                                       | -8                | Comfy Creek                 |                |
| 250                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 250                                     | 275                            | 250                                    | 27.5                            | -247.5                                       | -18               |                             |                |
| 180                     | 0.7                       | 1.65   | 0.98                       | 0.11  | -1.54  | 1                         | 1                        | 180                                     | 297                            | 180                                    | 19.8                            | -277.2                                       | -28               |                             |                |
| 340                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 680                                     | 748                            | 680                                    | 74.8                            | -673.2                                       | -18               |                             |                |
| 540                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 1080                                    | 594                            | 1080                                   | 118.8                           | -475.2                                       | -8                |                             |                |
| 1600                    | 0.8                       | 1.1  | 0.97                       | 0.165   | -0.935   | 3                         | 3                        | 4800                                    | 5280                           | 4800                                   | 792                             | -4488  | -17               |                             |                |
| 1200                    | 0.7                       | 1.65   | 0.96                       | 0.22  | -1.43  | 4                         | 4                        | 4800                                    | 7920                           | 4800                                   | 1056                            | -6864  | -26               |                             |                |
| 230                     | 0.7                       | 1.65   | 0.96                       | 0.22  | -1.43  | 4                         | 4                        | 920                                     | 1518                           | 920                                    | 202.4                           | -1315.6                                      | -26               |                             |                |
| 1700                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1700                                    | 935                            | 1700                                   | 187                             | -748   | -8                | Clark Gulch                 |                |
| 1800                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1800                                    | 990                            | 1800                                   | 198                             | -792   | -8                | Black Canyon                |                |
| 490                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 980                                     | 1078                           | 980                                    | 107.8                           | -970.2                                       | -18               |                             |                |
| 490                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 490                                     | 269.5                          | 490                                    | 53.9                            | -215.6                                       | -8                | Boston Brook                |                |
| 310                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 310                                     | 341                            | 310                                    | 34.1                            | -306.9                                       | -18               |                             |                |
| 860                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 860                                     | 473                            | 860                                    | 94.6                            | -378.4                                       | -8                |                             |                |
| 2100                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 2100                                    | 1155                           | 2100                                   | 231                             | -924   | -8                | June Creek                  |                |
| 750                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 750                                     | 825                            | 750                                    | 82.5                            | -742.5                                       | -18               | Group C                     |                |
| 1800                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 3600                                    | 1980                           | 3600                                   | 396                             | -1584  | -8                | Group B                     |                |
| 1600                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 3200                                    | 1760                           | 3200                                   | 352                             | -1408  | -8                | Can Creek                   |                |
| 3200                    | 0.9                       | 0.55   | 0.97                       | 0.165   | -0.385   | 3                         | 3                        | 9600                                    | 5280                           | 9600                                   | 1584                            | -3696  | -7                |                             |                |
| 960                     | 0.8                       | 1.1  | 0.96                       | 0.22  | -0.88  | 4                         | 4                        | 3840                                    | 4224                           | 3840                                   | 844.8                           | -3379.2                                      | -16               |                             |                |
| 250                     | 0.8                       | 1.1  | 0.96                       | 0.22  | -0.88  | 4                         | 4                        | 1000                                    | 1100                           | 1000                                   | 220                             | -880   | -16               |                             |                |
| 1500                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1500                                    | 825                            | 1500                                   | 165                             | -660   | -8                | Felder Creek                |                |
| 310                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 620                                     | 682                            | 620                                    | 68.2                            | -613.8                                       | -18               |                             |                |
| 1700                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1700                                    | 935                            | 1700                                   | 187                             | -748   | -8                | 2nd to Can                  |                |
| 1100                    | 0.9                       | 0.55   | 0.95                       | 0.275   | -0.275   | 1                         | 1                        | 1100                                    | 605                            | 1100                                   | 302.5                           | -302.5                                       | -5                | Group A                     |                |
| 1800                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 3600                                    | 1980                           | 3600                                   | 396                             | -1584  | -8                | Group B                     |                |
| 240                     | 0.8                       | 1.1  | 0.97                       | 0.165   | -0.935   | 3                         | 3                        | 720                                     | 792                            | 720                                    | 118.8                           | -673.2                                       | -17               | Barrymore Creek             |                |
| 600                     | 0.9                       | 0.55   | 0.97                       | 0.165   | -0.385   | 3                         | 3                        | 1800                                    | 990                            | 1800                                   | 297                             | -693   | -7                |                             |                |
| 2600                    | 0.8                       | 1.1  | 0.96                       | 0.22  | -0.88  | 4                         | 4                        | 10400                                   | 11440                          | 10400                                  | 2288                            | -9152  | -16               |                             |                |
| 600                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 600                                     | 330                            | 600                                    | 66                              | -264   | -8                | Group C                     |                |
| 3200                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 6400                                    | 3520                           | 6400                                   | 704                             | -2816  | -8                | Group B                     |                |
| 210                     | 0.8                       | 1.1  | 0.97                       | 0.165   | -0.935   | 3                         | 3                        | 630                                     | 693                            | 630                                    | 103.95                          | -589.05                                      | -17               |                             |                |
| 1900                    | 0.8                       | 1.1  | 0.97                       | 0.165   | -0.935   | 3                         | 3                        | 5700                                    | 6270                           | 5700                                   | 940.5                           | -5329.5                                      | -17               |                             |                |
| 2100                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 4200                                    | 2310                           | 4200                                   | 462                             | -1848  | -8                | 1st to Indian               |                |
| 2600                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 2600                                    | 1430                           | 2600                                   | 286                             | -1144  | -8                | Omaha Creek                 |                |
| 860                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 1720                                    | 1892                           | 1720                                   | 189.2                           | -1702.8                                      | -18               |                             |                |
| 3400                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 3400                                    | 1870                           | 3400                                   | 374                             | -1496  | -8                | Eighty Day Cr               |                |
| <b>Total</b>            |                           |  |                            |   |  |                           |                          |   | <b>118,030</b>                 | <b>91,641</b>                          | <b>118,030</b>                  | <b>16,914</b>                                | <b>-74,727</b>    | <b>-13</b>                  |                |

**Table F-42. Existing and potential solar loads for Stewart Creek and tributaries.**

| Segment Length (meters) | Existing Shade (fraction) | Existing Summer Load (kWh/m <sup>2</sup> /day) | Potential Shade (fraction) | Potential Summer Load (kWh/m <sup>2</sup> /day) | Potential Load minus Existing load (kWh/m <sup>2</sup> /day) | Existing Stream Width (m) | Natural Stream Width (m) | Existing Segment Area (m <sup>2</sup> ) | Existing Summer Load (kWh/day) | Natural Segment Area (m <sup>2</sup> ) | Potential Summer Load (kWh/day) | Potential Load minus Existing Load (kWh/day) | Lack of Shade (%) | Stewart Creek     |
|-------------------------|---------------------------|--|----------------------------|---|--|---------------------------|--------------------------|---|--------------------------------|--|---------------------------------|--|-------------------|-------------------|
| AU# ID17010301PN019_02  |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |                   |
| 1600                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1600                                    | 880                            | 1600                                   | 176                             | -704   | -8                | Forest Group B    |
| 1800                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1800                                    | 990                            | 1800                                   | 198                             | -792   | -8                |                   |
| 1700                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1700                                    | 935                            | 1700                                   | 187                             | -748   | -8                |                   |
| 1600                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1600                                    | 880                            | 1600                                   | 176                             | -704   | -8                |                   |
| 1800                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1800                                    | 990                            | 1800                                   | 198                             | -792   | -8                |                   |
| 2100                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 2100                                    | 1155                           | 2100                                   | 231                             | -924   | -8                | Stewart Creek     |
| 350                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 700                                     | 770                            | 700                                    | 77                              | -693   | -18               |                   |
| 1100                    | 0.8                       | 1.1  | 0.97                       | 0.165   | -0.935   | 3                         | 3                        | 3300                                    | 3630                           | 3300                                   | 544.5                           | -3085.5                                      | -17               |                   |
| 540                     | 0.7                       | 1.65   | 0.86                       | 0.77  | -0.88  | 3                         | 3                        | 1620                                    | 2673                           | 1620                                   | 1247.4                          | -1425.6                                      | -16               |                   |
| 3000                    | 0.7                       | 1.65   | 0.78                       | 1.21  | -0.44  | 4                         | 4                        | 12000                                   | 19800                          | 12000                                  | 14520                           | -5280  | -8                |                   |
| AU# ID17010301PN019_03  |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |                   |
| 40                      | 0.7                       | 1.65   | 0.78                       | 1.21  | -0.44  | 4                         | 4                        | 160                                     | 264                            | 160                                    | 193.6                           | -70.4  | -8                | Nonforest Group 1 |
| <b>Total</b>            |                           |  |                            |   |  |                           |                          | <b>28,380</b>                           | <b>32,967</b>                  | <b>28,380</b>                          | <b>17,749</b>                   | <b>-15,219</b>                               | <b>-10</b>        |                   |

**Table F-43. Existing and potential solar loads for Upper Tepee Creek (AU# 020\_02).**

| Segment Length (meters)              | Existing Shade (fraction) | Existing Summer Load (kWh/m <sup>2</sup> /day) | Potential Shade (fraction) | Potential Summer Load (kWh/m <sup>2</sup> /day) | Potential Load minus Existing load (kWh/m <sup>2</sup> /day) | Existing Stream Width (m) | Natural Stream Width (m) | Existing Segment Area (m <sup>2</sup> ) | Existing Summer Load (kWh/day) | Natural Segment Area (m <sup>2</sup> ) | Potential Summer Load (kWh/day) | Potential Load minus Existing Load (kWh/day) | Lack of Shade (%) | Tepee Creek       |
|--------------------------------------|---------------------------|--|----------------------------|---|--|---------------------------|--------------------------|---|--------------------------------|--|---------------------------------|--|-------------------|-------------------|
| Assessment Unit # ID17010301PN020_02 |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |                   |
| 540                                  | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 540                                     | 297                            | 540                                    | 59.4                            | -237.6                                       | -8                | Nonforest Group 1 |
| 740                                  | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 740                                     | 814                            | 740                                    | 81.4                            | -732.6                                       | -18               |                   |
| 520                                  | 0.7                       | 1.65   | 0.98                       | 0.11  | -1.54  | 1                         | 1                        | 520                                     | 858                            | 520                                    | 57.2                            | -800.8                                       | -28               |                   |
| 1870                                 | 0.8                       | 1.1  | 0.94                       | 0.33  | -0.77  | 2                         | 2                        | 3740                                    | 4114                           | 3740                                   | 1234.2                          | -2879.8                                      | -14               |                   |
| 1360                                 | 0.7                       | 1.65   | 0.86                       | 0.77  | -0.88  | 3                         | 3                        | 4080                                    | 6732                           | 4080                                   | 3141.6                          | -3590.4                                      | -16               |                   |
| 1520                                 | 0.5                       | 2.75   | 0.86                       | 0.77  | -1.98  | 3                         | 3                        | 4560                                    | 12540                          | 4560                                   | 3511.2                          | -9028.8                                      | -36               |                   |
| <b>Total</b>                         |                           |  |                            |   |  |                           |                          | <b>14,180</b>                           | <b>25,355</b>                  | <b>14,180</b>                          | <b>8,085</b>                    | <b>-17,270</b>                               | <b>-20</b>        |                   |

**Table F-44. Existing and potential solar loads for Tepee Creek (AU# 020\_03).**

| Segment Length (meters)              | Existing Shade (fraction) | Existing Summer Load (kWh/m <sup>2</sup> /day) | Potential Shade (fraction) | Potential Summer Load (kWh/m <sup>2</sup> /day) | Potential Load minus Existing load (kWh/m <sup>2</sup> /day) | Existing Stream Width (m) | Natural Stream Width (m) | Existing Segment Area (m <sup>2</sup> ) | Existing Summer Load (kWh/day) | Natural Segment Area (m <sup>2</sup> ) | Potential Summer Load (kWh/day) | Potential Load minus Existing Load (kWh/day) | Lack of Shade (%) | Tepee Creek       |  |
|--------------------------------------|---------------------------|--|----------------------------|---|--|---------------------------|--------------------------|---|--------------------------------|--|---------------------------------|--|-------------------|-------------------|--|
| Assessment Unit # ID17010301PN020_03 |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |                   |  |
| 1450                                 | 0.4                       | 3.3  | 0.78                       | 1.21  | -2.09  | 4                         | 4                        | 5800                                    | 19140                          | 5800                                   | 7018                            | -12122                                       | -38               | Nonforest Group 1 |  |
| 280                                  | 0.6                       | 2.2  | 0.72                       | 1.54  | -0.66  | 5                         | 5                        | 1400                                    | 3080                           | 1400                                   | 2156                            | -924   | -12               |                   |  |
| 250                                  | 0.5                       | 2.75   | 0.72                       | 1.54  | -1.21  | 5                         | 5                        | 1250                                    | 3437.5                         | 1250                                   | 1925                            | -1512.5                                      | -22               |                   |  |
| 300                                  | 0.6                       | 2.2  | 0.72                       | 1.54  | -0.66  | 6                         | 5                        | 1800                                    | 3960                           | 1500                                   | 2310                            | -1650  | -12               |                   |  |
| 580                                  | 0.4                       | 3.3  | 0.65                       | 1.925   | -1.38  | 7                         | 6                        | 4060                                    | 13398                          | 3480                                   | 6699                            | -6699  | -25               |                   |  |
| 380                                  | 0.5                       | 2.75   | 0.65                       | 1.925   | -0.83  | 8                         | 6                        | 3040                                    | 8360                           | 2280                                   | 4389                            | -3971  | -15               |                   |  |
| 280                                  | 0.6                       | 2.2  | 0.6                        | 2.2   | 0.00   | 8                         | 7                        | 2240                                    | 4928                           | 1960                                   | 4312                            | -616   | 0                 |                   |  |
| 630                                  | 0.3                       | 3.85   | 0.6                        | 2.2   | -1.65  | 9                         | 7                        | 5670                                    | 21829.5                        | 4410                                   | 9702                            | -12127.5                                     | -30               |                   |  |
| 1850                                 | 0                         | 5.5  | 0.52                       | 2.64  | -2.86  | 11                        | 9                        | 20350                                   | 111925                         | 16650                                  | 43956                           | -67969                                       | -52               |                   |  |
| 140                                  | 0.1                       | 4.95   | 0.45                       | 3.025   | -1.93  | 13                        | 11                       | 1820                                    | 9009                           | 1540                                   | 4658.5                          | -4350.5                                      | -35               |                   |  |
| 1330                                 | 0                         | 5.5  | 0.41                       | 3.245   | -2.26  | 14                        | 12                       | 18620                                   | 102410                         | 15960                                  | 51790.2                         | -50619.8                                     | -41               |                   |  |
| <b>Total</b>                         |                           |  |                            |   |  |                           |                          | <b>66,050</b>                           | <b>301,477</b>                 | <b>56,230</b>                          | <b>138,916</b>                  | <b>-162,561</b>                              | <b>-26</b>        |                   |  |

**Table F-45. Existing and potential solar loads for Tepee Creek (AU# 017\_04).**

| Segment Length (meters)              | Existing Shade (fraction) | Existing Summer Load (kWh/m <sup>2</sup> /day) | Potential Shade (fraction) | Potential Summer Load (kWh/m <sup>2</sup> /day) | Potential Load minus Existing load (kWh/m <sup>2</sup> /day) | Existing Stream Width (m) | Natural Stream Width (m) | Existing Segment Area (m <sup>2</sup> ) | Existing Summer Load (kWh/day) | Natural Segment Area (m <sup>2</sup> ) | Potential Summer Load (kWh/day) | Potential Load minus Existing Load (kWh/day) | Lack of Shade (%) | Tepee Creek       |
|--------------------------------------|---------------------------|--|----------------------------|---|--|---------------------------|--------------------------|---|--------------------------------|--|---------------------------------|--|-------------------|-------------------|
| Assessment Unit # ID17010301PN017_04 |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |                   |
| 190                                  | 0.1                       | 4.95   | 0.41                       | 3.245   | -1.71  | 14                        | 12                       | 2660                                    | 13167                          | 2280                                   | 7398.6                          | -5768.4                                      | -31               | Nonforest Group 1 |
| 2950                                 | 0.1                       | 4.95   | 0.37                       | 3.465   | -1.49  | 16                        | 14                       | 47200                                   | 233640                         | 41300                                  | 143104.5                        | -90535.5                                     | -27               |                   |
| 1060                                 | 0.1                       | 4.95   | 0.35                       | 3.575   | -1.38  | 17                        | 15                       | 18020                                   | 89199                          | 15900                                  | 56842.5                         | -32356.5                                     | -25               |                   |
| 160                                  | 0                         | 5.5  | 0.35                       | 3.575   | -1.93  | 17                        | 15                       | 2720                                    | 14960                          | 2400                                   | 8580                            | -6380  | -35               |                   |
| 300                                  | 0.1                       | 4.95   | 0.35                       | 3.575   | -1.38  | 17                        | 15                       | 5100                                    | 25245                          | 4500                                   | 16087.5                         | -9157.5                                      | -25               |                   |
| 140                                  | 0                         | 5.5  | 0.33                       | 3.685   | -1.82  | 18                        | 16                       | 2520                                    | 13860                          | 2240                                   | 8254.4                          | -5605.6                                      | -33               |                   |
| 180                                  | 0.1                       | 4.95   | 0.33                       | 3.685   | -1.27  | 18                        | 16                       | 3240                                    | 16038                          | 2880                                   | 10612.8                         | -5425.2                                      | -23               |                   |
| 440                                  | 0                         | 5.5  | 0.33                       | 3.685   | -1.82  | 18                        | 16                       | 7920                                    | 43560                          | 7040                                   | 25942.4                         | -17617.6                                     | -33               |                   |
| 1010                                 | 0.1                       | 4.95   | 0.33                       | 3.685   | -1.27  | 18                        | 16                       | 18180                                   | 89991                          | 16160                                  | 59549.6                         | -30441.4                                     | -23               |                   |
|                                      |                           |  |                            |   |  |                           |                          | <b>Total</b>                            | <b>107,560</b>                 | <b>539,660</b>                         | <b>94,700</b>                   | <b>336,372</b>                               | <b>-203,288</b>   |                   |

**Table F-46. Existing and potential solar loads for Lower Tepee Creek (AU# 017\_05).**

| Segment Length (meters)              | Existing Shade (fraction) | Existing Summer Load (kWh/m <sup>2</sup> /day) | Potential Shade (fraction) | Potential Summer Load (kWh/m <sup>2</sup> /day) | Potential Load minus Existing load (kWh/m <sup>2</sup> /day) | Existing Stream Width (m) | Natural Stream Width (m) | Existing Segment Area (m <sup>2</sup> ) | Existing Summer Load (kWh/day) | Natural Segment Area (m <sup>2</sup> ) | Potential Summer Load (kWh/day) | Potential Load minus Existing Load (kWh/day) | Lack of Shade (%) | Tepee Creek       |
|--------------------------------------|---------------------------|--|----------------------------|---|--|---------------------------|--------------------------|---|--------------------------------|--|---------------------------------|--|-------------------|-------------------|
| Assessment Unit # ID17010301PN017_05 |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |                   |
| 320                                  | 0                         | 5.5  | 0.29                       | 3.905   | -1.60  | 19                        | 17                       | 6080                                    | 33440                          | 5440                                   | 21243.2                         | -12196.8                                     | -29               | Nonforest Group 2 |
| 290                                  | 0.1                       | 4.95   | 0.29                       | 3.905   | -1.05  | 19                        | 17                       | 5510                                    | 27274.5                        | 4930                                   | 19251.65                        | -8022.85                                     | -19               |                   |
| 500                                  | 0                         | 5.5  | 0.29                       | 3.905   | -1.60  | 19                        | 17                       | 9500                                    | 52250                          | 8500                                   | 33192.5                         | -19057.5                                     | -29               |                   |
| 480                                  | 0.1                       | 4.95   | 0.28                       | 3.96  | -0.99  | 20                        | 18                       | 9600                                    | 47520                          | 8640                                   | 34214.4                         | -13305.6                                     | -18               |                   |
| 240                                  | 0                         | 5.5  | 0.28                       | 3.96  | -1.54  | 20                        | 18                       | 4800                                    | 26400                          | 4320                                   | 17107.2                         | -9292.8                                      | -28               |                   |
| 1030                                 | 0.1                       | 4.95   | 0.27                       | 4.015   | -0.94  | 21                        | 19                       | 21630                                   | 107068.5                       | 19570                                  | 78573.55                        | -28494.95                                    | -17               |                   |
| 180                                  | 0                         | 5.5  | 0.25                       | 4.125   | -1.38  | 22                        | 20                       | 3960                                    | 21780                          | 3600                                   | 14850                           | -6930  | -25               |                   |
| 1060                                 | 0.1                       | 4.95   | 0.25                       | 4.125   | -0.83  | 22                        | 20                       | 23320                                   | 115434                         | 21200                                  | 87450                           | -27984                                       | -15               |                   |
| 3330                                 | 0                         | 5.5  | 0.24                       |   |  | 25                        | 23                       | 83250                                   | 457875                         | 76590                                  | 0                               | -457875                                      | -24               |                   |
|                                      |                           |  |                            |   |  |                           |                          | <b>Total</b>                            | <b>167,650</b>                 | <b>889,042</b>                         | <b>152,790</b>                  | <b>305,883</b>                               | <b>-583,160</b>   |                   |

**Table F-47. Existing and potential solar loads for Tepee Creek tributaries.**

| Segment Length (meters) | Existing Shade (fraction) | Existing Summer Load (kWh/m <sup>2</sup> /day) | Potential Shade (fraction) | Potential Summer Load (kWh/m <sup>2</sup> /day) | Potential Load minus Existing load (kWh/m <sup>2</sup> /day) | Existing Stream Width (m) | Natural Stream Width (m) | Existing Segment Area (m <sup>2</sup> ) | Existing Summer Load (kWh/day) | Natural Segment Area (m <sup>2</sup> ) | Potential Summer Load (kWh/day) | Potential Load minus Existing Load (kWh/day) | Lack of Shade (%) | Tepee Creek Tributaries |                   |
|-------------------------|---------------------------|--|----------------------------|---|--|---------------------------|--------------------------|---|--------------------------------|--|---------------------------------|--|-------------------|-------------------------|-------------------|
| AU# ID17010301PN020_02  |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |                         |                   |
| 1200                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1200                                    | 660                            | 1200                                   | 132                             | -528   | -8                | Forest<br>Group B       | 1st un-named      |
| 750                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 750                                     | 825                            | 750                                    | 82.5                            | -742.5                                       | -18               |                         |                   |
| 2100                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 4200                                    | 2310                           | 4200                                   | 462                             | -1848  | -8                |                         |                   |
| 1700                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1700                                    | 935                            | 1700                                   | 187                             | -748   | -8                |                         |                   |
| 330                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 660                                     | 726                            | 660                                    | 72.6                            | -653.4                                       | -18               |                         |                   |
| 1700                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1700                                    | 935                            | 1700                                   | 187                             | -748   | -8                |                         |                   |
| 940                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 940                                     | 517                            | 940                                    | 103.4                           | -413.6                                       | -8                |                         |                   |
| 250                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 500                                     | 550                            | 500                                    | 55                              | -495   | -18               |                         |                   |
| 2000                    | 0.8                       | 1.1  | 0.86                       | 0.77  | -0.33  | 3                         | 3                        | 6000                                    | 6600                           | 6000                                   | 4620                            | -1980  | -6                |                         |                   |
| 490                     | 0.7                       | 1.65   | 0.86                       | 0.77  | -0.88  | 3                         | 3                        | 1470                                    | 2425.5                         | 1470                                   | 1131.9                          | -1293.6                                      | -16               |                         |                   |
| Nonforest               |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |                         |                   |
| 1600                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 3200                                    | 1760                           | 3200                                   | 352                             | -1408  | -8                | Group B                 | 1st to Little Elk |
| 1100                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1100                                    | 605                            | 1100                                   | 121                             | -484   | -8                |                         |                   |
| 310                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 310                                     | 341                            | 310                                    | 34.1                            | -306.9                                       | -18               | Group B                 | 2nd to Little Elk |
| 1800                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 3600                                    | 1980                           | 3600                                   | 396                             | -1584  | -8                |                         |                   |
| 160                     | 0.8                       | 1.1  | 0.94                       | 0.33  | -0.77  | 2                         | 2                        | 320                                     | 352                            | 320                                    | 105.6                           | -246.4                                       | -14               | Group 1                 | Little Elk Creek  |
| 1500                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1500                                    | 825                            | 1500                                   | 165                             | -660   | -8                |                         |                   |
| 1200                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 2400                                    | 1320                           | 2400                                   | 264                             | -1056  | -8                | Group B                 | Little Elk Creek  |
| 740                     | 0.8                       | 1.1  | 0.97                       | 0.165   | -0.935   | 3                         | 3                        | 2220                                    | 2442                           | 2220                                   | 366.3                           | -2075.7                                      | -17               |                         |                   |
| 470                     | 0.8                       | 1.1  | 0.86                       | 0.77  | -0.33  | 3                         | 3                        | 1410                                    | 1551                           | 1410                                   | 1085.7                          | -465.3                                       | -6                | Group 1                 | Drexall Creek     |
| 1000                    | 0.7                       | 1.65   | 0.78                       | 1.21  | -0.44  | 4                         | 4                        | 4000                                    | 6600                           | 4000                                   | 4840                            | -1760  | -8                |                         |                   |
| 360                     | 0.8                       | 1.1  | 0.78                       | 1.21  | 0.11   | 4                         | 4                        | 1440                                    | 1584                           | 1440                                   | 1742.4                          | 158.4  | 0                 | Group B                 | Drexall Creek     |
| 1600                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1600                                    | 880                            | 1600                                   | 176                             | -704   | -8                |                         |                   |
| 2000                    | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 2000                                    | 2200                           | 2000                                   | 220                             | -1980  | -18               | Group B                 | Drexall Creek     |
| 190                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 190                                     | 104.5                          | 190                                    | 20.9                            | -83.6  | -8                |                         |                   |
| 1600                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1600                                    | 880                            | 1600                                   | 176                             | -704   | -8                | Group B                 | Drexall Creek     |
| 1900                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1900                                    | 1045                           | 1900                                   | 209                             | -836   | -8                |                         |                   |
| 2100                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 2100                                    | 1155                           | 2100                                   | 231                             | -924   | -8                | Group B                 | Drexall Creek     |
| 2300                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 4600                                    | 2530                           | 4600                                   | 506                             | -2024  | -8                |                         |                   |
| 700                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 1400                                    | 1540                           | 1400                                   | 154                             | -1386  | -18               | Group 1                 | Drexall Creek     |
| 690                     | 0.8                       | 1.1  | 0.86                       | 0.77  | -0.33  | 3                         | 3                        | 2070                                    | 2277                           | 2070                                   | 1593.9                          | -683.1                                       | -6                |                         |                   |
| 610                     | 0.7                       | 1.65   | 0.86                       | 0.77  | -0.88  | 3                         | 3                        | 1830                                    | 3019.5                         | 1830                                   | 1409.1                          | -1610.4                                      | -16               | Group 1                 | Drexall Creek     |
| 340                     | 0.5                       | 2.75   | 0.86                       | 0.77  | -1.98  | 3                         | 3                        | 1020                                    | 2805                           | 1020                                   | 785.4                           | -2019.6                                      | -36               |                         |                   |
| 280                     | 0.7                       | 1.65   | 0.78                       | 1.21  | -0.44  | 4                         | 4                        | 1120                                    | 1848                           | 1120                                   | 1355.2                          | -492.8                                       | -8                | Group 1                 | Drexall Creek     |
| 550                     | 0.8                       | 1.1  | 0.78                       | 1.21  | 0.11   | 4                         | 4                        | 2200                                    | 2420                           | 2200                                   | 2662                            | 242  | 0                 |                         |                   |
| 1010                    | 0.8                       | 1.1  | 0.78                       | 1.21  | 0.11   | 4                         | 4                        | 4040                                    | 4444                           | 4040                                   | 4888.4                          | 444.4  | 0                 | Group B                 | Drexall Creek     |
| 2100                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 2100                                    | 1155                           | 2100                                   | 231                             | -924   | -8                |                         |                   |
| 1300                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1300                                    | 715                            | 1300                                   | 143                             | -572   | -8                | Group B                 | Drexall Creek     |
| 1800                    | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 3600                                    | 3960                           | 3600                                   | 396                             | -3564  | -18               |                         |                   |
| 90                      | 0.9                       | 0.55   | 0.94                       | 0.33  | -0.22  | 2                         | 2                        | 180                                     | 99                             | 180                                    | 59.4                            | -39.6  | -4                | Group 1                 | Drexall Creek     |
| 1400                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1400                                    | 770                            | 1400                                   | 154                             | -616   | -8                |                         |                   |
| 600                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 1200                                    | 1320                           | 1200                                   | 132                             | -1188  | -18               | Group B                 | Drexall Creek     |
| 470                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 940                                     | 517                            | 940                                    | 103.4                           | -413.6                                       | -8                |                         |                   |
| 170                     | 0.7                       | 1.65   | 0.94                       | 0.33  | -1.32  | 2                         | 2                        | 340                                     | 561                            | 340                                    | 112.2                           | -448.8                                       | -24               | Group 1                 | Drexall Creek     |
| <b>Total</b>            |                           |  |                            |   |  |                           |                          |   | <b>79,010</b>                  | <b>71,528</b>                          | <b>79,010</b>                   | <b>32,111</b>                                | <b>-39,416</b>    |                         |                   |

**Table F-48. Existing and potential solar loads for Trail Creek.**

| Segment Length (meters)              | Existing Shade (fraction) | Existing Summer Load (kWh/m <sup>2</sup> /day) | Potential Shade (fraction) | Potential Summer Load (kWh/m <sup>2</sup> /day) | Potential Load minus Existing load (kWh/m <sup>2</sup> /day) | Existing Stream Width (m) | Natural Stream Width (m) | Existing Segment Area (m <sup>2</sup> ) | Existing Summer Load (kWh/day) | Natural Segment Area (m <sup>2</sup> ) | Potential Summer Load (kWh/day) | Potential Load minus Existing Load (kWh/day) | Lack of Shade (%) | Trail Creek       |  |
|--------------------------------------|---------------------------|--|----------------------------|---|--|---------------------------|--------------------------|---|--------------------------------|--|---------------------------------|--|-------------------|-------------------|--|
| Assessment Unit # ID17010301PN019_03 |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |                   |  |
| 590                                  | 0.6                       | 2.2  | 0.65                       | 1.925   | -0.28  | 14                        | 6                        | 8260                                    | 18172                          | 3540                                   | 6814.5                          | -11357.5                                     | -5                | Nonforest Group 1 |  |
| 240                                  | 0.7                       | 1.65   | 0.6                        | 2.2   | 0.55   | 15                        | 7                        | 3600                                    | 5940                           | 1680                                   | 3696                            | -2244  | 0                 |                   |  |
| 1900                                 | 0.6                       | 2.2  | 0.55                       | 2.475   | 0.27   | 16                        | 8                        | 30400                                   | 66880                          | 15200                                  | 37620                           | -29260                                       | 0                 |                   |  |
| 1160                                 | 0.3                       | 3.85   | 0.55                       | 2.475   | -1.38  | 16                        | 8                        | 18560                                   | 71456                          | 9280                                   | 22968                           | -48488                                       | -25               |                   |  |
| 280                                  | 0.4                       | 3.3  | 0.55                       | 2.475   | -0.83  | 16                        | 8                        | 4480                                    | 14784                          | 2240                                   | 5544                            | -9240  | -15               |                   |  |
| 700                                  | 0.3                       | 3.85   | 0.55                       | 2.475   | -1.38  | 16                        | 8                        | 11200                                   | 43120                          | 5600                                   | 13860                           | -29260                                       | -25               |                   |  |
| 470                                  | 0.2                       | 4.4  | 0.52                       | 2.64  | -1.76  | 16                        | 9                        | 7520                                    | 33088                          | 4230                                   | 11167.2                         | -21920.8                                     | -32               |                   |  |
| 2130                                 | 0                         | 5.5  | 0.52                       | 2.64  | -2.86  | 16                        | 9                        | 34080                                   | 187440                         | 19170                                  | 50608.8                         | -136831.2                                    | -52               |                   |  |
| 680                                  | 0.1                       | 4.95   | 0.52                       | 2.64  | -2.31  | 16                        | 9                        | 10880                                   | 53856                          | 6120                                   | 16156.8                         | -37699.2                                     | -42               |                   |  |
| 370                                  | 0                         | 5.5  | 0.52                       | 2.64  | -2.86  | 16                        | 9                        | 5920                                    | 32560                          | 3330                                   | 8791.2                          | -23768.8                                     | -52               |                   |  |
| 230                                  | 0.1                       | 4.95   | 0.52                       | 2.64  | -2.31  | 16                        | 9                        | 3680                                    | 18216                          | 2070                                   | 5464.8                          | -12751.2                                     | -42               |                   |  |
| 1350                                 | 0                         | 5.5  | 0.48                       | 2.86  | -2.64  | 16                        | 10                       | 21600                                   | 118800                         | 13500                                  | 38610                           | -80190                                       | -48               |                   |  |
| <b>Total</b>                         |                           |  |                            |   |  |                           |                          | <b>160,180</b>                          | <b>664,312</b>                 | <b>85,960</b>                          | <b>221,301</b>                  | <b>-443,011</b>                              | <b>-28</b>        |                   |  |

**Table F-49. Existing and potential solar loads for Trail Creek tributaries.**

| Segment Length (meters) | Existing Shade (fraction) | Existing Summer Load (kWh/m <sup>2</sup> /day) | Potential Shade (fraction) | Potential Summer Load (kWh/m <sup>2</sup> /day) | Potential Load minus Existing load (kWh/m <sup>2</sup> /day) | Existing Stream Width (m) | Natural Stream Width (m) | Existing Segment Area (m <sup>2</sup> ) | Existing Summer Load (kWh/day) | Natural Segment Area (m <sup>2</sup> ) | Potential Summer Load (kWh/day) | Potential Load minus Existing Load (kWh/day) | Lack of Shade (%) | Trail Creek Tributaries |                      |
|-------------------------|---------------------------|--|----------------------------|---|--|---------------------------|--------------------------|---|--------------------------------|--|---------------------------------|--|-------------------|-------------------------|----------------------|
| AU# ID17010301PN019_02  |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |                         |                      |
| 1800                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1800                                    | 990                            | 1800                                   | 198                             | -792   | -8                | Forest Group B          |                      |
| 700                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 1400                                    | 1540                           | 1400                                   | 154                             | -1386  | -18               |                         | Coon Gulch           |
| 1700                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1700                                    | 935                            | 1700                                   | 187                             | -748   | -8                |                         | Hamilton Creek       |
| 1000                    | 0.7                       | 1.65   | 0.98                       | 0.11  | -1.54  | 2                         | 2                        | 2000                                    | 3300                           | 2000                                   | 220                             | -3080  | -28               |                         | Dresser Creek        |
| 230                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 460                                     | 506                            | 460                                    | 50.6                            | -455.4                                       | -18               |                         |                      |
| 170                     | 0.2                       | 4.4  | 0.98                       | 0.11  | -4.29  | 2                         | 2                        | 340                                     | 1496                           | 340                                    | 37.4                            | -1458.6                                      | -78               |                         |                      |
| 840                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 840                                     | 462                            | 840                                    | 92.4                            | -369.6                                       | -8                |                         |                      |
| 590                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 590                                     | 649                            | 590                                    | 64.9                            | -584.1                                       | -18               |                         |                      |
| 910                     | 0.7                       | 1.65   | 0.98                       | 0.11  | -1.54  | 2                         | 2                        | 1820                                    | 3003                           | 1820                                   | 200.2                           | -2802.8                                      | -28               |                         |                      |
| 290                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 580                                     | 638                            | 580                                    | 63.8                            | -574.2                                       | -18               |                         | West Bear Creek      |
| 60                      | 0.5                       | 2.75   | 0.98                       | 0.11  | -2.64  | 2                         | 2                        | 120                                     | 330                            | 120                                    | 13.2                            | -316.8                                       | -48               |                         |                      |
| 1300                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1300                                    | 715                            | 1300                                   | 143                             | -572   | -8                |                         |                      |
| 230                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 460                                     | 253                            | 460                                    | 50.6                            | -202.4                                       | -8                |                         | 1st to W. Bear Creek |
| 760                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 1520                                    | 1672                           | 1520                                   | 167.2                           | -1504.8                                      | -18               |                         |                      |
| 230                     | 0.7                       | 1.65   | 0.98                       | 0.11  | -1.54  | 2                         | 2                        | 460                                     | 759                            | 460                                    | 50.6                            | -708.4                                       | -28               |                         |                      |
| 1700                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1700                                    | 935                            | 1700                                   | 187                             | -748   | -8                |                         |                      |
| 1200                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1200                                    | 660                            | 1200                                   | 132                             | -528   | -8                |                         |                      |
| 490                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 490                                     | 539                            | 490                                    | 53.9                            | -485.1                                       | -18               |                         |                      |
| 180                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 180                                     | 99                             | 180                                    | 19.8                            | -79.2  | -8                |                         |                      |
| 390                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 780                                     | 858                            | 780                                    | 85.8                            | -772.2                                       | -18               |                         |                      |
| 770                     | 0.7                       | 1.65   | 0.98                       | 0.11  | -1.54  | 2                         | 2                        | 1540                                    | 2541                           | 1540                                   | 169.4                           | -2371.6                                      | -28               |                         |                      |
| 270                     | 0.6                       | 2.2  | 0.98                       | 0.11  | -2.09  | 2                         | 2                        | 540                                     | 1188                           | 540                                    | 59.4                            | -1128.6                                      | -38               |                         |                      |
| 590                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 1180                                    | 1298                           | 1180                                   | 129.8                           | -1168.2                                      | -18               |                         |                      |
| 620                     | 0.7                       | 1.65   | 0.98                       | 0.11  | -1.54  | 2                         | 2                        | 1240                                    | 2046                           | 1240                                   | 136.4                           | -1909.6                                      | -28               |                         |                      |
| 450                     | 0.6                       | 2.2  | 0.97                       | 0.165   | -2.035   | 3                         | 3                        | 1350                                    | 2970                           | 1350                                   | 222.75                          | -2747.25                                     | -37               |                         |                      |
| 170                     | 0.7                       | 1.65   | 0.97                       | 0.165   | -1.485   | 3                         | 3                        | 510                                     | 841.5                          | 510                                    | 84.15                           | -757.35                                      | -27               |                         |                      |
| 90                      | 0.5                       | 2.75   | 0.86                       | 0.77  | -1.98  | 3                         | 3                        | 270                                     | 742.5                          | 270                                    | 207.9                           | -534.6                                       | -36               | Nonforest Group 1       |                      |
| 80                      | 0.7                       | 1.65   | 0.86                       | 0.77  | -0.88  | 3                         | 3                        | 240                                     | 396                            | 240                                    | 184.8                           | -211.2                                       | -16               |                         |                      |
| 100                     | 0.5                       | 2.75   | 0.86                       | 0.77  | -1.98  | 3                         | 3                        | 300                                     | 825                            | 300                                    | 231                             | -594   | -36               |                         |                      |
| 110                     | 0.8                       | 1.1  | 0.86                       | 0.77  | -0.33  | 3                         | 3                        | 330                                     | 363                            | 330                                    | 254.1                           | -108.9                                       | -6                |                         |                      |
|                         |                           |  |                            |   |  | <b>Total</b>              |                          | <b>27,240</b>                           | <b>33,550</b>                  | <b>27,240</b>                          | <b>3,851</b>                    | <b>-29,699</b>                               | <b>-22</b>        |                         |                      |

**Table F-50. Existing and Potential solar loads for Yellow Dog Creek and tributaries.**

| Segment Length (meters) | Existing Shade (fraction) | Existing Summer Load (kWh/m <sup>2</sup> /day) | Potential Shade (fraction) | Potential Summer Load (kWh/m <sup>2</sup> /day) | Potential Load minus Existing load (kWh/m <sup>2</sup> /day) | Existing Stream Width (m) | Natural Stream Width (m) | Existing Segment Area (m <sup>2</sup> ) | Existing Summer Load (kWh/day) | Natural Segment Area (m <sup>2</sup> ) | Potential Summer Load (kWh/day) | Potential Load minus Existing Load (kWh/day) | Lack of Shade (%) | Yellow Dog Creek  |                   |                   |
|-------------------------|---------------------------|--|----------------------------|---|--|---------------------------|--------------------------|---|--------------------------------|--|---------------------------------|--|-------------------|-------------------|-------------------|-------------------|
| AU# ID17010301PN024_02  |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |                   |                   |                   |
| 1300                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1300                                    | 715                            | 1300                                   | 143                             | -572   | -8                | Forest Group B    | 1st to Yellow Dog |                   |
| 290                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 290                                     | 319                            | 290                                    | 31.9                            | -287.1                                       | -18               |                   |                   |                   |
| 410                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 410                                     | 225.5                          | 410                                    | 45.1                            | -180.4                                       | -8                |                   |                   |                   |
| 1000                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1000                                    | 550                            | 1000                                   | 110                             | -440   | -8                |                   |                   | 2nd to Yellow Dog |
| 670                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 1340                                    | 1474                           | 1340                                   | 147.4                           | -1326.6                                      | -18               |                   |                   |                   |
| 1200                    | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 1200                                    | 1320                           | 1200                                   | 132                             | -1188  | -18               |                   |                   | 3rd to Yellow Dog |
| 2300                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 4600                                    | 2530                           | 4600                                   | 506                             | -2024  | -8                |                   |                   |                   |
| 1300                    | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 1300                                    | 1430                           | 1300                                   | 143                             | -1287  | -18               |                   |                   | 4th to Yellow Dog |
| 370                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 370                                     | 203.5                          | 370                                    | 40.7                            | -162.8                                       | -8                |                   |                   |                   |
| 310                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 310                                     | 170.5                          | 310                                    | 34.1                            | -136.4                                       | -8                |                   |                   | Ash Creek         |
| 310                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 310                                     | 341                            | 310                                    | 34.1                            | -306.9                                       | -18               |                   |                   |                   |
| 910                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 1820                                    | 1001                           | 1820                                   | 200.2                           | -800.8                                       | -8                | Yellow Dog Creek  |                   |                   |
| 1000                    | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 2000                                    | 2200                           | 2000                                   | 220                             | -1980  | -18               |                   |                   |                   |
| 390                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 390                                     | 429                            | 390                                    | 42.9                            | -386.1                                       | -18               |                   |                   |                   |
| 190                     | 0.7                       | 1.65   | 0.98                       | 0.11  | -1.54  | 1                         | 1                        | 190                                     | 313.5                          | 190                                    | 20.9                            | -292.6                                       | -28               |                   |                   |                   |
| 180                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 180                                     | 198                            | 180                                    | 19.8                            | -178.2                                       | -18               |                   |                   |                   |
| 1100                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 2200                                    | 1210                           | 2200                                   | 242                             | -968   | -8                |                   |                   |                   |
| 890                     | 0.9                       | 0.55   | 0.97                       | 0.165   | -0.385   | 3                         | 3                        | 2670                                    | 1468.5                         | 2670                                   | 440.55                          | -1027.95                                     | -7                |                   |                   |                   |
| 210                     | 0.9                       | 0.55   | 0.97                       | 0.165   | -0.385   | 3                         | 3                        | 630                                     | 346.5                          | 630                                    | 103.95                          | -242.55                                      | -7                |                   |                   |                   |
| 500                     | 0.9                       | 0.55   | 0.96                       | 0.22  | -0.33  | 4                         | 4                        | 2000                                    | 1100                           | 2000                                   | 440                             | -660   | -6                |                   |                   |                   |
| 240                     | 0.9                       | 0.55   | 0.96                       | 0.22  | -0.33  | 4                         | 4                        | 960                                     | 528                            | 960                                    | 211.2                           | -316.8                                       | -6                |                   |                   |                   |
| 600                     | 0.7                       | 1.65   | 0.96                       | 0.22  | -1.43  | 4                         | 4                        | 2400                                    | 3960                           | 2400                                   | 528                             | -3432  | -26               |                   |                   |                   |
| 200                     | 0.9                       | 0.55   | 0.96                       | 0.22  | -0.33  | 4                         | 4                        | 800                                     | 440                            | 800                                    | 176                             | -264   | -6                |                   |                   |                   |
| 200                     | 0.8                       | 1.1  | 0.78                       | 1.21  | 0.11   | 4                         | 4                        | 800                                     | 880                            | 800                                    | 968                             | 88   | 0                 | Nonforest Group 1 |                   |                   |
| 810                     | 0.7                       | 1.65   | 0.78                       | 1.21  | -0.44  | 4                         | 4                        | 3240                                    | 5346                           | 3240                                   | 3920.4                          | -1425.6                                      | -8                |                   |                   |                   |
| 490                     | 0.6                       | 2.2  | 0.72                       | 1.54  | -0.66  | 5                         | 5                        | 2450                                    | 5390                           | 2450                                   | 3773                            | -1617  | -12               | Group B           |                   |                   |
| 2100                    | 0.8                       | 1.1  | 0.94                       | 0.33  | -0.77  | 5                         | 5                        | 10500                                   | 11550                          | 10500                                  | 3465                            | -8085  | -14               |                   |                   |                   |
| <b>Total</b>            |                           |  |                            |   |  |                           |                          |   | <b>45,660</b>                  | <b>45,639</b>                          | <b>45,660</b>                   | <b>16,139</b>                                | <b>-29,500</b>    | <b>-12</b>        |                   |                   |

**Table F-51. Existing and potential solar loads for Little North Fork Coeur d'Alene River headwaters (AU# 030\_02).**

| Segment Length (meters)              | Existing Shade (fraction) | Existing Summer Load (kWh/m <sup>2</sup> /day) | Potential Shade (fraction) | Potential Summer Load (kWh/m <sup>2</sup> /day) | Potential Load minus Existing load (kWh/m <sup>2</sup> /day) | Existing Stream Width (m) | Natural Stream Width (m) | Existing Segment Area (m <sup>2</sup> ) | Existing Summer Load (kWh/day) | Natural Segment Area (m <sup>2</sup> ) | Potential Summer Load (kWh/day) | Potential Load minus Existing Load (kWh/day) | Lack of Shade (%) | Little NF Coeur d'Alene River |                      |
|--------------------------------------|---------------------------|--|----------------------------|---|--|---------------------------|--------------------------|---|--------------------------------|--|---------------------------------|--|-------------------|-------------------------------|----------------------|
| Assessment Unit # ID17010301PN030_02 |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |                               |                      |
| 2210                                 | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 2210                                    | 1215.5                         | 2210                                   | 243.1                           | -972.4                                       | -8                | Forest Group B                | Headwaters Little NF |
| 710                                  | 0.8                       | 1.1  | 0.96                       | 0.22  | -0.88  | 3                         | 3                        | 2130                                    | 2343                           | 2130                                   | 468.6                           | -1874.4                                      | -16               |                               |                      |
| 190                                  | 0.9                       | 0.55   | 0.96                       | 0.22  | -0.33  | 3                         | 3                        | 570                                     | 313.5                          | 570                                    | 125.4                           | -188.1                                       | -6                |                               |                      |
| 2070                                 | 0.8                       | 1.1  | 0.78                       | 1.21  | 0.11   | 4                         | 4                        | 8280                                    | 9108                           | 8280                                   | 10018.8                         | 910.8  | 0                 | Nonforest Group 1             |                      |
| 730                                  | 0.7                       | 1.65   | 0.72                       | 1.54  | -0.11  | 5                         | 5                        | 3650                                    | 6022.5                         | 3650                                   | 5621                            | -401.5                                       | -2                |                               |                      |
| 420                                  | 0.9                       | 0.55   | 0.72                       | 1.54  | 0.99   | 5                         | 5                        | 2100                                    | 1155                           | 2100                                   | 3234                            | 2079   | 0                 |                               |                      |
| 370                                  | 0.7                       | 1.65   | 0.72                       | 1.54  | -0.11  | 5                         | 5                        | 1850                                    | 3052.5                         | 1850                                   | 2849                            | -203.5                                       | -2                |                               |                      |
| 340                                  | 0.9                       | 0.55   | 0.65                       | 1.925   | 1.38   | 6                         | 6                        | 2040                                    | 1122                           | 2040                                   | 3927                            | 2805   | 0                 |                               |                      |
| <b>Total</b>                         |                           |  |                            |   |  |                           |                          |   | <b>22,830</b>                  | <b>24,332</b>                          | <b>22,830</b>                   | <b>26,487</b>                                | <b>2,155</b>      | <b>-4</b>                     |                      |

**Table F-52. Existing and potential solar loads for Little North Fork Coeur d'Alene River tributaries (AU# 030\_02a).**

| Segment Length (meters)               | Existing Shade (fraction) | Existing Summer Load (kWh/m <sup>2</sup> /day) | Potential Shade (fraction) | Potential Summer Load (kWh/m <sup>2</sup> /day) | Potential Load minus Existing load (kWh/m <sup>2</sup> /day) | Existing Stream Width (m) | Natural Stream Width (m) | Existing Segment Area (m <sup>2</sup> ) | Existing Summer Load (kWh/day) | Natural Segment Area (m <sup>2</sup> ) | Potential Summer Load (kWh/day) | Potential Load minus Existing Load (kWh/day) | Lack of Shade (%) | Little NF Coeur d'Alene River Tributaries |                   |
|---------------------------------------|---------------------------|--|----------------------------|---|--|---------------------------|--------------------------|---|--------------------------------|--|---------------------------------|--|-------------------|---|-------------------|
| Assessment Unit # ID17010301PN030_02a |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |   |                   |
| 1760                                  | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1760                                    | 968                            | 1760                                   | 193.6                           | -774.4                                       | -8                | Forest Group B                            | Honey Creek       |
| 420                                   | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 840                                     | 924                            | 840                                    | 92.4                            | -831.6                                       | -18               |   |                   |
| 450                                   | 0.7                       | 1.65   | 0.98                       | 0.11  | -1.54  | 2                         | 2                        | 900                                     | 1485                           | 900                                    | 99                              | -1386  | -28               |   |                   |
| 630                                   | 0.7                       | 1.65   | 0.98                       | 0.11  | -1.54  | 2                         | 2                        | 1260                                    | 2079                           | 1260                                   | 138.6                           | -1940.4                                      | -28               | Nonforest 1                               | 1st Trib to Honey |
| 970                                   | 0.8                       | 1.1  | 0.86                       | 0.77  | -0.33  | 3                         | 3                        | 2910                                    | 3201                           | 2910                                   | 2240.7                          | -960.3                                       | -6                |   |                   |
| 960                                   | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 960                                     | 528                            | 960                                    | 105.6                           | -422.4                                       | -8                | Forest Group B                            | Prospect Creek    |
| 240                                   | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 240                                     | 264                            | 240                                    | 26.4                            | -237.6                                       | -18               |   |                   |
| 220                                   | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 220                                     | 121                            | 220                                    | 24.2                            | -96.8  | -8                |   |                   |
| 360                                   | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 360                                     | 198                            | 360                                    | 39.6                            | -158.4                                       | -8                | Nonforest Group 1                         | Sob Creek         |
| 520                                   | 0.7                       | 1.65   | 0.98                       | 0.11  | -1.54  | 1                         | 1                        | 520                                     | 858                            | 520                                    | 57.2                            | -800.8                                       | -28               |   |                   |
| 190                                   | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 190                                     | 104.5                          | 190                                    | 20.9                            | -83.6  | -8                |   |                   |
| 160                                   | 0.7                       | 1.65   | 0.98                       | 0.11  | -1.54  | 1                         | 1                        | 160                                     | 264                            | 160                                    | 17.6                            | -246.4                                       | -28               | Nonforest Group 1                         | Solitaire Creek   |
| 460                                   | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 460                                     | 253                            | 460                                    | 50.6                            | -202.4                                       | -8                |   |                   |
| 560                                   | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 560                                     | 308                            | 560                                    | 61.6                            | -246.4                                       | -8                |   |                   |
| 710                                   | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 710                                     | 781                            | 710                                    | 78.1                            | -702.9                                       | -18               | Nonforest Group 1                         | EF Solitaire      |
| 1410                                  | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 2820                                    | 1551                           | 2820                                   | 310.2                           | -1240.8                                      | -8                |   |                   |
| 280                                   | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 560                                     | 616                            | 560                                    | 61.6                            | -554.4                                       | -18               |   |                   |
| 140                                   | 0.7                       | 1.65   | 0.86                       | 0.77  | -0.88  | 3                         | 3                        | 420                                     | 693                            | 420                                    | 323.4                           | -369.6                                       | -16               | Nonforest Group 1                         | WF Solitaire      |
| 470                                   | 0.8                       | 1.1  | 0.86                       | 0.77  | -0.33  | 3                         | 3                        | 1410                                    | 1551                           | 1410                                   | 1085.7                          | -465.3                                       | -6                |   |                   |
| 110                                   | 0.7                       | 1.65   | 0.86                       | 0.77  | -0.88  | 3                         | 3                        | 330                                     | 544.5                          | 330                                    | 254.1                           | -290.4                                       | -16               |   |                   |
| 470                                   | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 470                                     | 517                            | 470                                    | 51.7                            | -465.3                                       | -18               | Forest Group B                            | Tom Lavin Creek   |
| 1720                                  | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 3440                                    | 1892                           | 3440                                   | 378.4                           | -1513.6                                      | -8                |   |                   |
| 800                                   | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 1600                                    | 1760                           | 1600                                   | 176                             | -1584  | -18               |   |                   |
| 2230                                  | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 2230                                    | 1226.5                         | 2230                                   | 245.3                           | -981.2                                       | -8                | Group C                                   | Lewelling Creek   |
| 440                                   | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 880                                     | 968                            | 880                                    | 96.8                            | -871.2                                       | -18               |   |                   |
| 1670                                  | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1670                                    | 918.5                          | 1670                                   | 183.7                           | -734.8                                       | -8                |   |                   |
| 1100                                  | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 2200                                    | 2420                           | 2200                                   | 242                             | -2178  | -18               | Forest Group B                            |                   |
| 1140                                  | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 2280                                    | 1254                           | 2280                                   | 250.8                           | -1003.2                                      | -8                |   |                   |
| 420                                   | 0.8                       | 1.1  | 0.96                       | 0.22  | -0.88  | 3                         | 3                        | 1260                                    | 1386                           | 1260                                   | 277.2                           | -1108.8                                      | -16               |   |                   |
| 700                                   | 0.9                       | 0.55   | 0.96                       | 0.22  | -0.33  | 3                         | 3                        | 2100                                    | 1155                           | 2100                                   | 462                             | -693   | -6                |   |                   |
| 2990                                  | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 5980                                    | 3289                           | 5980                                   | 657.8                           | -2631.2                                      | -8                |   |                   |
| 1170                                  | 0.8                       | 1.1  | 0.96                       | 0.22  | -0.88  | 3                         | 3                        | 3510                                    | 3861                           | 3510                                   | 772.2                           | -3088.8                                      | -16               |   |                   |
| 220                                   | 0.9                       | 0.55   | 0.96                       | 0.22  | -0.33  | 3                         | 3                        | 660                                     | 363                            | 660                                    | 145.2                           | -217.8                                       | -6                |   |                   |
|                                       |                           |  |                            |   |  |                           | <b>Total</b>             | <b>45,870</b>                           | <b>38,302</b>                  | <b>45,870</b>                          | <b>9,220</b>                    | <b>-29,082</b>                               | <b>-14</b>        |   |                   |

**Table F-53. Existing and potential solar loads for Little North Fork Coeur d'Alene River tributaries (AU# 030\_02b).**

| Segment Length (meters)               | Existing Shade (fraction) | Existing Summer Load (kWh/m <sup>2</sup> /day) | Potential Shade (fraction) | Potential Summer Load (kWh/m <sup>2</sup> /day) | Potential Load minus Existing load (kWh/m <sup>2</sup> /day) | Existing Stream Width (m) | Natural Stream Width (m) | Existing Segment Area (m <sup>2</sup> ) | Existing Summer Load (kWh/day) | Natural Segment Area (m <sup>2</sup> ) | Potential Summer Load (kWh/day) | Potential Load minus Existing Load (kWh/day) | Lack of Shade (%) | Little NF Coeur d'Alene River Tributaries |                   |
|---------------------------------------|---------------------------|--|----------------------------|---|--|---------------------------|--------------------------|---|--------------------------------|--|---------------------------------|--|-------------------|---|-------------------|
| Assessment Unit # ID17010301PN030_02b |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |   |                   |
| 1420                                  | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1420                                    | 781                            | 1420                                   | 156.2                           | -624.8                                       | -8                | Forest Group B                            |                   |
| 1720                                  | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1720                                    | 946                            | 1720                                   | 189.2                           | -756.8                                       | -8                |   | Trib to WF Hudlow |
| 170                                   | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 340                                     | 187                            | 340                                    | 37.4                            | -149.6                                       | -8                |   | WF Hudlow Creek   |
| 1430                                  | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 2860                                    | 3146                           | 2860                                   | 314.6                           | -2831.4                                      | -18               |   | MF Hudlow Creek   |
| 460                                   | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 460                                     | 253                            | 460                                    | 50.6                            | -202.4                                       | -8                |   |                   |
| 170                                   | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 170                                     | 187                            | 170                                    | 18.7                            | -168.3                                       | -18               |   |                   |
| 890                                   | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 890                                     | 489.5                          | 890                                    | 97.9                            | -391.6                                       | -8                |   |                   |
| 680                                   | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 1360                                    | 1496                           | 1360                                   | 149.6                           | -1346.4                                      | -18               |   |                   |
| 160                                   | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 320                                     | 176                            | 320                                    | 35.2                            | -140.8                                       | -8                |   | EF Hudlow Creek   |
| 850                                   | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 1700                                    | 1870                           | 1700                                   | 187                             | -1683  | -18               |   |                   |
| 300                                   | 0.9                       | 0.55   | 0.96                       | 0.22  | -0.33  | 3                         | 3                        | 900                                     | 495                            | 900                                    | 198                             | -297   | -6                |   |                   |
| 1190                                  | 0.8                       | 1.1  | 0.96                       | 0.22  | -0.88  | 3                         | 3                        | 3570                                    | 3927                           | 3570                                   | 785.4                           | -3141.6                                      | -16               |   |                   |
| 730                                   | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 730                                     | 401.5                          | 730                                    | 80.3                            | -321.2                                       | -8                |   |                   |
| 1930                                  | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 1930                                    | 2123                           | 1930                                   | 212.3                           | -1910.7                                      | -18               |   |                   |
| 670                                   | 0.8                       | 1.1  | 0.78                       | 1.21  | 0.11   | 4                         | 4                        | 2680                                    | 2948                           | 2680                                   | 3242.8                          | 294.8  | 0                 |   | Nonforest Group 1 |
| 1200                                  | 0.8                       | 1.1  | 0.78                       | 1.21  | 0.11   | 4                         | 4                        | 4800                                    | 5280                           | 4800                                   | 5808                            | 528  | 0                 | Hudlow Creek                              |                   |
| 1480                                  | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1480                                    | 814                            | 1480                                   | 162.8                           | -651.2                                       | -8                | Forest                                    |                   |
| 2220                                  | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 2220                                    | 1221                           | 2220                                   | 244.2                           | -976.8                                       | -8                | Forest Group B                            |                   |
| 2050                                  | 0.9                       | 0.55   | 0.94                       | 0.33  | -0.22  | 2                         | 2                        | 4100                                    | 2255                           | 4100                                   | 1353                            | -902   | -4                | Nonforest                                 |                   |
| 1740                                  | 0.8                       | 1.1  | 0.86                       | 0.77  | -0.33  | 3                         | 3                        | 5220                                    | 5742                           | 5220                                   | 4019.4                          | -1722.6                                      | -6                | Group 1                                   |                   |
| 140                                   | 0.7                       | 1.65   | 0.78                       | 1.21  | -0.44  | 4                         | 4                        | 560                                     | 924                            | 560                                    | 677.6                           | -246.4                                       | -8                | Forest Group B                            |                   |
| 2030                                  | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 4060                                    | 2233                           | 4060                                   | 446.6                           | -1786.4                                      | -8                |   |                   |
| 200                                   | 0.9                       | 0.55   | 0.96                       | 0.22  | -0.33  | 3                         | 3                        | 600                                     | 330                            | 600                                    | 132                             | -198   | -6                |   |                   |
| 940                                   | 0.9                       | 0.55   | 0.96                       | 0.22  | -0.33  | 3                         | 3                        | 2820                                    | 1551                           | 2820                                   | 620.4                           | -930.6                                       | -6                |   |                   |
| 180                                   | 0.8                       | 1.1  | 0.86                       | 0.77  | -0.33  | 3                         | 3                        | 540                                     | 594                            | 540                                    | 415.8                           | -178.2                                       | -6                |   |                   |
| 1830                                  | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1830                                    | 1006.5                         | 1830                                   | 201.3                           | -805.2                                       | -8                | Nonforest                                 |                   |
| 1620                                  | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1620                                    | 891                            | 1620                                   | 178.2                           | -712.8                                       | -8                | Forest                                    |                   |
|                                       |                           |  |                            |   |  |                           |                          | <b>Total</b>                            | <b>50,900</b>                  | <b>50,900</b>                          | <b>20,015</b>                   | <b>-22,253</b>                               | <b>-9</b>         | Forest Group B                            |                   |

**Table F-54. Existing and potential solar loads for Little North Fork Coeur d'Alene River tributaries (AU# 030\_02c).**

| Segment Length (meters)               | Existing Shade (fraction) | Existing Summer Load (kWh/m <sup>2</sup> /day) | Potential Shade (fraction) | Potential Summer Load (kWh/m <sup>2</sup> /day) | Potential Load minus Existing load (kWh/m <sup>2</sup> /day) | Existing Stream Width (m) | Natural Stream Width (m) | Existing Segment Area (m <sup>2</sup> ) | Existing Summer Load (kWh/day) | Natural Segment Area (m <sup>2</sup> ) | Potential Summer Load (kWh/day) | Potential Load minus Existing Load (kWh/day) | Lack of Shade (%) | Little NF Coeur d'Alene River Tributaries |                     |  |
|---------------------------------------|---------------------------|--|----------------------------|---|--|---------------------------|--------------------------|---|--------------------------------|--|---------------------------------|--|-------------------|---|---------------------|--|
| Assessment Unit # ID17010301PN030_02c |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |   |                     |  |
| 1340                                  | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1340                                    | 737                            | 1340                                   | 147.4                           | -589.6                                       | -8                | Forest Group B                            | Nicholas Creek      |  |
| 2060                                  | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 4120                                    | 4532                           | 4120                                   | 453.2                           | -4078.8                                      | -18               |   |                     |  |
| 200                                   | 0.7                       | 1.65   | 0.98                       | 0.11  | -1.54  | 2                         | 2                        | 400                                     | 660                            | 400                                    | 44                              | -616   | -28               | Nonforest                                 | Canyon Fork         |  |
| 380                                   | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 760                                     | 836                            | 760                                    | 83.6                            | -752.4                                       | -18               |   |                     |  |
| 870                                   | 0.7                       | 1.65   | 0.78                       | 1.21  | -0.44  | 4                         | 4                        | 3480                                    | 5742                           | 3480                                   | 4210.8                          | -1531.2                                      | -8                | Forest Group B                            | Barney Creek        |  |
| 2630                                  | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 5260                                    | 2893                           | 5260                                   | 578.6                           | -2314.4                                      | -8                |   |                     |  |
| 970                                   | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 1940                                    | 2134                           | 1940                                   | 213.4                           | -1920.6                                      | -18               | Nonforest Group 1                         | Argument Creek      |  |
| 2710                                  | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 5420                                    | 2981                           | 5420                                   | 596.2                           | -2384.8                                      | -8                |   |                     |  |
| 170                                   | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 340                                     | 374                            | 340                                    | 37.4                            | -336.6                                       | -18               | Forest Group B                            | Little Cr           |  |
| 2180                                  | 0.8                       | 1.1  | 0.86                       | 0.77  | -0.33  | 3                         | 3                        | 6540                                    | 7194                           | 6540                                   | 5035.8                          | -2158.2                                      | -6                |   |                     |  |
| 1160                                  | 0.9                       | 0.55   | 0.86                       | 0.77  | 0.22   | 3                         | 3                        | 3480                                    | 1914                           | 3480                                   | 2679.6                          | 765.6  | 0                 | Forest Group B                            | Cathcart Creek      |  |
| 1320                                  | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1320                                    | 726                            | 1320                                   | 145.2                           | -580.8                                       | -8                |   |                     |  |
| 300                                   | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 300                                     | 330                            | 300                                    | 33                              | -297   | -18               | Nonforest                                 | Cascade Creek       |  |
| 1820                                  | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1820                                    | 1001                           | 1820                                   | 200.2                           | -800.8                                       | -8                |   |                     |  |
| 650                                   | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 650                                     | 357.5                          | 650                                    | 71.5                            | -286   | -8                | Forest Group B                            | 1st Trib to Cascade |  |
| 710                                   | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 710                                     | 781                            | 710                                    | 78.1                            | -702.9                                       | -18               |   |                     |  |
| 910                                   | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 1820                                    | 1001                           | 1820                                   | 200.2                           | -800.8                                       | -8                | Nonforest Group 1                         | Walker Creek        |  |
| 110                                   | 0.5                       | 2.75   | 0.94                       | 0.33  | -2.42  | 2                         | 2                        | 220                                     | 605                            | 220                                    | 72.6                            | -532.4                                       | -44               |   |                     |  |
| 220                                   | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 220                                     | 121                            | 220                                    | 24.2                            | -96.8  | -8                | Forest Group B                            | Picnic Creek        |  |
| 1050                                  | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 1050                                    | 1155                           | 1050                                   | 115.5                           | -1039.5                                      | -18               |   |                     |  |
| 140                                   | 0.7                       | 1.65   | 0.98                       | 0.11  | -1.54  | 2                         | 2                        | 280                                     | 462                            | 280                                    | 30.8                            | -431.2                                       | -28               | Nonforest                                 | Thiesen Cr          |  |
| 1360                                  | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 2720                                    | 1496                           | 2720                                   | 299.2                           | -1196.8                                      | -8                |   |                     |  |
| 1060                                  | 0.9                       | 0.55   | 0.96                       | 0.22  | -0.33  | 3                         | 3                        | 3180                                    | 1749                           | 3180                                   | 699.6                           | -1049.4                                      | -6                | Forest Group B                            | Larch Cr            |  |
| 960                                   | 0.8                       | 1.1  | 0.96                       | 0.22  | -0.88  | 3                         | 3                        | 2880                                    | 3168                           | 2880                                   | 633.6                           | -2534.4                                      | -16               |   |                     |  |
| 660                                   | 0.9                       | 0.55   | 0.78                       | 1.21  | 0.66   | 4                         | 4                        | 2640                                    | 1452                           | 2640                                   | 3194.4                          | 1742.4                                       | 0                 | Nonforest Group 1                         |                     |  |
| 440                                   | 0.8                       | 1.1  | 0.78                       | 1.21  | 0.11   | 4                         | 4                        | 1760                                    | 1936                           | 1760                                   | 2129.6                          | 193.6  | 0                 |   |                     |  |
| 1110                                  | 0.7                       | 1.65   | 0.78                       | 1.21  | -0.44  | 4                         | 4                        | 4440                                    | 7326                           | 4440                                   | 5372.4                          | -1953.6                                      | -8                | Forest Group B                            |                     |  |
| 470                                   | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 470                                     | 517                            | 470                                    | 51.7                            | -465.3                                       | -18               |   |                     |  |
| 810                                   | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 810                                     | 445.5                          | 810                                    | 89.1                            | -356.4                                       | -8                | Nonforest                                 |                     |  |
| 430                                   | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 430                                     | 473                            | 430                                    | 47.3                            | -425.7                                       | -18               |   |                     |  |
| 2650                                  | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 5300                                    | 2915                           | 5300                                   | 583                             | -2332  | -8                | Forest Group B                            |                     |  |
| 150                                   | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 300                                     | 330                            | 300                                    | 33                              | -297   | -18               |   |                     |  |
| 1790                                  | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1790                                    | 984.5                          | 1790                                   | 196.9                           | -787.6                                       | -8                | Nonforest                                 |                     |  |
| 180                                   | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 360                                     | 396                            | 360                                    | 39.6                            | -356.4                                       | -18               |   |                     |  |
| 270                                   | 0.7                       | 1.65   | 0.98                       | 0.11  | -1.54  | 2                         | 2                        | 540                                     | 891                            | 540                                    | 59.4                            | -831.6                                       | -28               | Forest Group B                            |                     |  |
| 580                                   | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 1160                                    | 1276                           | 1160                                   | 127.6                           | -1148.4                                      | -18               |   |                     |  |
| 260                                   | 0.7                       | 1.65   | 0.98                       | 0.11  | -1.54  | 2                         | 2                        | 520                                     | 858                            | 520                                    | 57.2                            | -800.8                                       | -28               | Nonforest                                 |                     |  |
| 650                                   | 0.6                       | 2.2  | 0.96                       | 0.22  | -1.98  | 3                         | 3                        | 1950                                    | 4290                           | 1950                                   | 429                             | -3861  | -36               |   |                     |  |
| 270                                   | 0.7                       | 1.65   | 0.96                       | 0.22  | -1.43  | 3                         | 3                        | 810                                     | 1336.5                         | 810                                    | 178.2                           | -1158.3                                      | -26               | Forest Group B                            |                     |  |
| 340                                   | 0.8                       | 1.1  | 0.96                       | 0.22  | -0.88  | 3                         | 3                        | 1020                                    | 1122                           | 1020                                   | 224.4                           | -897.6                                       | -16               |   |                     |  |
| 610                                   | 0.8                       | 1.1  | 0.94                       | 0.33  | -0.77  | 4                         | 4                        | 2440                                    | 2684                           | 2440                                   | 805.2                           | -1878.8                                      | -14               | Nonforest                                 |                     |  |
| 1150                                  | 0.7                       | 1.65   | 0.94                       | 0.33  | -1.32  | 4                         | 4                        | 4600                                    | 7590                           | 4600                                   | 1518                            | -6072  | -24               |   |                     |  |
| 400                                   | 0.7                       | 1.65   | 0.78                       | 1.21  | -0.44  | 4                         | 4                        | 1600                                    | 2640                           | 1600                                   | 1936                            | -704   | -8                | Forest Group B                            |                     |  |
| 1700                                  | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1700                                    | 935                            | 1700                                   | 187                             | -748   | -8                |   |                     |  |
| 1660                                  | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1660                                    | 913                            | 1660                                   | 182.6                           | -730.4                                       | -8                | Nonforest                                 |                     |  |
|                                       |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |   |                     |  |
| <b>Total</b>                          |                           |  |                            |   |  |                           |                          |   | <b>86,550</b>                  | <b>84,260</b>                          | <b>86,550</b>                   | <b>34,125</b>                                | <b>-50,135</b>    | <b>-14</b>                                |                     |  |

**Table F-55. Existing and potential solar loads for Little North Fork Coeur d'Alene River tributaries (AU# 030\_02d).**

| Segment Length (meters)               | Existing Shade (fraction) | Existing Summer Load (kWh/m <sup>2</sup> /day) | Potential Shade (fraction) | Potential Summer Load (kWh/m <sup>2</sup> /day) | Potential Load minus Existing load (kWh/m <sup>2</sup> /day) | Existing Stream Width (m) | Natural Stream Width (m) | Existing Segment Area (m <sup>2</sup> ) | Existing Summer Load (kWh/day) | Natural Segment Area (m <sup>2</sup> ) | Potential Summer Load (kWh/day) | Potential Load minus Existing Load (kWh/day) | Lack of Shade (%) | Little NF Coeur d'Alene River Tributaries |                    |
|---------------------------------------|---------------------------|--|----------------------------|---|--|---------------------------|--------------------------|---|--------------------------------|--|---------------------------------|--|-------------------|---|--------------------|
| Assessment Unit # ID17010301PN030_02d |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |   |                    |
| 1820                                  | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 3640                                    | 2002                           | 3640                                   | 400.4                           | -1601.6                                      | -8                | Forest Group B                            | Trestle Cr         |
| 1790                                  | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1790                                    | 984.5                          | 1790                                   | 196.9                           | -787.6                                       | -8                |   | Delaney Cr         |
| 400                                   | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 400                                     | 220                            | 400                                    | 44                              | -176   | -8                |   | Lindberg Creek     |
| 240                                   | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 240                                     | 264                            | 240                                    | 26.4                            | -237.6                                       | -18               |   |                    |
| 1310                                  | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 2620                                    | 1441                           | 2620                                   | 288.2                           | -1152.8                                      | -8                |   |                    |
| 810                                   | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 810                                     | 445.5                          | 810                                    | 89.1                            | -356.4                                       | -8                |   | Breadwater Creek   |
| 260                                   | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 260                                     | 286                            | 260                                    | 28.6                            | -257.4                                       | -18               |   |                    |
| 760                                   | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 760                                     | 418                            | 760                                    | 83.6                            | -334.4                                       | -8                |   |                    |
| 360                                   | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 360                                     | 396                            | 360                                    | 39.6                            | -356.4                                       | -18               |   | Nonforest Group1   |
| 5860                                  | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 11720                                   | 6446                           | 11720                                  | 1289.2                          | -5156.8                                      | -8                |   | Forest Group B     |
| 730                                   | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 730                                     | 401.5                          | 730                                    | 80.3                            | -321.2                                       | -8                |   | Little Tepee Creek |
| 600                                   | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 600                                     | 660                            | 600                                    | 66                              | -594   | -18               |   |                    |
| 3910                                  | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 7820                                    | 4301                           | 7820                                   | 860.2                           | -3440.8                                      | -8                |   |                    |
| 310                                   | 0.8                       | 1.1  | 0.96                       | 0.22  | -0.88  | 3                         | 3                        | 930                                     | 1023                           | 930                                    | 204.6                           | -818.4                                       | -16               |   |                    |
| 500                                   | 0.9                       | 0.55   | 0.96                       | 0.22  | -0.33  | 3                         | 3                        | 1500                                    | 825                            | 1500                                   | 330                             | -495   | -6                |   |                    |
| 150                                   | 0.8                       | 1.1  | 0.96                       | 0.22  | -0.88  | 3                         | 3                        | 450                                     | 495                            | 450                                    | 99                              | -396   | -16               |   |                    |
| 660                                   | 0.7                       | 1.65   | 0.86                       | 0.77  | -0.88  | 3                         | 3                        | 1980                                    | 3267                           | 1980                                   | 1524.6                          | -1742.4                                      | -16               | Nonforest Group1                          |                    |
| 2060                                  | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 2060                                    | 1133                           | 2060                                   | 226.6                           | -906.4                                       | -8                | Group B                                   | Unnamed ab         |
| 230                                   | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 230                                     | 253                            | 230                                    | 25.3                            | -227.7                                       | -18               | Nonforest Group1                          | Williams           |
| 2640                                  | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 5280                                    | 2904                           | 5280                                   | 580.8                           | -2323.2                                      | -8                | Forest Group B                            | Williams Draw      |
| 1650                                  | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1650                                    | 907.5                          | 1650                                   | 181.5                           | -726   | -8                |   | County Creek       |
| 150                                   | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 150                                     | 165                            | 150                                    | 16.5                            | -148.5                                       | -18               |   |                    |
| 2060                                  | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 4120                                    | 2266                           | 4120                                   | 453.2                           | -1812.8                                      | -8                |   | Browns Gulch       |
| 3790                                  | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 7580                                    | 4169                           | 7580                                   | 833.8                           | -3335.2                                      | -8                |   | Little             |
| 550                                   | 0.8                       | 1.1  | 0.96                       | 0.22  | -0.88  | 3                         | 3                        | 1650                                    | 1815                           | 1650                                   | 363                             | -1452  | -16               |   | Bumblebee Cr       |
| 1490                                  | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1490                                    | 819.5                          | 1490                                   | 163.9                           | -655.6                                       | -8                |   | Cannon             |
| 290                                   | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 290                                     | 319                            | 290                                    | 31.9                            | -287.1                                       | -18               | Nonforest Group1                          | Creek              |
|                                       |                           |  |                            |   |  | <b>Total</b>              |                          | <b>61,110</b>                           | <b>38,627</b>                  | <b>61,110</b>                          | <b>8,527</b>                    | <b>-30,099</b>                               | <b>-12</b>        |   |                    |

**Table F-56. Existing and potential solar loads for Little North Fork Coeur d'Alene River (AU# 030\_03).**

| Segment Length (meters)              | Existing Shade (fraction) | Existing Summer Load (kWh/m <sup>2</sup> /day) | Potential Shade (fraction) | Potential Summer Load (kWh/m <sup>2</sup> /day) | Potential Load minus Existing load (kWh/m <sup>2</sup> /day) | Existing Stream Width (m) | Natural Stream Width (m) | Existing Segment Area (m <sup>2</sup> ) | Existing Summer Load (kWh/day) | Natural Segment Area (m <sup>2</sup> ) | Potential Summer Load (kWh/day) | Potential Load minus Existing Load (kWh/day) | Lack of Shade (%) | Little NF Coeur d'Alene River |
|--------------------------------------|---------------------------|--|----------------------------|---|--|---------------------------|--------------------------|---|--------------------------------|--|---------------------------------|--|-------------------|-------------------------------|
| Assessment Unit # ID17010301PN030_03 |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |                               |
| 690                                  | 0.7                       | 1.65   | 0.65                       | 1.925   | 0.27   | 6                         | 6                        | 4140                                    | 6831                           | 4140                                   | 7969.5                          | 1138.5                                       | 0                 | Nonforest Group 1             |
| 600                                  | 0.8                       | 1.1  | 0.65                       | 1.925   | 0.83   | 6                         | 6                        | 3600                                    | 3960                           | 3600                                   | 6930                            | 2970   | 0                 |                               |
| 360                                  | 0.7                       | 1.65   | 0.6                        | 2.2   | 0.55   | 7                         | 7                        | 2520                                    | 4158                           | 2520                                   | 5544                            | 1386   | 0                 |                               |
| 270                                  | 0.8                       | 1.1  | 0.6                        | 2.2   | 1.10   | 7                         | 7                        | 1890                                    | 2079                           | 1890                                   | 4158                            | 2079   | 0                 |                               |
| 180                                  | 0.7                       | 1.65   | 0.6                        | 2.2   | 0.55   | 7                         | 7                        | 1260                                    | 2079                           | 1260                                   | 2772                            | 693  | 0                 |                               |
| 180                                  | 0.8                       | 1.1  | 0.6                        | 2.2   | 1.10   | 7                         | 7                        | 1260                                    | 1386                           | 1260                                   | 2772                            | 1386   | 0                 |                               |
| 660                                  | 0.7                       | 1.65   | 0.6                        | 2.2   | 0.55   | 7                         | 7                        | 4620                                    | 7623                           | 4620                                   | 10164                           | 2541   | 0                 |                               |
| 580                                  | 0.8                       | 1.1  | 0.55                       | 2.475   | 1.38   | 8                         | 8                        | 4640                                    | 5104                           | 4640                                   | 11484                           | 6380   | 0                 |                               |
| 920                                  | 0.7                       | 1.65   | 0.55                       | 2.475   | 0.82   | 8                         | 8                        | 7360                                    | 12144                          | 7360                                   | 18216                           | 6072   | 0                 |                               |
| 690                                  | 0.6                       | 2.2  | 0.52                       | 2.64  | 0.44   | 9                         | 9                        | 6210                                    | 13662                          | 6210                                   | 16394.4                         | 2732.4                                       | 0                 |                               |
| 180                                  | 0.7                       | 1.65   | 0.52                       | 2.64  | 0.99   | 9                         | 9                        | 1620                                    | 2673                           | 1620                                   | 4276.8                          | 1603.8                                       | 0                 |                               |
| 160                                  | 0.6                       | 2.2  | 0.52                       | 2.64  | 0.44   | 9                         | 9                        | 1440                                    | 3168                           | 1440                                   | 3801.6                          | 633.6  | 0                 |                               |
| 600                                  | 0.7                       | 1.65   | 0.48                       | 2.86  | 1.21   | 10                        | 10                       | 6000                                    | 9900                           | 6000                                   | 17160                           | 7260   | 0                 |                               |
| 300                                  | 0.4                       | 3.3  | 0.48                       | 2.86  | -0.44  | 10                        | 10                       | 3000                                    | 9900                           | 3000                                   | 8580                            | -1320  | -8                |                               |
| 140                                  | 0.2                       | 4.4  | 0.48                       | 2.86  | -1.54  | 10                        | 10                       | 1400                                    | 6160                           | 1400                                   | 4004                            | -2156  | -28               |                               |
| 160                                  | 0.3                       | 3.85   | 0.48                       | 2.86  | -0.99  | 10                        | 10                       | 1600                                    | 6160                           | 1600                                   | 4576                            | -1584  | -18               |                               |
| 330                                  | 0.2                       | 4.4  | 0.45                       | 3.025   | -1.38  | 11                        | 11                       | 3630                                    | 15972                          | 3630                                   | 10980.75                        | -4991.25                                     | -25               |                               |
| 940                                  | 0.3                       | 3.85   | 0.45                       | 3.025   | -0.82  | 11                        | 11                       | 10340                                   | 39809                          | 10340                                  | 31278.5                         | -8530.5                                      | -15               |                               |
| 360                                  | 0.3                       | 3.85   | 0.41                       | 3.245   | -0.60  | 12                        | 12                       | 4320                                    | 16632                          | 4320                                   | 14018.4                         | -2613.6                                      | -11               |                               |
| 410                                  | 0.4                       | 3.3  | 0.41                       | 3.245   | -0.05  | 12                        | 12                       | 4920                                    | 16236                          | 4920                                   | 15965.4                         | -270.6                                       | -1                |                               |
| 440                                  | 0.3                       | 3.85   | 0.41                       | 3.245   | -0.60  | 13                        | 12                       | 5720                                    | 22022                          | 5280                                   | 17133.6                         | -4888.4                                      | -11               |                               |
| 1100                                 | 0.2                       | 4.4  | 0.39                       | 3.355   | -1.05  | 13                        | 13                       | 14300                                   | 62920                          | 14300                                  | 47976.5                         | -14943.5                                     | -19               |                               |
| 700                                  | 0.4                       | 3.3  | 0.39                       | 3.355   | 0.06   | 13                        | 13                       | 9100                                    | 30030                          | 9100                                   | 30530.5                         | 500.5  | 0                 |                               |
| 370                                  | 0.5                       | 2.75   | 0.39                       | 3.355   | 0.61   | 13                        | 13                       | 4810                                    | 13227.5                        | 4810                                   | 16137.55                        | 2910.05                                      | 0                 |                               |
| 260                                  | 0.2                       | 4.4  | 0.39                       | 3.355   | -1.05  | 14                        | 13                       | 3640                                    | 16016                          | 3380                                   | 11339.9                         | -4676.1                                      | -19               |                               |
| 230                                  | 0.4                       | 3.3  | 0.39                       | 3.355   | 0.06   | 14                        | 13                       | 3220                                    | 10626                          | 2990                                   | 10031.45                        | -594.55                                      | 0                 |                               |
| 290                                  | 0.5                       | 2.75   | 0.39                       | 3.355   | 0.61   | 14                        | 13                       | 4060                                    | 11165                          | 3770                                   | 12648.35                        | 1483.35                                      | 0                 |                               |
| 440                                  | 0.3                       | 3.85   | 0.37                       | 3.465   | -0.39  | 14                        | 14                       | 6160                                    | 23716                          | 6160                                   | 21344.4                         | -2371.6                                      | -7                |                               |
| 830                                  | 0.4                       | 3.3  | 0.37                       | 3.465   | 0.17   | 15                        | 14                       | 12450                                   | 41085                          | 11620                                  | 40263.3                         | -821.7                                       | 0                 |                               |
| 530                                  | 0.6                       | 2.2  | 0.37                       | 3.465   | 1.27   | 15                        | 14                       | 7950                                    | 17490                          | 7420                                   | 25710.3                         | 8220.3                                       | 0                 |                               |
| 180                                  | 0                         | 5.5  | 0.37                       | 3.465   | -2.04  | 15                        | 14                       | 2700                                    | 14850                          | 2520                                   | 8731.8                          | -6118.2                                      | -37               |                               |
| 500                                  | 0.2                       | 4.4  | 0.37                       | 3.465   | -0.94  | 15                        | 14                       | 7500                                    | 33000                          | 7000                                   | 24255                           | -8745  | -17               |                               |
| 370                                  | 0.1                       | 4.95   | 0.37                       | 3.465   | -1.49  | 16                        | 14                       | 5920                                    | 29304                          | 5180                                   | 17948.7                         | -11355.3                                     | -27               |                               |
| 230                                  | 0.2                       | 4.4  | 0.35                       | 3.575   | -0.83  | 16                        | 15                       | 3680                                    | 16192                          | 3450                                   | 12333.75                        | -3858.25                                     | -15               |                               |
| 350                                  | 0.4                       | 3.3  | 0.35                       | 3.575   | 0.28   | 16                        | 15                       | 5600                                    | 18480                          | 5250                                   | 18768.75                        | 288.75                                       | 0                 |                               |
| 330                                  | 0.2                       | 4.4  | 0.35                       | 3.575   | -0.83  | 16                        | 15                       | 5280                                    | 23232                          | 4950                                   | 17696.25                        | -5535.75                                     | -15               |                               |
| 830                                  | 0.1                       | 4.95   | 0.35                       | 3.575   | -1.38  | 17                        | 15                       | 14110                                   | 69844.5                        | 12450                                  | 44508.75                        | -25335.75                                    | -25               |                               |
| 330                                  | 0.2                       | 4.4  | 0.35                       | 3.575   | -0.83  | 17                        | 15                       | 5610                                    | 24684                          | 4950                                   | 17696.25                        | -6987.75                                     | -15               |                               |
| 610                                  | 0.3                       | 3.85   | 0.35                       | 3.575   | -0.27  | 17                        | 15                       | 10370                                   | 39924.5                        | 9150                                   | 32711.25                        | -7213.25                                     | -5                |                               |
| 450                                  | 0.1                       | 4.95   | 0.33                       | 3.685   | -1.27  | 17                        | 16                       | 7650                                    | 37867.5                        | 7200                                   | 26532                           | -11335.5                                     | -23               |                               |
| 110                                  | 0.1                       | 4.95   | 0.33                       | 3.685   | -1.27  | 18                        | 16                       | 1980                                    | 9801                           | 1760                                   | 6485.6                          | -3315.4                                      | -23               |                               |
|                                      |                           |  |                            |   |  | <b>Total</b>              |                          | <b>217,580</b>                          | <b>751,113</b>                 | <b>208,460</b>                         | <b>661,829</b>                  | <b>-89,284</b>                               | <b>-9</b>         |                               |

**Table F-57. Existing and potential solar loads for Little North Fork Coeur d'Alene River (AU# 030\_04).**

| Segment Length (meters)              | Existing Shade (fraction) | Existing Summer Load (kWh/m <sup>2</sup> /day) | Potential Shade (fraction) | Potential Summer Load (kWh/m <sup>2</sup> /day) | Potential Load minus Existing load (kWh/m <sup>2</sup> /day) | Existing Stream Width (m) | Natural Stream Width (m) | Existing Segment Area (m <sup>2</sup> ) | Existing Summer Load (kWh/day) | Natural Segment Area (m <sup>2</sup> ) | Potential Summer Load (kWh/day) | Potential Existing Load (kWh/day) | Lack of Shade (%) | Little NF Coeur d'Alene River |
|--------------------------------------|---------------------------|--|----------------------------|---|--|---------------------------|--------------------------|---|--------------------------------|--|---------------------------------|-----------------------------------|-------------------|-------------------------------|
| Assessment Unit # ID17010301PN030_04 |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |                                   |                   |                               |
| 1020                                 | 0                         | 5.5  | 0.33                       | 3.685   | -1.82  | 18                        | 16                       | 18360                                   | 100980                         | 16320                                  | 60139.2                         | -40840.8                          | -33               | Nonforest Group 1             |
| 480                                  | 0.2                       | 4.4  | 0.33                       | 3.685   | -0.72  | 18                        | 16                       | 8640                                    | 38016                          | 7680                                   | 28300.8                         | -9715.2                           | -13               |                               |
| 190                                  | 0.1                       | 4.95   | 0.33                       | 3.685   | -1.27  | 18                        | 16                       | 3420                                    | 16929                          | 3040                                   | 11202.4                         | -5726.6                           | -23               |                               |
| 530                                  | 0.3                       | 3.85   | 0.33                       | 3.685   | -0.17  | 19                        | 16                       | 10070                                   | 38769.5                        | 8480                                   | 31248.8                         | -7520.7                           | -3                |                               |
| 390                                  | 0.2                       | 4.4  | 0.33                       | 3.685   | -0.72  | 19                        | 16                       | 7410                                    | 32604                          | 6240                                   | 22994.4                         | -9609.6                           | -13               |                               |
| 360                                  | 0.3                       | 3.85   | 0.32                       | 3.74  | -0.11  | 19                        | 17                       | 6840                                    | 26334                          | 6120                                   | 22888.8                         | -3445.2                           | -2                |                               |
| 270                                  | 0.2                       | 4.4  | 0.32                       | 3.74  | -0.66  | 19                        | 17                       | 5130                                    | 22572                          | 4590                                   | 17166.6                         | -5405.4                           | -12               |                               |
| 180                                  | 0.3                       | 3.85   | 0.32                       | 3.74  | -0.11  | 19                        | 17                       | 3420                                    | 13167                          | 3060                                   | 11444.4                         | -1722.6                           | -2                |                               |
| 590                                  | 0.1                       | 4.95   | 0.32                       | 3.74  | -1.21  | 20                        | 17                       | 11800                                   | 58410                          | 10030                                  | 37512.2                         | -20897.8                          | -22               |                               |
| 240                                  | 0.2                       | 4.4  | 0.32                       | 3.74  | -0.66  | 20                        | 17                       | 4800                                    | 21120                          | 4080                                   | 15259.2                         | -5860.8                           | -12               |                               |
| 580                                  | 0.3                       | 3.85   | 0.32                       | 3.74  | -0.11  | 20                        | 17                       | 11600                                   | 44660                          | 9860                                   | 36876.4                         | -7783.6                           | -2                |                               |
| 1610                                 | 0.1                       | 4.95   | 0.3                        | 3.85  | -1.10  | 21                        | 18                       | 33810                                   | 167359.5                       | 28980                                  | 111573                          | -55786.5                          | -20               |                               |
| 620                                  | 0.3                       | 3.85   | 0.3                        | 3.85  | 0.00   | 22                        | 18                       | 13640                                   | 52514                          | 11160                                  | 42966                           | -9548                             | 0                 |                               |
| 580                                  | 0.2                       | 4.4  | 0.3                        | 3.85  | -0.55  | 22                        | 18                       | 12760                                   | 56144                          | 10440                                  | 40194                           | -15950                            | -10               |                               |
| 940                                  | 0.1                       | 4.95   | 0.3                        | 3.85  | -1.10  | 22                        | 18                       | 20680                                   | 102366                         | 16920                                  | 65142                           | -37224                            | -20               |                               |
| 470                                  | 0.2                       | 4.4  | 0.29                       | 3.905   | -0.50  | 23                        | 19                       | 10810                                   | 47564                          | 8930                                   | 34871.65                        | -12692.35                         | -9                |                               |
| 270                                  | 0.1                       | 4.95   | 0.29                       | 3.905   | -1.05  | 23                        | 19                       | 6210                                    | 30739.5                        | 5130                                   | 20032.65                        | -10706.85                         | -19               |                               |
| 190                                  | 0.2                       | 4.4  | 0.29                       | 3.905   | -0.50  | 23                        | 19                       | 4370                                    | 19228                          | 3610                                   | 14097.05                        | -5130.95                          | -9                |                               |
| 510                                  | 0.1                       | 4.95   | 0.29                       | 3.905   | -1.05  | 23                        | 19                       | 11730                                   | 58063.5                        | 9690                                   | 37839.45                        | -20224.05                         | -19               |                               |
| 1140                                 | 0.2                       | 4.4  | 0.29                       | 3.905   | -0.50  | 23                        | 19                       | 26220                                   | 115368                         | 21660                                  | 84582.3                         | -30785.7                          | -9                |                               |
| 360                                  | 0.3                       | 3.85   | 0.29                       | 3.905   | 0.06   | 23                        | 19                       | 8280                                    | 31878                          | 6840                                   | 26710.2                         | -5167.8                           | 0                 |                               |
| 1220                                 | 0.2                       | 4.4  | 0.29                       | 3.905   | -0.50  | 23                        | 19                       | 28060                                   | 123464                         | 23180                                  | 90517.9                         | -32946.1                          | -9                |                               |
| 890                                  | 0.2                       | 4.4  | 0.28                       | 3.96  | -0.44  | 24                        | 20                       | 21360                                   | 93984                          | 17800                                  | 70488                           | -23496                            | -8                |                               |
| 1410                                 | 0.5                       | 2.75   | 0.28                       | 3.96  | 1.21   | 24                        | 20                       | 33840                                   | 93060                          | 28200                                  | 111672                          | 18612                             | 0                 |                               |
| 2170                                 | 0.3                       | 3.85   | 0.28                       | 3.96  | 0.11   | 24                        | 20                       | 52080                                   | 200508                         | 43400                                  | 171864                          | -28644                            | 0                 |                               |
| 1920                                 | 0.2                       | 4.4  | 0.27                       | 4.015   | -0.39  | 25                        | 21                       | 48000                                   | 211200                         | 40320                                  | 161884.8                        | -49315.2                          | -7                |                               |
| 720                                  | 0.3                       | 3.85   | 0.26                       | 4.07  | 0.22   | 26                        | 22                       | 18720                                   | 72072                          | 15840                                  | 64468.8                         | -7603.2                           | 0                 |                               |
| 1050                                 | 0.1                       | 4.95   | 0.26                       | 4.07  | -0.88  | 26                        | 22                       | 27300                                   | 135135                         | 23100                                  | 94017                           | -41118                            | -16               |                               |
| 190                                  | 0.2                       | 4.4  | 0.26                       | 4.07  | -0.33  | 26                        | 22                       | 4940                                    | 21736                          | 4180                                   | 17012.6                         | -4723.4                           | -6                |                               |
| 490                                  | 0.1                       | 4.95   | 0.26                       | 4.07  | -0.88  | 26                        | 22                       | 12740                                   | 63063                          | 10780                                  | 43874.6                         | -19188.4                          | -16               |                               |
| 280                                  | 0                         | 5.5  | 0.26                       | 4.07  | -1.43  | 26                        | 22                       | 7280                                    | 40040                          | 6160                                   | 25071.2                         | -14968.8                          | -26               |                               |
| 300                                  | 0.1                       | 4.95   | 0.26                       | 4.07  | -0.88  | 26                        | 22                       | 7800                                    | 38610                          | 6600                                   | 26862                           | -11748                            | -16               |                               |
| 1310                                 | 0                         | 5.5  | 0.25                       | 4.125   | -1.38  | 27                        | 23                       | 35370                                   | 194535                         | 30130                                  | 124286.25                       | -70248.75                         | -25               |                               |
| 540                                  | 0.1                       | 4.95   | 0.25                       | 4.125   | -0.83  | 27                        | 23                       | 14580                                   | 72171                          | 12420                                  | 51232.5                         | -20938.5                          | -15               |                               |
| 1950                                 | 0                         | 5.5  | 0.25                       | 4.125   | -1.38  | 27                        | 23                       | 52650                                   | 289575                         | 44850                                  | 185006.25                       | -104568.75                        | -25               |                               |
| 250                                  | 0.1                       | 4.95   | 0.25                       | 4.125   | -0.83  | 27                        | 23                       | 6750                                    | 33412.5                        | 5750                                   | 23718.75                        | -9693.75                          | -15               |                               |
| 440                                  | 0.2                       | 4.4  | 0.24                       | 4.18  | -0.22  | 28                        | 24                       | 12320                                   | 54208                          | 10560                                  | 44140.8                         | -10067.2                          | -4                |                               |
| 470                                  | 0.1                       | 4.95   | 0.24                       | 4.18  | -0.77  | 28                        | 24                       | 13160                                   | 65142                          | 11280                                  | 47150.4                         | -17991.6                          | -14               |                               |
| 170                                  | 0.2                       | 4.4  | 0.24                       | 4.18  | -0.22  | 28                        | 24                       | 4760                                    | 20944                          | 4080                                   | 17054.4                         | -3889.6                           | -4                |                               |
| 750                                  | 0.1                       | 4.95   | 0.24                       | 4.18  | -0.77  | 28                        | 24                       | 21000                                   | 103950                         | 18000                                  | 75240                           | -28710                            | -14               |                               |
| 480                                  | 0                         | 5.5  | 0.24                       | 4.18  | -1.32  | 28                        | 24                       | 13440                                   | 73920                          | 11520                                  | 48153.6                         | -25766.4                          | -24               |                               |
| 370                                  | 0.3                       | 3.85   | 0.24                       | 4.18  | 0.33   | 28                        | 24                       | 10360                                   | 39886                          | 8880                                   | 37118.4                         | -2767.6                           | -4                |                               |
| 190                                  | 0.1                       | 4.95   | 0.24                       | 4.18  | -0.77  | 28                        | 24                       | 5320                                    | 26334                          | 4560                                   | 19060.8                         | -7273.2                           | -10               |                               |
| 380                                  | 0.3                       | 3.85   | 0.24                       | 4.18  | 0.33   | 28                        | 24                       | 10640                                   | 40964                          | 9120                                   | 38121.6                         | -2842.4                           | 0                 |                               |
| 1030                                 | 0.2                       | 4.4  | 0.24                       | 4.18  | -0.22  | 28                        | 24                       | 28840                                   | 126896                         | 24720                                  | 103329.6                        | -23566.4                          | -4                |                               |
| 220                                  | 0.1                       | 4.95   | 0.23                       | 4.235   | -0.72  | 29                        | 25                       | 6380                                    | 31581                          | 5500                                   | 23292.5                         | -8288.5                           | -13               |                               |
| 940                                  | 0.2                       | 4.4  | 0.23                       | 4.235   | -0.17  | 29                        | 25                       | 27260                                   | 119944                         | 23500                                  | 99522.5                         | -20421.5                          | -3                |                               |
| 780                                  | 0                         | 5.5  | 0.23                       | 4.235   | -1.27  | 29                        | 25                       | 22620                                   | 124410                         | 19500                                  | 82582.5                         | -41827.5                          | -23               |                               |
| 420                                  | 0.1                       | 4.95   | 0.23                       | 4.235   | -0.72  | 29                        | 25                       | 12180                                   | 60291                          | 10500                                  | 44467.5                         | -15823.5                          | -13               |                               |
| 400                                  | 0                         | 5.5  | 0.23                       | 4.235   | -1.27  | 29                        | 25                       | 11600                                   | 63800                          | 10000                                  | 42350                           | -21450                            | -23               |                               |
| 530                                  | 0.1                       | 4.95   | 0.23                       | 4.235   | -0.72  | 29                        | 25                       | 15370                                   | 76081.5                        | 13250                                  | 56113.75                        | -19967.75                         | -13               |                               |
| 1350                                 | 0                         | 5.5  | 0.23                       | 4.235   | -1.27  | 29                        | 25                       | 39150                                   | 215325                         | 33750                                  | 142931.25                       | -72393.75                         | -23               |                               |
| <b>Total</b>                         |                           |  |                            |   |  |                           |                          | <b>865,870</b>                          | <b>4,021,028</b>               | <b>734,290</b>                         | <b>2,955,648</b>                | <b>-1,065,380</b>                 | <b>-12</b>        |                               |

**Table F-58. Existing and potential solar loads for the Upper North Fork Coeur d'Alene River (AU# 015\_02).**

| Segment Length (meters)              | Existing Shade (fraction) | Existing Summer Load (kWh/m <sup>2</sup> /day) | Potential Shade (fraction) | Potential Summer Load (kWh/m <sup>2</sup> /day) | Potential Load minus Existing load (kWh/m <sup>2</sup> /day) | Existing Stream Width (m) | Natural Stream Width (m) | Existing Segment Area (m <sup>2</sup> ) | Existing Summer Load (kWh/day) | Natural Segment Area (m <sup>2</sup> ) | Potential Summer Load (kWh/day) | Potential Load minus Existing Load (kWh/day) | Lack of Shade (%) | NF Coeur d'Alene River Tributaries |
|--------------------------------------|---------------------------|--|----------------------------|---|--|---------------------------|--------------------------|---|--------------------------------|--|---------------------------------|--|-------------------|------------------------------------|
| Assessment Unit # ID17010301PN015_02 |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |                                    |
| 2270                                 | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 4540                                    | 2497                           | 4540                                   | 499.4                           | -1997.6                                      | -8                | Forest Group B                     |
| 800                                  | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 800                                     | 440                            | 800                                    | 88                              | -352   | -8                | Forest Group C                     |
| 400                                  | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 800                                     | 880                            | 800                                    | 88                              | -792   | -18               | Forest Group B                     |
| 780                                  | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 1560                                    | 858                            | 1560                                   | 171.6                           | -686.4                                       | -8                |                                    |
| 1400                                 | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1400                                    | 770                            | 1400                                   | 154                             | -616   | -8                |                                    |
| 520                                  | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 1040                                    | 1144                           | 1040                                   | 114.4                           | -1029.6                                      | -18               |                                    |
| 460                                  | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 920                                     | 506                            | 920                                    | 101.2                           | -404.8                                       | -8                | Forest Group A                     |
| 2180                                 | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 2180                                    | 1199                           | 2180                                   | 239.8                           | -959.2                                       | -8                | Forest Group B                     |
| 1230                                 | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 2460                                    | 2706                           | 2460                                   | 270.6                           | -2435.4                                      | -18               |                                    |
| 630                                  | 0.9                       | 0.55   | 0.96                       | 0.22  | -0.33  | 3                         | 3                        | 1890                                    | 1039.5                         | 1890                                   | 415.8                           | -623.7                                       | -6                |                                    |
| 730                                  | 0.8                       | 1.1  | 0.96                       | 0.22  | -0.88  | 3                         | 3                        | 2190                                    | 2409                           | 2190                                   | 481.8                           | -1927.2                                      | -16               |                                    |
| 1320                                 | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1320                                    | 726                            | 1320                                   | 145.2                           | -580.8                                       | -8                |                                    |
| 2720                                 | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 5440                                    | 2992                           | 5440                                   | 598.4                           | -2393.6                                      | -8                | Trib to 4th Trib                   |
| 1740                                 | 0.9                       | 0.55   | 0.96                       | 0.22  | -0.33  | 3                         | 3                        | 5220                                    | 2871                           | 5220                                   | 1148.4                          | -1722.6                                      | -6                | Mosquito Cr                        |
| 310                                  | 0.8                       | 1.1  | 0.96                       | 0.22  | -0.88  | 3                         | 3                        | 930                                     | 1023                           | 930                                    | 204.6                           | -818.4                                       | -16               |                                    |
| 2350                                 | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 4700                                    | 2585                           | 4700                                   | 517                             | -2068  | -8                |                                    |
| 1870                                 | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 3740                                    | 2057                           | 3740                                   | 411.4                           | -1645.6                                      | -8                | Forest Group A                     |
| 3700                                 | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 7400                                    | 4070                           | 7400                                   | 814                             | -3256  | -8                | Forest Group B                     |
| 370                                  | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 740                                     | 814                            | 740                                    | 81.4                            | -732.6                                       | -18               |                                    |
| 4280                                 | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 8560                                    | 4708                           | 8560                                   | 941.6                           | -3766.4                                      | -8                |                                    |
| 1190                                 | 0.8                       | 1.1  | 0.86                       | 0.77  | -0.33  | 3                         | 3                        | 3570                                    | 3927                           | 3570                                   | 2748.9                          | -1178.1                                      | -6                | Nonforest                          |
| 960                                  | 0.8                       | 1.1  | 0.78                       | 1.21  | 0.11   | 4                         | 4                        | 3840                                    | 4224                           | 3840                                   | 4646.4                          | 422.4  | 2                 | Group 1                            |
| 430                                  | 0.7                       | 1.65   | 0.72                       | 1.54  | -0.11  | 5                         | 5                        | 2150                                    | 3547.5                         | 2150                                   | 3311                            | -236.5                                       | -2                |                                    |
| 2130                                 | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 2130                                    | 1171.5                         | 2130                                   | 234.3                           | -937.2                                       | -8                | Forest Group B                     |
| 3220                                 | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 6440                                    | 3542                           | 6440                                   | 708.4                           | -2833.6                                      | -8                |                                    |
| 850                                  | 0.9                       | 0.55   | 0.96                       | 0.22  | -0.33  | 3                         | 3                        | 2550                                    | 1402.5                         | 2550                                   | 561                             | -841.5                                       | -6                |                                    |
| 810                                  | 0.8                       | 1.1  | 0.86                       | 0.77  | -0.33  | 3                         | 3                        | 2430                                    | 2673                           | 2430                                   | 1871.1                          | -801.9                                       | -6                | Nonforest                          |
| 2280                                 | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 4560                                    | 2508                           | 4560                                   | 501.6                           | -2006.4                                      | -8                | Forest Group B                     |
| 1510                                 | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1510                                    | 830.5                          | 1510                                   | 166.1                           | -664.4                                       | -8                | Nonforest                          |
| 1690                                 | 0.8                       | 1.1  | 0.94                       | 0.33  | -0.77  | 2                         | 2                        | 3380                                    | 3718                           | 3380                                   | 1115.4                          | -2602.6                                      | -14               | Group 1                            |
| 660                                  | 0.9                       | 0.55   | 0.86                       | 0.77  | 0.22   | 3                         | 3                        | 1980                                    | 1089                           | 1980                                   | 1524.6                          | 435.6  | 4                 |                                    |
| 1160                                 | 0.8                       | 1.1  | 0.78                       | 1.21  | 0.11   | 4                         | 4                        | 4640                                    | 5104                           | 4640                                   | 5614.4                          | 510.4  | 2                 |                                    |
| 740                                  | 0.6                       | 2.2  | 0.78                       | 1.21  | -0.99  | 4                         | 4                        | 2960                                    | 6512                           | 2960                                   | 3581.6                          | -2930.4                                      | -18               |                                    |
| 360                                  | 0.8                       | 1.1  | 0.78                       | 1.21  | 0.11   | 4                         | 4                        | 1440                                    | 1584                           | 1440                                   | 1742.4                          | 158.4  | 2                 |                                    |
| 800                                  | 0.7                       | 1.65   | 0.72                       | 1.54  | -0.11  | 5                         | 5                        | 4000                                    | 6600                           | 4000                                   | 6160                            | -440   | -2                |                                    |
| 510                                  | 0.6                       | 2.2  | 0.72                       | 1.54  | -0.66  | 5                         | 5                        | 2550                                    | 5610                           | 2550                                   | 3927                            | -1683  | -12               |                                    |
| 360                                  | 0.7                       | 1.65   | 0.72                       | 1.54  | -0.11  | 5                         | 5                        | 1800                                    | 2970                           | 1800                                   | 2772                            | -198   | -2                |                                    |
| 540                                  | 0.7                       | 1.65   | 0.65                       | 1.925   | 0.27   | 6                         | 6                        | 3240                                    | 5346                           | 3240                                   | 6237                            | 891  | 5                 |                                    |
| 880                                  | 0.6                       | 2.2  | 0.65                       | 1.925   | -0.28  | 6                         | 6                        | 5280                                    | 11616                          | 5280                                   | 10164                           | -1452  | -5                |                                    |
| 2680                                 | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 5360                                    | 2948                           | 5360                                   | 589.6                           | -2358.4                                      | -8                | Forest Group B                     |
| 3740                                 | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 7480                                    | 4114                           | 7480                                   | 822.8                           | -3291.2                                      | -8                |                                    |
| 2040                                 | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 4080                                    | 2244                           | 4080                                   | 448.8                           | -1795.2                                      | -8                |                                    |
| 120                                  | 0.7                       | 1.65   | 0.98                       | 0.11  | -1.54  | 2                         | 2                        | 240                                     | 396                            | 240                                    | 26.4                            | -369.6                                       | -28               |                                    |
| 3520                                 | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 7040                                    | 3872                           | 7040                                   | 774.4                           | -3097.6                                      | -8                |                                    |
| 140                                  | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 280                                     | 308                            | 280                                    | 30.8                            | -277.2                                       | -18               |                                    |

**Table F-58 (cont.). Existing and potential solar loads for the Upper North Fork Coeur d'Alene River (AU# 015\_02).**

| Segment Length (meters) | Existing Shade (fraction) | Existing Summer Load (kWh/m <sup>2</sup> /day) | Potential Shade (fraction) | Potential Summer Load (kWh/m <sup>2</sup> /day) | Potential Load minus Existing load (kWh/m <sup>2</sup> /day) | Existing Stream Width (m) | Natural Stream Width (m) | Existing Segment Area (m <sup>2</sup> ) | Existing Summer Load (kWh/day) | Natural Segment Area (m <sup>2</sup> ) | Potential Summer Load (kWh/day) | Potential Load minus Existing Load (kWh/day) | Lack of Shade (%) | NF Coeur d'Alene River Tributaries |
|-------------------------|---------------------------|--|----------------------------|---|--|---------------------------|--------------------------|---|--------------------------------|--|---------------------------------|--|-------------------|------------------------------------|
| 1540                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1540                                    | 847                            | 1540                                   | 169.4                           | -677.6                                       | -8                | Devil Cr                           |
| 710                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 1420                                    | 1562                           | 1420                                   | 156.2                           | -1405.8                                      | -18               |                                    |
| 1800                    | 0.7                       | 1.65   | 0.94                       | 0.33  | -1.32  | 2                         | 2                        | 3600                                    | 5940                           | 3600                                   | 1188                            | -4752  | -24               | Nonforest Group 1                  |
| 150                     | 0.8                       | 1.1  | 0.86                       | 0.77  | -0.33  | 3                         | 3                        | 450                                     | 495                            | 450                                    | 346.5                           | -148.5                                       | -6                |                                    |
| 620                     | 0.9                       | 0.55   | 0.86                       | 0.77  | 0.22   | 3                         | 3                        | 1860                                    | 1023                           | 1860                                   | 1432.2                          | 409.2  | 4                 | Forest Group B                     |
| 560                     | 0.8                       | 1.1  | 0.86                       | 0.77  | -0.33  | 3                         | 3                        | 1680                                    | 1848                           | 1680                                   | 1293.6                          | -554.4                                       | -6                |                                    |
| 140                     | 0.7                       | 1.65   | 0.78                       | 1.21  | -0.44  | 4                         | 4                        | 560                                     | 924                            | 560                                    | 677.6                           | -246.4                                       | -8                | 1st Trib to Devil Imp Cr           |
| 1800                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1800                                    | 990                            | 1800                                   | 198                             | -792   | -8                |                                    |
| 570                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 570                                     | 313.5                          | 570                                    | 62.7                            | -250.8                                       | -8                | Wren Cr                            |
| 910                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 910                                     | 1001                           | 910                                    | 100.1                           | -900.9                                       | -18               |                                    |
| 740                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 1480                                    | 814                            | 1480                                   | 162.8                           | -651.2                                       | -8                | Clark Cr                           |
| 2100                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 2100                                    | 1155                           | 2100                                   | 231                             | -924   | -8                |                                    |
| 2590                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 5180                                    | 2849                           | 5180                                   | 569.8                           | -2279.2                                      | -8                | Sluice Cr                          |
| 2170                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 4340                                    | 2387                           | 4340                                   | 477.4                           | -1909.6                                      | -8                |                                    |
| 1830                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1830                                    | 1006.5                         | 1830                                   | 201.3                           | -805.2                                       | -8                | Forest Group C                     |
| 240                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 480                                     | 264                            | 480                                    | 52.8                            | -211.2                                       | -8                |                                    |
| 1440                    | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 2880                                    | 3168                           | 2880                                   | 316.8                           | -2851.2                                      | -18               | Whitetail Cr                       |
| 610                     | 0.9                       | 0.55   | 0.96                       | 0.22  | -0.33  | 3                         | 3                        | 1830                                    | 1006.5                         | 1830                                   | 402.6                           | -603.9                                       | -6                |                                    |
| 1540                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 3080                                    | 1694                           | 3080                                   | 338.8                           | -1355.2                                      | -8                | Trib to Whitetail Blacktail Cr     |
| 3670                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 7340                                    | 4037                           | 7340                                   | 807.4                           | -3229.6                                      | -8                |                                    |
| 1070                    | 0.7                       | 1.65   | 0.78                       | 1.21  | -0.44  | 4                         | 4                        | 4280                                    | 7062                           | 4280                                   | 5178.8                          | -1883.2                                      | -8                | Nonforest Group 1                  |
| 1010                    | 0.8                       | 1.1  | 0.72                       | 1.54  | 0.44   | 5                         | 5                        | 5050                                    | 5555                           | 5050                                   | 7777                            | 2222   | 8                 |                                    |
| 2290                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 4580                                    | 2519                           | 4580                                   | 503.8                           | -2015.2                                      | -8                | Forest Group B                     |
| 4940                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 9880                                    | 5434                           | 9880                                   | 1086.8                          | -4347.2                                      | -8                |                                    |
| 180                     | 0.8                       | 1.1  | 0.96                       | 0.22  | -0.88  | 3                         | 3                        | 540                                     | 594                            | 540                                    | 118.8                           | -475.2                                       | -16               | Alden Cr                           |
| 380                     | 0.8                       | 1.1  | 0.94                       | 0.33  | -0.77  | 4                         | 4                        | 1520                                    | 1672                           | 1520                                   | 501.6                           | -1170.4                                      | -14               |                                    |
| 340                     | 0.9                       | 0.55   | 0.95                       | 0.275   | -0.28  | 4                         | 4                        | 1360                                    | 748                            | 1360                                   | 374                             | -374   | -5                | Forest Group A                     |
| 760                     | 0.8                       | 1.1  | 0.95                       | 0.275   | -0.82  | 4                         | 4                        | 3040                                    | 3344                           | 3040                                   | 836                             | -2508  | -15               |                                    |
| 1700                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 3400                                    | 1870                           | 3400                                   | 374                             | -1496  | -8                | Forest Group B                     |
| 770                     | 0.8                       | 1.1  | 0.96                       | 0.22  | -0.88  | 3                         | 3                        | 2310                                    | 2541                           | 2310                                   | 508.2                           | -2032.8                                      | -16               |                                    |
| 2840                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 5680                                    | 3124                           | 5680                                   | 624.8                           | -2499.2                                      | -8                | Sheep Run Cr                       |
| 1520                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1520                                    | 836                            | 1520                                   | 167.2                           | -668.8                                       | -8                |                                    |
| 210                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 210                                     | 231                            | 210                                    | 23.1                            | -207.9                                       | -18               | Forest Group A                     |
| 1060                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1060                                    | 583                            | 1060                                   | 116.6                           | -466.4                                       | -8                |                                    |
| 2290                    | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 4580                                    | 5038                           | 4580                                   | 503.8                           | -4534.2                                      | -18               | Forest Group B                     |
| 1630                    | 0.7                       | 1.65   | 0.94                       | 0.33  | -1.32  | 2                         | 2                        | 3260                                    | 5379                           | 3260                                   | 1075.8                          | -4303.2                                      | -24               |                                    |
| 610                     | 0.6                       | 2.2  | 0.86                       | 0.77  | -1.43  | 3                         | 3                        | 1830                                    | 4026                           | 1830                                   | 1409.1                          | -2616.9                                      | -26               | Nonforest Group 1                  |
| 320                     | 0.5                       | 2.75   | 0.86                       | 0.77  | -1.98  | 3                         | 3                        | 960                                     | 2640                           | 960                                    | 739.2                           | -1900.8                                      | -36               |                                    |
| 320                     | 0.6                       | 2.2  | 0.78                       | 1.21  | -0.99  | 4                         | 4                        | 1280                                    | 2816                           | 1280                                   | 1548.8                          | -1267.2                                      | -18               |                                    |
|                         |                           |  |                            |   |  |                           | <b>Total</b>             | <b>244,030</b>                          | <b>213,488</b>                 | <b>244,030</b>                         | <b>100,419</b>                  | <b>-113,069</b>                              | <b>-10</b>        |                                    |

**Table F-59. Existing and potential solar loads for the Upper North Fork Coeur d'Alene River (AU# 015\_03).**

| Segment Length (meters)              | Existing Shade (fraction) | Existing Summer Load (kWh/m <sup>2</sup> /day) | Potential Shade (fraction) | Potential Summer Load (kWh/m <sup>2</sup> /day) | Potential Load minus Existing load (kWh/m <sup>2</sup> /day) | Existing Stream Width (m) | Natural Stream Width (m) | Existing Segment Area (m <sup>2</sup> ) | Existing Summer Load (kWh/day) | Natural Segment Area (m <sup>2</sup> ) | Potential Summer Load (kWh/day) | Potential Load minus Existing Load (kWh/day) | Lack of Shade (%) | NF Coeur d'Alene River |              |
|--------------------------------------|---------------------------|--|----------------------------|---|--|---------------------------|--------------------------|---|--------------------------------|--|---------------------------------|--|-------------------|------------------------|--------------|
| Assessment Unit # ID17010301PN015_03 |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |                        |              |
| 280                                  | 0.7                       | 1.65   | 0.72                       | 1.54  | -0.11  | 5                         | 5                        | 1400                                    | 2310                           | 1400                                   | 2156                            | -154   | -2                | Nonforest Group 1      |              |
| 310                                  | 0.6                       | 2.2  | 0.72                       | 1.54  | -0.66  | 5                         | 5                        | 1550                                    | 3410                           | 1550                                   | 2387                            | -1023  | -12               |                        | Deer Cr      |
| 1240                                 | 0.7                       | 1.65   | 0.65                       | 1.925   | 0.27   | 6                         | 6                        | 7440                                    | 12276                          | 7440                                   | 14322                           | 2046   | 5                 |                        |              |
| 850                                  | 0.6                       | 2.2  | 0.65                       | 1.925   | -0.28  | 6                         | 6                        | 5100                                    | 11220                          | 5100                                   | 9817.5                          | -1402.5                                      | -5                |                        | NF CDA River |
| 210                                  | 0.5                       | 2.75   | 0.78                       | 1.21  | -1.54  | 4                         | 4                        | 840                                     | 2310                           | 840                                    | 1016.4                          | -1293.6                                      | -28               |                        |              |
| 270                                  | 0.6                       | 2.2  | 0.78                       | 1.21  | -0.99  | 4                         | 4                        | 1080                                    | 2376                           | 1080                                   | 1306.8                          | -1069.2                                      | -18               |                        |              |
| 810                                  | 0.5                       | 2.75   | 0.78                       | 1.21  | -1.54  | 4                         | 4                        | 3240                                    | 8910                           | 3240                                   | 3920.4                          | -4989.6                                      | -28               |                        |              |
| 370                                  | 0.7                       | 1.65   | 0.78                       | 1.21  | -0.44  | 4                         | 4                        | 1480                                    | 2442                           | 1480                                   | 1790.8                          | -651.2                                       | -8                |                        |              |
| 2440                                 | 0.5                       | 2.75   | 0.72                       | 1.54  | -1.21  | 5                         | 5                        | 12200                                   | 33550                          | 12200                                  | 18788                           | -14762                                       | -22               |                        |              |
| 1020                                 | 0.6                       | 2.2  | 0.65                       | 1.925   | -0.28  | 6                         | 6                        | 6120                                    | 13464                          | 6120                                   | 11781                           | -1683  | -5                |                        |              |
| 1160                                 | 0.5                       | 2.75   | 0.65                       | 1.925   | -0.83  | 6                         | 6                        | 6960                                    | 19140                          | 6960                                   | 13398                           | -5742  | -15               |                        |              |
|                                      |                           |  |                            |   |  | <b>Total</b>              |                          | <b>47,410</b>                           | <b>111,408</b>                 | <b>47,410</b>                          | <b>80,684</b>                   | <b>-30,724</b>                               | <b>-13</b>        |                        |              |

**Table F-60. Existing and potential solar loads for the North Fork Coeur d'Alene River (AU# 015\_04).**

| Segment Length (meters)              | Existing Shade (fraction) | Existing Summer Load (kWh/m <sup>2</sup> /day) | Potential Shade (fraction) | Potential Summer Load (kWh/m <sup>2</sup> /day) | Potential Load minus Existing load (kWh/m <sup>2</sup> /day) | Existing Stream Width (m) | Natural Stream Width (m) | Existing Segment Area (m <sup>2</sup> ) | Existing Summer Load (kWh/day) | Natural Segment Area (m <sup>2</sup> ) | Potential Summer Load (kWh/day) | Potential Load minus Existing Load (kWh/day) | Lack of Shade (%) | NF Coeur d'Alene River |  |
|--------------------------------------|---------------------------|--|----------------------------|---|--|---------------------------|--------------------------|---|--------------------------------|--|---------------------------------|--|-------------------|------------------------|--|
| Assessment Unit # ID17010301PN015_04 |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |                        |  |
| 950                                  | 0.4                       | 3.3  | 0.65                       | 1.925   | -1.38  | 6                         | 6                        | 5700                                    | 18810                          | 5700                                   | 10972.5                         | -7837.5                                      | -25               | Nonforest Group 1      |  |
| 380                                  | 0.2                       | 4.4  | 0.6                        | 2.2   | -2.20  | 7                         | 7                        | 2660                                    | 11704                          | 2660                                   | 5852                            | -5852  | -40               |                        |  |
| 960                                  | 0.3                       | 3.85   | 0.6                        | 2.2   | -1.65  | 7                         | 7                        | 6720                                    | 25872                          | 6720                                   | 14784                           | -11088                                       | -30               |                        |  |
| 1140                                 | 0.5                       | 2.75   | 0.6                        | 2.2   | -0.55  | 7                         | 7                        | 7980                                    | 21945                          | 7980                                   | 17556                           | -4389  | -10               |                        |  |
| 1480                                 | 0.4                       | 3.3  | 0.55                       | 2.475   | -0.83  | 8                         | 8                        | 11840                                   | 39072                          | 11840                                  | 29304                           | -9768  | -15               |                        |  |
| 2620                                 | 0.5                       | 2.75   | 0.52                       | 2.64  | -0.11  | 9                         | 9                        | 23580                                   | 64845                          | 23580                                  | 62251.2                         | -2593.8                                      | -2                |                        |  |
| 2500                                 | 0.4                       | 3.3  | 0.48                       | 2.86  | -0.44  | 10                        | 10                       | 25000                                   | 82500                          | 25000                                  | 71500                           | -11000                                       | -8                |                        |  |
| 920                                  | 0.3                       | 3.85   | 0.45                       | 3.025   | -0.82  | 11                        | 11                       | 10120                                   | 38962                          | 10120                                  | 30613                           | -8349  | -15               |                        |  |
| 350                                  | 0.4                       | 3.3  | 0.45                       | 3.025   | -0.27  | 11                        | 11                       | 3850                                    | 12705                          | 3850                                   | 11646.25                        | -1058.75                                     | -5                |                        |  |
| 750                                  | 0.3                       | 3.85   | 0.41                       | 3.245   | -0.60  | 12                        | 12                       | 9000                                    | 34650                          | 9000                                   | 29205                           | -5445  | -11               |                        |  |
| 880                                  | 0.4                       | 3.3  | 0.41                       | 3.245   | -0.05  | 12                        | 12                       | 10560                                   | 34848                          | 10560                                  | 34267.2                         | -580.8                                       | -1                |                        |  |
|                                      |                           |  |                            |   |  | <b>Total</b>              |                          | <b>117,010</b>                          | <b>385,913</b>                 | <b>117,010</b>                         | <b>317,951</b>                  | <b>-67,962</b>                               | <b>-15</b>        |                        |  |

**Table F-61. Existing and potential solar loads for the North Fork Coeur d'Alene River tributaries (AU# 013\_02).**

| Segment Length (meters) | Existing Shade (fraction) | Existing Summer Load (kWh/m <sup>2</sup> /day) | Potential Shade (fraction) | Potential Summer Load (kWh/m <sup>2</sup> /day) | Potential Load minus Existing load (kWh/m <sup>2</sup> /day) | Existing Stream Width (m) | Natural Stream Width (m) | Existing Segment Area (m <sup>2</sup> ) | Existing Summer Load (kWh/day) | Natural Segment Area (m <sup>2</sup> ) | Potential Summer Load (kWh/day) | Potential Load minus Existing Load (kWh/day) | Lack of Shade (%) | NF CDA River Tributaries |
|-------------------------|---------------------------|--|----------------------------|---|--|---------------------------|--------------------------|---|--------------------------------|--|---------------------------------|--|-------------------|--------------------------|
| AU# ID17010301PN013_02  |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |                          |
| 1500                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1500                                    | 825                            | 1500                                   | 165                             | -660   | -8                | Forest                   |
| 610                     | 0.7                       | 1.65   | 0.94                       | 0.33  | -1.32  | 2                         | 2                        | 1220                                    | 2013                           | 1220                                   | 402.6                           | -1610.4                                      | -24               | Group 1                  |
| 1150                    | 0.9                       | 0.55   | 0.96                       | 0.22  | -0.33  | 2                         | 2                        | 2300                                    | 1265                           | 2300                                   | 506                             | -759   | -6                | Group D                  |
| 2250                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 4500                                    | 2475                           | 4500                                   | 495                             | -1980  | -8                | Group B                  |
| 1200                    | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 1200                                    | 1320                           | 1200                                   | 132                             | -1188  | -18               | Group C                  |
| 520                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 520                                     | 286                            | 520                                    | 57.2                            | -228.8                                       | -8                | Group B                  |
| 1000                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1000                                    | 550                            | 1000                                   | 110                             | -440   | -8                | Group C                  |
| 1500                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 3000                                    | 1650                           | 3000                                   | 330                             | -1320  | -8                | Group B                  |
| 1800                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 3600                                    | 1980                           | 3600                                   | 396                             | -1584  | -8                | Group B                  |
| 880                     | 0.9                       | 0.55   | 0.95                       | 0.275   | -0.275   | 1                         | 1                        | 880                                     | 484                            | 880                                    | 242                             | -242   | -5                | Group A                  |
| 880                     | 0.9                       | 0.55   | 0.94                       | 0.33  | -0.22  | 2                         | 2                        | 1760                                    | 968                            | 1760                                   | 580.8                           | -387.2                                       | -4                | Group A                  |
| 1100                    | 0.8                       | 1.1  | 0.86                       | 0.77  | -0.33  | 3                         | 3                        | 3300                                    | 3630                           | 3300                                   | 2541                            | -1089  | -6                | Nonforest                |
| 410                     | 0.8                       | 1.1  | 0.78                       | 1.21  | 0.11   | 4                         | 4                        | 1640                                    | 1804                           | 1640                                   | 1984.4                          | 180.4  | 0                 | Group 1                  |
| 1200                    | 0.7                       | 1.65   | 0.78                       | 1.21  | -0.44  | 4                         | 4                        | 4800                                    | 7920                           | 4800                                   | 5808                            | -2112  | -8                | Group 1                  |
| 170                     | 0.8                       | 1.1  | 0.96                       | 0.22  | -0.88  | 4                         | 4                        | 680                                     | 748                            | 680                                    | 149.6                           | -598.4                                       | -16               | Group B                  |
| 1500                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1500                                    | 825                            | 1500                                   | 165                             | -660   | -8                | Group B                  |
| 2500                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 5000                                    | 2750                           | 5000                                   | 550                             | -2200  | -8                | Group B                  |
| 2400                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 2400                                    | 1320                           | 2400                                   | 264                             | -1056  | -8                | Group B                  |
| 220                     | 0.8                       | 1.1  | 0.97                       | 0.165   | -0.935   | 1                         | 1                        | 220                                     | 242                            | 220                                    | 36.3                            | -205.7                                       | -17               | Group 1                  |
| 1100                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1100                                    | 605                            | 1100                                   | 121                             | -484   | -8                | Group B                  |
| 110                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 110                                     | 121                            | 110                                    | 12.1                            | -108.9                                       | -18               | Group B                  |
| 110                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 110                                     | 60.5                           | 110                                    | 12.1                            | -48.4  | -8                | Group B                  |
| 240                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 240                                     | 264                            | 240                                    | 26.4                            | -237.6                                       | -18               | Group B                  |
| 930                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 930                                     | 511.5                          | 930                                    | 102.3                           | -409.2                                       | -8                | Group B                  |
| 120                     | 0.8                       | 1.1  | 0.95                       | 0.275   | -0.825   | 1                         | 1                        | 120                                     | 132                            | 120                                    | 33                              | -99  | -15               | Group A                  |
| 2200                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 2200                                    | 1210                           | 2200                                   | 242                             | -968   | -8                | Group B                  |
| 110                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 220                                     | 242                            | 220                                    | 24.2                            | -217.8                                       | -18               | Group B                  |
| 60                      | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 120                                     | 66                             | 120                                    | 13.2                            | -52.8  | -8                | Group B                  |
| 460                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 920                                     | 1012                           | 920                                    | 101.2                           | -910.8                                       | -18               | Group B                  |
| 190                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 380                                     | 209                            | 380                                    | 41.8                            | -167.2                                       | -8                | Group B                  |
| 850                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 1700                                    | 1870                           | 1700                                   | 187                             | -1683  | -18               | Group B                  |
| 410                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 820                                     | 451                            | 820                                    | 90.2                            | -360.8                                       | -8                | Group B                  |
| 1800                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1800                                    | 990                            | 1800                                   | 198                             | -792   | -8                | Group B                  |
| 430                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 430                                     | 473                            | 430                                    | 47.3                            | -425.7                                       | -18               | Group B                  |
| 1800                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1800                                    | 990                            | 1800                                   | 198                             | -792   | -8                | Group B                  |
| 2000                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 2000                                    | 1100                           | 2000                                   | 220                             | -880   | -8                | Group B                  |
| 750                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 750                                     | 412.5                          | 750                                    | 82.5                            | -330   | -8                | Group C                  |
| 1650                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1650                                    | 907.5                          | 1650                                   | 181.5                           | -726   | -8                | Group B                  |
| 160                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 320                                     | 352                            | 320                                    | 35.2                            | -316.8                                       | -18               | Group B                  |
| 80                      | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 160                                     | 88                             | 160                                    | 17.6                            | -70.4  | -8                | Group B                  |
| 120                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 240                                     | 264                            | 240                                    | 26.4                            | -237.6                                       | -18               | Group B                  |
| 2300                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 4600                                    | 2530                           | 4600                                   | 506                             | -2024  | -8                | Group B                  |
| 90                      | 0.8                       | 1.1  | 0.97                       | 0.165   | -0.935   | 3                         | 3                        | 270                                     | 297                            | 270                                    | 44.55                           | -252.45                                      | -17               | Group B                  |
| 540                     | 0.9                       | 0.55   | 0.97                       | 0.165   | -0.385   | 3                         | 3                        | 1620                                    | 891                            | 1620                                   | 267.3                           | -623.7                                       | -7                | Group B                  |
| 230                     | 0.8                       | 1.1  | 0.97                       | 0.165   | -0.935   | 3                         | 3                        | 690                                     | 759                            | 690                                    | 113.85                          | -645.15                                      | -17               | Group B                  |
| 760                     | 0.9                       | 0.55   | 0.97                       | 0.165   | -0.385   | 3                         | 3                        | 2280                                    | 1254                           | 2280                                   | 376.2                           | -877.8                                       | -7                | Group B                  |
| 290                     | 0.7                       | 1.65   | 0.86                       | 0.77  | -0.88  | 3                         | 3                        | 870                                     | 1435.5                         | 870                                    | 669.9                           | -765.6                                       | -16               | Group 1                  |
| 2000                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 2000                                    | 1100                           | 2000                                   | 220                             | -880   | -8                | Group B                  |
| 3000                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 6000                                    | 3300                           | 6000                                   | 660                             | -2640  | -8                | Group B                  |
| 1300                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1300                                    | 715                            | 1300                                   | 143                             | -572   | -8                | Group B                  |
| 540                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 1080                                    | 1188                           | 1080                                   | 118.8                           | -1069.2                                      | -18               | Group B                  |
| 1300                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 2600                                    | 1430                           | 2600                                   | 286                             | -1144  | -8                | Group B                  |
| 570                     | 0.8                       | 1.1  | 0.97                       | 0.165   | -0.935   | 3                         | 3                        | 1710                                    | 1881                           | 1710                                   | 282.15                          | -1598.85                                     | -17               | Group B                  |
| 350                     | 0.9                       | 0.55   | 0.97                       | 0.165   | -0.385   | 3                         | 3                        | 1050                                    | 577.5                          | 1050                                   | 173.25                          | -404.25                                      | -7                | Group B                  |
| 270                     | 0.8                       | 1.1  | 0.97                       | 0.165   | -0.935   | 3                         | 3                        | 810                                     | 891                            | 810                                    | 133.65                          | -757.35                                      | -17               | Group B                  |
| 450                     | 0.9                       | 0.55   | 0.97                       | 0.165   | -0.385   | 3                         | 3                        | 1350                                    | 742.5                          | 1350                                   | 222.75                          | -519.75                                      | -7                | Group B                  |
| <b>Total</b>            |                           |  |                            |   |  |                           |                          | <b>87,370</b>                           | <b>64,378</b>                  | <b>87,370</b>                          | <b>21,145</b>                   | <b>-43,232</b>                               | <b>-11</b>        |                          |

**Table F-62. Existing and potential solar loads for the North Fork Coeur d'Alene River (AU# 013\_04).**

| Segment Length (meters)              | Existing Shade (fraction) | Existing Summer Load (kWh/m <sup>2</sup> /day) | Potential Shade (fraction) | Potential Summer Load (kWh/m <sup>2</sup> /day) | Potential Load minus Existing load (kWh/m <sup>2</sup> /day) | Existing Stream Width (m) | Natural Stream Width (m) | Existing Segment Area (m <sup>2</sup> ) | Existing Summer Load (kWh/day) | Natural Segment Area (m <sup>2</sup> ) | Potential Summer Load (kWh/day) | Potential Load minus Existing Load (kWh/day) | Lack of Shade (%) | NF Coeur d'Alene River |  |
|--------------------------------------|---------------------------|--|----------------------------|---|--|---------------------------|--------------------------|---|--------------------------------|--|---------------------------------|--|-------------------|------------------------|--|
| Assessment Unit # ID17010301PN013_04 |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |                        |  |
| 3440                                 | 0.2                       | 4.4  | 0.39                       | 3.355   | -1.05  | 13                        | 13                       | 44720                                   | 196768                         | 44720                                  | 150035.6                        | -46732.4                                     | -19               | Nonforest Group 1      |  |
| 2480                                 | 0.3                       | 3.85   | 0.37                       | 3.465   | -0.39  | 14                        | 14                       | 34720                                   | 133672                         | 34720                                  | 120304.8                        | -13367.2                                     | -7                |                        |  |
| 470                                  | 0.2                       | 4.4  | 0.35                       | 3.575   | -0.83  | 15                        | 15                       | 7050                                    | 31020                          | 7050                                   | 25203.75                        | -5816.25                                     | -15               |                        |  |
| 800                                  | 0.3                       | 3.85   | 0.35                       | 3.575   | -0.27  | 15                        | 15                       | 12000                                   | 46200                          | 12000                                  | 42900                           | -3300  | -5                |                        |  |
| 630                                  | 0.2                       | 4.4  | 0.33                       | 3.685   | -0.72  | 16                        | 16                       | 10080                                   | 44352                          | 10080                                  | 37144.8                         | -7207.2                                      | -13               |                        |  |
| 450                                  | 0.3                       | 3.85   | 0.33                       | 3.685   | -0.17  | 16                        | 16                       | 7200                                    | 27720                          | 7200                                   | 26532                           | -1188  | -3                |                        |  |
| 1690                                 | 0.2                       | 4.4  | 0.32                       | 3.74  | -0.66  | 17                        | 17                       | 28730                                   | 126412                         | 28730                                  | 107450.2                        | -18961.8                                     | -12               |                        |  |
| 1150                                 | 0.1                       | 4.95   | 0.3                        | 3.85  | -1.10  | 18                        | 18                       | 20700                                   | 102465                         | 20700                                  | 79695                           | -22770                                       | -20               |                        |  |
| 330                                  | 0.2                       | 4.4  | 0.3                        | 3.85  | -0.55  | 18                        | 18                       | 5940                                    | 26136                          | 5940                                   | 22869                           | -3267  | -10               |                        |  |
| 1070                                 | 0.1                       | 4.95   | 0.29                       | 3.905   | -1.05  | 19                        | 19                       | 20330                                   | 100633.5                       | 20330                                  | 79388.65                        | -21244.85                                    | -19               |                        |  |
| 250                                  | 0.2                       | 4.4  | 0.29                       | 3.905   | -0.50  | 19                        | 19                       | 4750                                    | 20900                          | 4750                                   | 18548.75                        | -2351.25                                     | -9                |                        |  |
| 580                                  | 0.1                       | 4.95   | 0.29                       | 3.905   | -1.05  | 20                        | 19                       | 11600                                   | 57420                          | 11020                                  | 43033.1                         | -14386.9                                     | -19               |                        |  |
|                                      |                           |  |                            |   |  |                           | <b>Total</b>             | <b>207,820</b>                          | <b>913,699</b>                 | <b>207,240</b>                         | <b>753,106</b>                  | <b>-160,593</b>                              | <b>-13</b>        |                        |  |

**Table F-63. Existing and potential solar loads for the Lower North Fork Coeur d'Alene River (AU# 013\_05).**

| Segment Length (meters)              | Existing Shade (fraction) | Existing Summer Load (kWh/m <sup>2</sup> /day) | Potential Shade (fraction) | Potential Summer Load (kWh/m <sup>2</sup> /day) | Potential Load minus Existing load (kWh/m <sup>2</sup> /day) | Existing Stream Width (m) | Natural Stream Width (m) | Existing Segment Area (m <sup>2</sup> ) | Existing Summer Load (kWh/day) | Natural Segment Area (m <sup>2</sup> ) | Potential Summer Load (kWh/day) | Potential Load minus Existing Load (kWh/day) | Lack of Shade (%) | NF Coeur d'Alene River |  |
|--------------------------------------|---------------------------|--|----------------------------|---|--|---------------------------|--------------------------|---|--------------------------------|--|---------------------------------|--|-------------------|------------------------|--|
| Assessment Unit # ID17010301PN013_05 |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |                        |  |
| 630                                  | 0                         | 5.5  | 0.25                       | 4.125   | -1.38  | 20                        | 20                       | 12600                                   | 69300                          | 12600                                  | 51975                           | -17325                                       | -25               | Nonforest Group 2      |  |
| 220                                  | 0.1                       | 4.95   | 0.25                       | 4.125   | -0.83  | 20                        | 20                       | 4400                                    | 21780                          | 4400                                   | 18150                           | -3630  | -15               |                        |  |
| 1400                                 | 0                         | 5.5  | 0.25                       | 4.125   | -1.38  | 21                        | 20                       | 29400                                   | 161700                         | 28000                                  | 115500                          | -46200                                       | -25               |                        |  |
| 380                                  | 0.1                       | 4.95   | 0.25                       | 4.125   | -0.83  | 22                        | 21                       | 8360                                    | 41382                          | 7980                                   | 32917.5                         | -8464.5                                      | -15               |                        |  |
| 430                                  | 0                         | 5.5  | 0.25                       | 4.125   | -1.38  | 22                        | 21                       | 9460                                    | 52030                          | 9030                                   | 37248.75                        | -14781.25                                    | -25               |                        |  |
| 1000                                 | 0.2                       | 4.4  | 0.25                       | 4.125   | -0.28  | 22                        | 21                       | 22000                                   | 96800                          | 21000                                  | 86625                           | -10175                                       | -5                |                        |  |
| 490                                  | 0                         | 5.5  | 0.24                       | 4.18  | -1.32  | 23                        | 22                       | 11270                                   | 61985                          | 10780                                  | 45060.4                         | -16924.6                                     | -24               |                        |  |
| 440                                  | 0.2                       | 4.4  | 0.24                       | 4.18  | -0.22  | 23                        | 22                       | 10120                                   | 44528                          | 9680                                   | 40462.4                         | -4065.6                                      | -4                |                        |  |
| 360                                  | 0.1                       | 4.95   | 0.24                       | 4.18  | -0.77  | 23                        | 22                       | 8280                                    | 40986                          | 7920                                   | 33105.6                         | -7880.4                                      | -14               |                        |  |
| 1490                                 | 0                         | 5.5  | 0.23                       | 4.235   | -1.27  | 24                        | 23                       | 35760                                   | 196680                         | 34270                                  | 145133.45                       | -51546.55                                    | -23               |                        |  |
| 170                                  | 0.1                       | 4.95   | 0.23                       | 4.235   | -0.72  | 25                        | 23                       | 4250                                    | 21037.5                        | 3910                                   | 16558.85                        | -4478.65                                     | -13               |                        |  |
| 700                                  | 0                         | 5.5  | 0.23                       | 4.235   | -1.27  | 25                        | 23                       | 17500                                   | 96250                          | 16100                                  | 68183.5                         | -28066.5                                     | -23               |                        |  |
| 1500                                 | 0.1                       | 4.95   | 0.22                       | 4.29  | -0.66  | 26                        | 24                       | 39000                                   | 193050                         | 36000                                  | 154440                          | -38610                                       | -12               |                        |  |
| 1010                                 | 0.2                       | 4.4  | 0.21                       | 4.345   | -0.05  | 27                        | 25                       | 27270                                   | 119988                         | 25250                                  | 109711.25                       | -10276.75                                    | -1                |                        |  |
| 1270                                 | 0                         | 5.5  | 0.2                        | 4.4   | -1.10  | 28                        | 26                       | 35560                                   | 195580                         | 33020                                  | 145288                          | -50292                                       | -20               |                        |  |
| 590                                  | 0.1                       | 4.95   | 0.2                        | 4.4   | -0.55  | 28                        | 26                       | 16520                                   | 81774                          | 15340                                  | 67496                           | -14278                                       | -10               |                        |  |
| 280                                  | 0                         | 5.5  | 0.2                        | 4.4   | -1.10  | 29                        | 27                       | 8120                                    | 44660                          | 7560                                   | 33264                           | -11396                                       | -20               |                        |  |
| 200                                  | 0.1                       | 4.95   | 0.2                        | 4.4   | -0.55  | 29                        | 27                       | 5800                                    | 28710                          | 5400                                   | 23760                           | -4950  | -10               |                        |  |
| 1130                                 | 0                         | 5.5  | 0.2                        | 4.4   | -1.10  | 29                        | 27                       | 32770                                   | 180235                         | 30510                                  | 134244                          | -45991                                       | -20               |                        |  |
| 690                                  | 0.2                       | 4.4  | 0.19                       | 4.455   | 0.05   | 30                        | 28                       | 20700                                   | 91080                          | 19320                                  | 86070.6                         | -5009.4                                      | 0                 |                        |  |
| 630                                  | 0.1                       | 4.95   | 0.19                       | 4.455   | -0.50  | 30                        | 28                       | 18900                                   | 93555                          | 17640                                  | 78586.2                         | -14968.8                                     | -9                |                        |  |
| 1300                                 | 0.2                       | 4.4  | 0.19                       | 4.455   | 0.05   | 31                        | 28                       | 40300                                   | 177320                         | 36400                                  | 162162                          | -15158                                       | 0                 |                        |  |
| 3440                                 | 0.1                       | 4.95   | 0.19                       | 4.455   | -0.50  | 33                        | 29                       | 113520                                  | 561924                         | 99760                                  | 444430.8                        | -117493.2                                    | -9                |                        |  |
|                                      |                           |  |                            |   |  |                           | <b>Total</b>             | <b>531,860</b>                          | <b>2,672,335</b>               | <b>491,870</b>                         | <b>2,130,373</b>                | <b>-541,961</b>                              | <b>-14</b>        |                        |  |

**Table F-64. Existing and potential solar loads for the Lower North Fork Coeur d'Alene River (AU# 001\_05a).**

| Segment Length (meters)               | Existing Shade (fraction) | Existing Summer Load (kWh/m <sup>2</sup> /day) | Potential Shade (fraction) | Potential Summer Load (kWh/m <sup>2</sup> /day) | Potential Load minus Existing load (kWh/m <sup>2</sup> /day) | Existing Stream Width (m) | Natural Stream Width (m) | Existing Segment Area (m <sup>2</sup> ) | Existing Summer Load (kWh/day) | Natural Segment Area (m <sup>2</sup> ) | Potential Summer Load (kWh/day) | Potential Load minus Existing Load (kWh/day) | Lack of Shade (%) | NF Coeur d'Alene River |
|---------------------------------------|---------------------------|--|----------------------------|---|--|---------------------------|--------------------------|---|--------------------------------|--|---------------------------------|--|-------------------|------------------------|
| Assessment Unit # ID17010301PN001_05a |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |                        |
| 2290                                  | 0.2                       | 4.4  | 0.18                       | 4.51  | 0.11   | 35                        | 30                       | 80150                                   | 352660                         | 68700                                  | 309837                          | -42823                                       | 0                 | Nonforest Group 2      |
| 1210                                  | 0.1                       | 4.95   | 0.18                       | 4.51  | -0.44  | 36                        | 31                       | 43560                                   | 215622                         | 37510                                  | 169170.1                        | -46451.9                                     | -8                |                        |
| 860                                   | 0.2                       | 4.4  | 0.18                       | 4.51  | 0.11   | 37                        | 31                       | 31820                                   | 140008                         | 26660                                  | 120236.6                        | -19771.4                                     | 0                 |                        |
| 1260                                  | 0.1                       | 4.95   | 0.17                       | 4.565   | -0.39  | 38                        | 32                       | 47880                                   | 237006                         | 40320                                  | 184060.8                        | -52945.2                                     | -7                |                        |
| 610                                   | 0                         | 5.5  | 0.17                       | 4.565   | -0.94  | 39                        | 32                       | 23790                                   | 130845                         | 19520                                  | 89108.8                         | -41736.2                                     | -17               |                        |
| 470                                   | 0.1                       | 4.95   | 0.17                       | 4.565   | -0.39  | 39                        | 33                       | 18330                                   | 90733.5                        | 15510                                  | 70803.15                        | -19930.35                                    | -7                |                        |
| 2590                                  | 0.2                       | 4.4  | 0.16                       | 4.62  | 0.22   | 40                        | 34                       | 103600                                  | 455840                         | 88060                                  | 406837.2                        | -49002.8                                     | 0                 |                        |
| 840                                   | 0.1                       | 4.95   | 0.16                       | 4.62  | -0.33  | 41                        | 35                       | 34440                                   | 170478                         | 29400                                  | 135828                          | -34650                                       | -6                |                        |
| 1230                                  | 0.2                       | 4.4  | 0.16                       | 4.62  | 0.22   | 42                        | 35                       | 51660                                   | 227304                         | 43050                                  | 198891                          | -28413                                       | 0                 |                        |
| 630                                   | 0.1                       | 4.95   | 0.16                       | 4.62  | -0.33  | 43                        | 35                       | 27090                                   | 134095.5                       | 22050                                  | 101871                          | -32224.5                                     | -6                |                        |
| 5490                                  | 0.2                       | 4.4  | 0.15                       | 4.675   | 0.27   | 48                        | 38                       | 263520                                  | 1159488                        | 208620                                 | 975298.5                        | -184189.5                                    | 0                 |                        |
| 1370                                  | 0.1                       | 4.95   | 0.14                       | 4.73  | -0.22  | 47                        | 41                       | 64390                                   | 318730.5                       | 56170                                  | 265684.1                        | -53046.4                                     | -4                |                        |
| 5120                                  | 0                         | 5.5  | 0.13                       | 4.785   | -0.72  | 47                        | 44                       | 240640                                  | 1323520                        | 225280                                 | 1077964.8                       | -245555.2                                    | -13               |                        |
| <b>Total</b>                          |                           |  |                            |   |  |                           |                          | <b>1,030,870</b>                        | <b>4,956,331</b>               | <b>880,850</b>                         | <b>4,105,591</b>                | <b>-850,739</b>                              | <b>-5</b>         |                        |

**Table F-65. Existing and potential solar loads for the Lower North Fork Coeur d'Alene River (AU# 001\_05).**

| Segment Length (meters)              | Existing Shade (fraction) | Existing Summer Load (kWh/m <sup>2</sup> /day) | Potential Shade (fraction) | Potential Summer Load (kWh/m <sup>2</sup> /day) | Potential Load minus Existing load (kWh/m <sup>2</sup> /day) | Existing Stream Width (m) | Natural Stream Width (m) | Existing Segment Area (m <sup>2</sup> ) | Existing Summer Load (kWh/day) | Natural Segment Area (m <sup>2</sup> ) | Potential Summer Load (kWh/day) | Potential Load minus Existing Load (kWh/day) | Lack of Shade (%) | NF Coeur d'Alene River |  |
|--------------------------------------|---------------------------|--|----------------------------|---|--|---------------------------|--------------------------|---|--------------------------------|--|---------------------------------|--|-------------------|------------------------|--|
| Assessment Unit # ID17010301PN001_05 |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |                        |  |
| 4140                                 | 0.1                       | 4.95   | 0.12                       | 4.84  | -0.11  | 46                        | 46                       | 190440                                  | 942678                         | 190440                                 | 921729.6                        | -20948.4                                     | -2                |                        |  |
| 880                                  | 0                         | 5.5  | 0.12                       | 4.84  | -0.66  | 47                        | 47                       | 41360                                   | 227480                         | 41360                                  | 200182.4                        | -27297.6                                     | -12               |                        |  |
| 1280                                 | 0.1                       | 4.95   | 0.12                       | 4.84  | -0.11  | 47                        | 47                       | 60160                                   | 297792                         | 60160                                  | 291174.4                        | -6617.6                                      | -2                |                        |  |
| 960                                  | 0                         | 5.5  | 0.12                       | 4.84  | -0.66  | 47                        | 47                       | 45120                                   | 248160                         | 45120                                  | 218380.8                        | -29779.2                                     | -12               |                        |  |
| 1260                                 | 0.1                       | 4.95   | 0.12                       | 4.84  | -0.11  | 47                        | 47                       | 59220                                   | 293139                         | 59220                                  | 286624.8                        | -6514.2                                      | -2                |                        |  |
| 980                                  | 0                         | 5.5  | 0.12                       | 4.84  | -0.66  | 48                        | 48                       | 47040                                   | 258720                         | 47040                                  | 227673.6                        | -31046.4                                     | -12               |                        |  |
| 830                                  | 0.1                       | 4.95   | 0.12                       | 4.84  | -0.11  | 48                        | 48                       | 39840                                   | 197208                         | 39840                                  | 192825.6                        | -4382.4                                      | -2                |                        |  |
| 8020                                 | 0                         | 5.5  | 0.12                       | 4.84  | -0.66  | 49                        | 49                       | 392980                                  | 2161390                        | 392980                                 | 1902023                         | -259367                                      | -12               |                        |  |
| 420                                  | 0.1                       | 4.95   | 0.11                       | 4.895   | -0.05  | 50                        | 50                       | 21000                                   | 103950                         | 21000                                  | 102795                          | -1155  | -1                |                        |  |
| 8030                                 | 0                         | 5.5  | 0.11                       | 4.895   | -0.61  | 51                        | 51                       | 409530                                  | 2252415                        | 409530                                 | 2004649                         | -247766                                      | -11               |                        |  |
| 660                                  | 0.1                       | 4.95   | 0.11                       | 4.895   | -0.05  | 51                        | 51                       | 33660                                   | 166617                         | 33660                                  | 164765.7                        | -1851.3                                      | -1                |                        |  |
| 1480                                 | 0                         | 5.5  | 0.11                       | 4.895   | -0.61  | 52                        | 52                       | 76960                                   | 423280                         | 76960                                  | 376719.2                        | -46560.8                                     | -11               |                        |  |
| 550                                  | 0.1                       | 4.95   | 0.11                       | 4.895   | -0.05  | 52                        | 52                       | 28600                                   | 141570                         | 28600                                  | 139997                          | -1573  | -1                |                        |  |
| 2160                                 | 0                         | 5.5  | 0.11                       | 4.895   | -0.61  | 52                        | 52                       | 112320                                  | 617760                         | 112320                                 | 549806.4                        | -67953.6                                     | -11               |                        |  |
| 7420                                 | 0                         | 5.5  | 0.1                        | 4.95  | -0.55  | 59                        | 59                       | 437780                                  | 2407790                        | 437780                                 | 2167011                         | -240779                                      | -10               |                        |  |
| <b>Total</b>                         |                           |  |                            |   |  |                           |                          | <b>1,996,010</b>                        | <b>10,739,949</b>              | <b>1,996,010</b>                       | <b>9,746,358</b>                | <b>-993,591</b>                              | <b>-7</b>         |                        |  |

**Table F-66. Existing and potential solar loads for the Lower North Fork Coeur d'Alene River tributaries (AU# 001\_02).**

| Segment Length (meters) | Existing Shade (fraction) | Existing Summer Load (kWh/m <sup>2</sup> /day) | Potential Shade (fraction) | Potential Summer Load (kWh/m <sup>2</sup> /day) | Potential Load minus Existing load (kWh/m <sup>2</sup> /day) | Existing Stream Width (m) | Natural Stream Width (m) | Existing Segment Area (m <sup>2</sup> ) | Existing Summer Load (kWh/day) | Natural Segment Area (m <sup>2</sup> ) | Potential Summer Load (kWh/day) | Potential Load minus Existing Load (kWh/day) | Lack of Shade (%) | Lower CDA River Tributaries  |  |
|-------------------------|---------------------------|--|----------------------------|---|--|---------------------------|--------------------------|---|--------------------------------|--|---------------------------------|--|-------------------|------------------------------|--|
| AU# ID17010301PN001_02  |                           |  |                            |   |  |                           |                          |   |                                |  |                                 |  |                   |                              |  |
| 2600                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 5200                                    | 2860                           | 5200                                   | 572                             | -2288  | -8                | Forest Group B               | Cedar Creek                              |
| 160                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 320                                     | 352                            | 320                                    | 35.2                            | -316.8                                       | -18               |                              |  |
| 690                     | 0.9                       | 0.55   | 0.97                       | 0.165   | -0.385   | 3                         | 3                        | 2070                                    | 1138.5                         | 2070                                   | 341.55                          | -796.95                                      | -7                |                              |  |
| 310                     | 0.7                       | 1.65   | 0.97                       | 0.165   | -1.485   | 3                         | 3                        | 930                                     | 1534.5                         | 930                                    | 153.45                          | -1381.05                                     | -27               |                              |  |
| 200                     | 0.9                       | 0.55   | 0.97                       | 0.165   | -0.385   | 3                         | 3                        | 600                                     | 330                            | 600                                    | 99                              | -231   | -7                |                              |  |
| 200                     | 0.7                       | 1.65   | 0.97                       | 0.165   | -1.485   | 3                         | 3                        | 600                                     | 990                            | 600                                    | 99                              | -891   | -27               |                              |  |
| 160                     | 0.9                       | 0.55   | 0.97                       | 0.165   | -0.385   | 3                         | 3                        | 480                                     | 264                            | 480                                    | 79.2                            | -184.8                                       | -7                |                              |  |
| 900                     | 0.8                       | 1.1  | 0.96                       | 0.22  | -0.88  | 4                         | 4                        | 3600                                    | 3960                           | 3600                                   | 792                             | -3168  | -16               |                              |  |
| 960                     | 0.9                       | 0.55   | 0.96                       | 0.22  | -0.33  | 4                         | 4                        | 3840                                    | 2112                           | 3840                                   | 844.8                           | -1267.2                                      | -6                |                              |  |
| 2200                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 2200                                    | 1210                           | 2200                                   | 242                             | -968   | -8                |                              |  |
| 2900                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 2900                                    | 1595                           | 2900                                   | 319                             | -1276  | -8                | Lansdale Creek Hopkins Creek |  |
| 440                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 880                                     | 968                            | 880                                    | 96.8                            | -871.2                                       | -18               |                              |  |
| 500                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 1000                                    | 1100                           | 1000                                   | 110                             | -990   | -18               |                              |  |
| 300                     | 0.7                       | 1.65   | 0.98                       | 0.11  | -1.54  | 2                         | 2                        | 600                                     | 990                            | 600                                    | 66                              | -924   | -28               |                              |  |
| 190                     | 0.5                       | 2.75   | 0.94                       | 0.33  | -2.42  | 2                         | 2                        | 380                                     | 1045                           | 380                                    | 125.4                           | -919.6                                       | -44               | Nonforest Group 1            |  |
| 450                     | 0.3                       | 3.85   | 0.94                       | 0.33  | -3.52  | 2                         | 2                        | 900                                     | 3465                           | 900                                    | 297                             | -3168  | -64               |                              |  |
| 1900                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1900                                    | 1045                           | 1900                                   | 209                             | -836   | -8                | Group B                      | 1st to Hopkins<br>2nd to Hopkins         |
| 1800                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1800                                    | 990                            | 1800                                   | 198                             | -792   | -8                |                              |  |
| 470                     | 0                         | 5.5  | 0                          | 5.5   | 0  | 1                         | 1                        | 470                                     | 2585                           | 470                                    | 2585                            | 0  | 0                 | Group 1                      | Little Grizzly Creek                     |
| 490                     | 0.7                       | 1.65   | 0.98                       | 0.11  | -1.54  | 1                         | 1                        | 490                                     | 808.5                          | 490                                    | 53.9                            | -754.6                                       | -28               |                              |  |
| 190                     | 0.3                       | 3.85   | 0.98                       | 0.11  | -3.74  | 1                         | 1                        | 190                                     | 731.5                          | 190                                    | 20.9                            | -710.6                                       | -68               |                              |  |
| 2600                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 2600                                    | 1430                           | 2600                                   | 286                             | -1144  | -8                |                              |  |
| 130                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 260                                     | 286                            | 260                                    | 28.6                            | -257.4                                       | -18               | Group 1                      |  |
| 110                     | 0.7                       | 1.65   | 0.94                       | 0.33  | -1.32  | 2                         | 2                        | 220                                     | 363                            | 220                                    | 72.6                            | -290.4                                       | -24               |                              |  |
| 510                     | 0.4                       | 3.3  | 0.94                       | 0.33  | -2.97  | 2                         | 2                        | 1020                                    | 3366                           | 1020                                   | 336.6                           | -3029.4                                      | -54               | Group B                      | Cinnabar Creek<br>Un-named (E of Graham) |
| 2400                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 4800                                    | 2640                           | 4800                                   | 528                             | -2112  | -8                |                              |  |
| 450                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 900                                     | 990                            | 900                                    | 99                              | -891   | -18               |                              |  |
| 260                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 260                                     | 286                            | 260                                    | 28.6                            | -257.4                                       | -18               |                              |  |
| 120                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 120                                     | 66                             | 120                                    | 13.2                            | -52.8  | -8                |                              |  |
| 390                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 390                                     | 429                            | 390                                    | 42.9                            | -386.1                                       | -18               |                              |  |
| 140                     | 0.7                       | 1.65   | 0.98                       | 0.11  | -1.54  | 1                         | 1                        | 140                                     | 231                            | 140                                    | 15.4                            | -215.6                                       | -28               |                              |  |
| 90                      | 0.3                       | 3.85   | 0.98                       | 0.11  | -3.74  | 1                         | 1                        | 90                                      | 346.5                          | 90                                     | 9.9                             | -336.6                                       | -68               |                              |  |
| 240                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 240                                     | 264                            | 240                                    | 26.4                            | -237.6                                       | -18               |                              |  |
| 170                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 170                                     | 93.5                           | 170                                    | 18.7                            | -74.8  | -8                |                              |  |
| 50                      | 0.1                       | 4.95   | 0.98                       | 0.11  | -4.84  | 1                         | 1                        | 50                                      | 247.5                          | 50                                     | 5.5                             | -242   | -88               |                              |  |
| 200                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 200                                     | 110                            | 200                                    | 22                              | -88  | -8                |                              |  |
| 1200                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1200                                    | 660                            | 1200                                   | 132                             | -528   | -8                |                              |  |
| 420                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 840                                     | 924                            | 840                                    | 92.4                            | -831.6                                       | -18               | Silver Creek                 |  |
| 1600                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 3200                                    | 1760                           | 3200                                   | 352                             | -1408  | -8                |                              |  |
| 5800                    | 0.9                       | 0.55   | 0.97                       | 0.165   | -0.385   | 3                         | 3                        | 17400                                   | 9570                           | 17400                                  | 2871                            | -6699  | -7                | Coal Creek<br>Tent Creek     |  |
| 1900                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1900                                    | 1045                           | 1900                                   | 209                             | -836   | -8                |                              |  |
| 1600                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1600                                    | 880                            | 1600                                   | 176                             | -704   | -8                | Pablo Creek                  |  |

**Table F-66 (cont.). Existing and potential solar loads for the Lower North Fork Coeur d'Alene River tributaries (AU# 001\_02).**

| Segment Length (meters) | Existing Shade (fraction) | Existing Summer Load (kWh/m <sup>2</sup> /day) | Potential Shade (fraction) | Potential Summer Load (kWh/m <sup>2</sup> /day) | Potential Load minus Existing load (kWh/m <sup>2</sup> /day) | Existing Stream Width (m) | Natural Stream Width (m) | Existing Segment Area (m <sup>2</sup> ) | Existing Summer Load (kWh/day) | Natural Segment Area (m <sup>2</sup> ) | Potential Summer Load (kWh/day) | Potential Load minus Existing Load (kWh/day) | Lack of Shade (%) | Lower CDA River Tributaries |
|-------------------------|---------------------------|--|----------------------------|---|--|---------------------------|--------------------------|---|--------------------------------|--|---------------------------------|--|-------------------|-----------------------------|
| 2400                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 2400                                    | 1320                           | 2400                                   | 264                             | -1056  | -8                | Scott Creek                 |
| 520                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 1040                                    | 1144                           | 1040                                   | 114.4                           | -1029.6                                      | -18               |                             |
| 1300                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 2600                                    | 1430                           | 2600                                   | 286                             | -1144  | -8                |                             |
| 2300                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 2300                                    | 1265                           | 2300                                   | 253                             | -1012  | -8                |                             |
| 2100                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 2100                                    | 1155                           | 2100                                   | 231                             | -924   | -8                |                             |
| 450                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 450                                     | 247.5                          | 450                                    | 49.5                            | -198   | -8                |                             |
| 150                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 150                                     | 165                            | 150                                    | 16.5                            | -148.5                                       | -18               |                             |
| 760                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 760                                     | 418                            | 760                                    | 83.6                            | -334.4                                       | -8                |                             |
| 390                     | 0.7                       | 1.65   | 0.98                       | 0.11  | -1.54  | 1                         | 1                        | 390                                     | 643.5                          | 390                                    | 42.9                            | -600.6                                       | -28               |                             |
| 160                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 160                                     | 88                             | 160                                    | 17.6                            | -70.4  | -8                |                             |
| 720                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 720                                     | 792                            | 720                                    | 79.2                            | -712.8                                       | -18               |                             |
| 200                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 200                                     | 110                            | 200                                    | 22                              | -88  | -8                |                             |
| 440                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 880                                     | 968                            | 880                                    | 96.8                            | -871.2                                       | -18               |                             |
| 660                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 1320                                    | 726                            | 1320                                   | 145.2                           | -580.8                                       | -8                |                             |
| 270                     | 0.7                       | 1.65   | 0.94                       | 0.33  | -1.32  | 2                         | 2                        | 540                                     | 891                            | 540                                    | 178.2                           | -712.8                                       | -24               |                             |
| 1600                    | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 1600                                    | 1760                           | 1600                                   | 176                             | -1584  | -18               |                             |
| 810                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 810                                     | 445.5                          | 810                                    | 89.1                            | -356.4                                       | -8                |                             |
| 360                     | 0.8                       | 1.1  | 0.97                       | 0.165   | -0.935   | 1                         | 1                        | 360                                     | 396                            | 360                                    | 59.4                            | -336.6                                       | -17               |                             |
| 500                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 500                                     | 550                            | 500                                    | 55                              | -495   | -18               |                             |
| 1400                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1400                                    | 770                            | 1400                                   | 154                             | -616   | -8                |                             |
| 380                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 380                                     | 418                            | 380                                    | 41.8                            | -376.2                                       | -18               |                             |
| 100                     | 0.7                       | 1.65   | 0.97                       | 0.165   | -1.485   | 1                         | 1                        | 100                                     | 165                            | 100                                    | 16.5                            | -148.5                                       | -27               |                             |
| 140                     | 0.7                       | 1.65   | 0.98                       | 0.11  | -1.54  | 1                         | 1                        | 140                                     | 231                            | 140                                    | 15.4                            | -215.6                                       | -28               |                             |
| 210                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 210                                     | 231                            | 210                                    | 23.1                            | -207.9                                       | -18               |                             |
| 980                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 980                                     | 539                            | 980                                    | 107.8                           | -431.2                                       | -8                |                             |
| 300                     | 0.3                       | 3.85   | 0.97                       | 0.165   | -3.685   | 1                         | 1                        | 300                                     | 1155                           | 300                                    | 49.5                            | -1105.5                                      | -67               |                             |
| 170                     | 0.7                       | 1.65   | 0.97                       | 0.165   | -1.485   | 1                         | 1                        | 170                                     | 280.5                          | 170                                    | 28.05                           | -252.45                                      | -27               |                             |
| 1300                    | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 1300                                    | 1430                           | 1300                                   | 143                             | -1287  | -18               |                             |
| 1100                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 2200                                    | 1210                           | 2200                                   | 242                             | -968   | -8                |                             |
| 500                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 1000                                    | 1100                           | 1000                                   | 110                             | -990   | -18               |                             |
| 820                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 820                                     | 902                            | 820                                    | 90.2                            | -811.8                                       | -18               |                             |
| 2900                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 5800                                    | 3190                           | 5800                                   | 638                             | -2552  | -8                |                             |
| 140                     | 0.8                       | 1.1  | 0.94                       | 0.33  | -0.77  | 2                         | 2                        | 280                                     | 308                            | 280                                    | 92.4                            | -215.6                                       | -14               |                             |
| 3300                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 6600                                    | 3630                           | 6600                                   | 726                             | -2904  | -8                |                             |
| 570                     | 0.8                       | 1.1  | 0.97                       | 0.165   | -0.935   | 3                         | 3                        | 1710                                    | 1881                           | 1710                                   | 282.15                          | -1598.85                                     | -17               |                             |
| 1400                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1400                                    | 770                            | 1400                                   | 154                             | -616   | -8                |                             |
| 500                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 500                                     | 550                            | 500                                    | 55                              | -495   | -18               |                             |
| 1000                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1000                                    | 550                            | 1000                                   | 110                             | -440   | -8                |                             |
| 110                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 110                                     | 121                            | 110                                    | 12.1                            | -108.9                                       | -18               |                             |
| 170                     | 0.3                       | 3.85   | 0.97                       | 0.165   | -3.685   | 1                         | 1                        | 170                                     | 654.5                          | 170                                    | 28.05                           | -626.45                                      | -67               |                             |
| 2300                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 2300                                    | 1265                           | 2300                                   | 253                             | -1012  | -8                |                             |
| 400                     | 0.7                       | 1.65   | 0.98                       | 0.11  | -1.54  | 2                         | 2                        | 800                                     | 1320                           | 800                                    | 88                              | -1232  | -28               |                             |
| 170                     | 0.5                       | 2.75   | 0.94                       | 0.33  | -2.42  | 2                         | 2                        | 340                                     | 935                            | 340                                    | 112.2                           | -822.8                                       | -44               |                             |
| 130                     | 0.1                       | 4.95   | 0.94                       | 0.33  | -4.62  | 2                         | 2                        | 260                                     | 1287                           | 260                                    | 85.8                            | -1201.2                                      | -84               |                             |
| 330                     | 0.7                       | 1.65   | 0.94                       | 0.33  | -1.32  | 2                         | 2                        | 660                                     | 1089                           | 660                                    | 217.8                           | -871.2                                       | -24               |                             |

**Table F-66 (cont.). Existing and potential solar loads for the Lower North Fork Coeur d'Alene River tributaries (AU# 001\_02).**

| Segment Length (meters) | Existing Shade (fraction) | Existing Summer Load (kWh/m <sup>2</sup> /day) | Potential Shade (fraction) | Potential Summer Load (kWh/m <sup>2</sup> /day) | Potential Load minus Existing load (kWh/m <sup>2</sup> /day) | Existing Stream Width (m) | Natural Stream Width (m) | Existing Segment Area (m <sup>2</sup> ) | Existing Summer Load (kWh/day) | Natural Segment Area (m <sup>2</sup> ) | Potential Summer Load (kWh/day) | Potential Load minus Existing Load (kWh/day) | Lack of Shade (%) | Lower CDA River Tributaries |                           |
|-------------------------|---------------------------|--|----------------------------|---|--|---------------------------|--------------------------|---|--------------------------------|--|---------------------------------|--|-------------------|-----------------------------|---------------------------|
| 170                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 170                                     | 187                            | 170                                    | 18.7                            | -168.3                                       | -18               | Group B                     | Lightner Draw             |
| 1000                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1000                                    | 550                            | 1000                                   | 110                             | -440   | -8                |                             |                           |
| 820                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 820                                     | 902                            | 820                                    | 90.2                            | -811.8                                       | -18               |                             |                           |
| 1800                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 3600                                    | 1980                           | 3600                                   | 396                             | -1584  | -8                | Group 1                     |                           |
| 60                      | 0.1                       | 4.95   | 0.94                       | 0.33  | -4.62  | 2                         | 2                        | 120                                     | 594                            | 120                                    | 39.6                            | -554.4                                       | -84               |                             |                           |
| 550                     | 0.6                       | 2.2  | 0.94                       | 0.33  | -1.87  | 2                         | 2                        | 1100                                    | 2420                           | 1100                                   | 363                             | -2057  | -34               |                             |                           |
| 230                     | 0.1                       | 4.95   | 0.94                       | 0.33  | -4.62  | 2                         | 2                        | 460                                     | 2277                           | 460                                    | 151.8                           | -2125.2                                      | -84               | Group B dry                 | Un-named (E of Hazendorf) |
| 700                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 700                                     | 385                            | 700                                    | 77                              | -308   | -8                |                             |                           |
| 390                     | 0                         | 5.5  | 0                          | 5.5   | 0  | 1                         | 1                        | 390                                     | 2145                           | 390                                    | 2145                            | 0  | 0                 |                             |                           |
| 1400                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 2800                                    | 1540                           | 2800                                   | 308                             | -1232  | -8                | Group 1                     | Hazendorf Creek           |
| 800                     | 0.7                       | 1.65   | 0.98                       | 0.11  | -1.54  | 2                         | 2                        | 1600                                    | 2640                           | 1600                                   | 176                             | -2464  | -28               |                             |                           |
| 230                     | 0.3                       | 3.85   | 0.94                       | 0.33  | -3.52  | 2                         | 2                        | 460                                     | 1771                           | 460                                    | 151.8                           | -1619.2                                      | -64               |                             |                           |
| 3100                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 3100                                    | 1705                           | 3100                                   | 341                             | -1364  | -8                | Group 1                     | Hullman Gulch             |
| 1000                    | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 2000                                    | 2200                           | 2000                                   | 220                             | -1980  | -18               |                             |                           |
| 150                     | 0.1                       | 4.95   | 0.94                       | 0.33  | -4.62  | 2                         | 2                        | 300                                     | 1485                           | 300                                    | 99                              | -1386  | -84               |                             |                           |
| 360                     | 0.7                       | 1.65   | 0.94                       | 0.33  | -1.32  | 2                         | 2                        | 720                                     | 1188                           | 720                                    | 237.6                           | -950.4                                       | -24               | Group B                     | Prado Creek               |
| 220                     | 0.3                       | 3.85   | 0.94                       | 0.33  | -3.52  | 2                         | 2                        | 440                                     | 1694                           | 440                                    | 145.2                           | -1548.8                                      | -64               |                             |                           |
| 470                     | 0.7                       | 1.65   | 0.94                       | 0.33  | -1.32  | 2                         | 2                        | 940                                     | 1551                           | 940                                    | 310.2                           | -1240.8                                      | -24               |                             |                           |
| 1200                    | 0.9                       | 0.55   | 0.97                       | 0.165   | -0.385   | 1                         | 1                        | 1200                                    | 660                            | 1200                                   | 198                             | -462   | -7                | Group 1                     | 1st to Prado              |
| 310                     | 0.7                       | 1.65   | 0.94                       | 0.33  | -1.32  | 2                         | 2                        | 620                                     | 1023                           | 620                                    | 204.6                           | -818.4                                       | -24               |                             |                           |
| 610                     | 0.3                       | 3.85   | 0.94                       | 0.33  | -3.52  | 2                         | 2                        | 1220                                    | 4697                           | 1220                                   | 402.6                           | -4294.4                                      | -64               |                             |                           |
| 320                     | 0.1                       | 4.95   | 0.94                       | 0.33  | -4.62  | 2                         | 2                        | 640                                     | 3168                           | 640                                    | 211.2                           | -2956.8                                      | -84               | Group B                     | Un-named (S of Prado)     |
| 160                     | 0.3                       | 3.85   | 0.94                       | 0.33  | -3.52  | 2                         | 2                        | 320                                     | 1232                           | 320                                    | 105.6                           | -1126.4                                      | -64               |                             |                           |
| 180                     | 0                         | 5.5  | 0.94                       | 0.33  | -5.17  | 2                         | 2                        | 360                                     | 1980                           | 360                                    | 118.8                           | -1861.2                                      | -94               |                             |                           |
| 1500                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 1500                                    | 825                            | 1500                                   | 165                             | -660   | -8                | Group 1                     | McPhee Creek              |
| 1500                    | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 3000                                    | 3300                           | 3000                                   | 330                             | -2970  | -18               |                             |                           |
| 970                     | 0.9                       | 0.55   | 0.97                       | 0.165   | -0.385   | 3                         | 3                        | 2910                                    | 1600.5                         | 2910                                   | 480.15                          | -1120.35                                     | -7                |                             |                           |
| 120                     | 0.8                       | 1.1  | 0.96                       | 0.22  | -0.88  | 4                         | 4                        | 480                                     | 528                            | 480                                    | 105.6                           | -422.4                                       | -16               | Group B                     |                           |
| 100                     | 0.8                       | 1.1  | 0.96                       | 0.22  | -0.88  | 4                         | 4                        | 400                                     | 440                            | 400                                    | 88                              | -352   | -16               |                             |                           |
| 250                     | 0.1                       | 4.95   | 0.78                       | 1.21  | -3.74  | 4                         | 4                        | 1000                                    | 4950                           | 1000                                   | 1210                            | -3740  | -68               |                             |                           |
| 260                     | 0.7                       | 1.65   | 0.78                       | 1.21  | -0.44  | 4                         | 4                        | 1040                                    | 1716                           | 1040                                   | 1258.4                          | -457.6                                       | -8                | Group 1                     |                           |
| 3900                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 7800                                    | 4290                           | 7800                                   | 858                             | -3432  | -8                |                             |                           |
| 890                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 1                         | 1                        | 890                                     | 489.5                          | 890                                    | 97.9                            | -391.6                                       | -8                |                             |                           |
| 660                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 2                         | 2                        | 1320                                    | 1452                           | 1320                                   | 145.2                           | -1306.8                                      | -18               | Group B                     |                           |
| 440                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 880                                     | 484                            | 880                                    | 96.8                            | -387.2                                       | -8                |                             |                           |
| 280                     | 0.3                       | 3.85   | 0.94                       | 0.33  | -3.52  | 2                         | 2                        | 560                                     | 2156                           | 560                                    | 184.8                           | -1971.2                                      | -64               |                             |                           |
| 1270                    | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 1270                                    | 1397                           | 1270                                   | 139.7                           | -1257.3                                      | -18               | Group 1                     |                           |
| 180                     | 0                         | 5.5  | 0.98                       | 0.11  | -5.39  | 1                         | 1                        | 180                                     | 990                            | 180                                    | 19.8                            | -970.2                                       | -98               |                             |                           |
| 140                     | 0.8                       | 1.1  | 0.98                       | 0.11  | -0.99  | 1                         | 1                        | 140                                     | 154                            | 140                                    | 15.4                            | -138.6                                       | -18               |                             |                           |
| 240                     | 0.6                       | 2.2  | 0.98                       | 0.11  | -2.09  | 1                         | 1                        | 240                                     | 528                            | 240                                    | 26.4                            | -501.6                                       | -38               | Group 1                     |                           |
| 110                     | 0.4                       | 3.3  | 0.98                       | 0.11  | -3.19  | 1                         | 1                        | 110                                     | 363                            | 110                                    | 12.1                            | -350.9                                       | -58               |                             |                           |
| 1200                    | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 2400                                    | 1320                           | 2400                                   | 264                             | -1056  | -8                |                             |                           |
| 170                     | 0.6                       | 2.2  | 0.98                       | 0.11  | -2.09  | 2                         | 2                        | 340                                     | 748                            | 340                                    | 37.4                            | -710.6                                       | -38               | Group 1                     |                           |
| 550                     | 0.9                       | 0.55   | 0.98                       | 0.11  | -0.44  | 2                         | 2                        | 1100                                    | 605                            | 1100                                   | 121                             | -484   | -8                |                             |                           |
| 330                     | 0.7                       | 1.65   | 0.94                       | 0.33  | -1.32  | 2                         | 2                        | 660                                     | 1089                           | 660                                    | 217.8                           | -871.2                                       | -24               |                             |                           |
| 290                     | 0.8                       | 1.1  | 0.94                       | 0.33  | -0.77  | 2                         | 2                        | 580                                     | 638                            | 580                                    | 191.4                           | -446.6                                       | -14               | Group 1                     |                           |
| 660                     | 0.7                       | 1.65   | 0.94                       | 0.33  | -1.32  | 2                         | 2                        | 1320                                    | 2178                           | 1320                                   | 435.6                           | -1742.4                                      | -24               |                             |                           |
| <b>Total</b>            |                           |  |                            |   |  |                           |                          | <b>174,360</b>                          | <b>168,773</b>                 | <b>174,360</b>                         | <b>31,962</b>                   | <b>-136,811</b>                              | <b>-24</b>        |                             |                           |

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## Appendix G. Relationship between Solar Pathfinder Measurements and Original Aerial Photograph Interpretation Estimates of Existing Shade

| Site                                    | Aerial Photo Estimated Shade Class (%) | Solar Pathfinder Measured Shade (%) | Solar Pathfinder Estimated Shade Class (%) | Difference in Shade Class (%) |
|---|--|-------------------------------------|--|-------------------------------|
| Little North Fork Coeur d'Alene River 1 | 30                                     | 45                                  | 40   | -10                           |
| Little North Fork Coeur d'Alene River 2 | 30                                     | 67                                  | 60   | -30                           |
| Little North Fork Coeur d'Alene River 3 | 10                                     | 58                                  | 50   | -40                           |
| Little North Fork Coeur d'Alene River 4 | 10                                     | 39                                  | 40   | -30                           |
| Deception Creek 1                       | 70                                     | 77                                  | 70   | 0                             |
| Deception Creek 2                       | 80                                     | 70                                  | 70   | 10                            |
| Deception Creek 3                       | 80                                     | 95                                  | 90   | -10                           |
| Steamboat Creek 1                       | 20                                     | 24                                  | 20   | 0                             |
| Steamboat Creek 2                       | 20                                     | 36                                  | 30   | -10                           |
| Steamboat Creek 3                       | 40                                     | 73                                  | 70   | -30                           |
| Steamboat Creek 4                       | 40                                     | 56                                  | 50   | -10                           |
| Leiberg Creek 1                         | 90                                     | 68                                  | 60   | 30                            |
| Leiberg Creek 2                         | 60                                     | 55                                  | 50   | 10                            |
| Leiberg Creek 3                         | 50                                     | 36                                  | 30   | 20                            |
| Leiberg Creek 4                         | 60                                     | 34                                  | 30   | 30                            |
| Beaver Creek                            | 50                                     | 58                                  | 50   | 0                             |
| West Fork Eagle Creek                   | 90                                     | 90                                  | 90   | 0                             |
| Tepee Creek 1                           | 0                                      | 12                                  | 10   | -10                           |
| Tepee Creek 2                           | 0                                      | 4                                   | 0  | 0                             |
| Average                                 |  |                                     |  | -4                            |
| Standard Deviation                      |  |                                     |  | 20                            |
| 95% Confidence Interval                 |  |                                     |  | 10                            |

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## **Appendix H. Shade Deficit Maps**

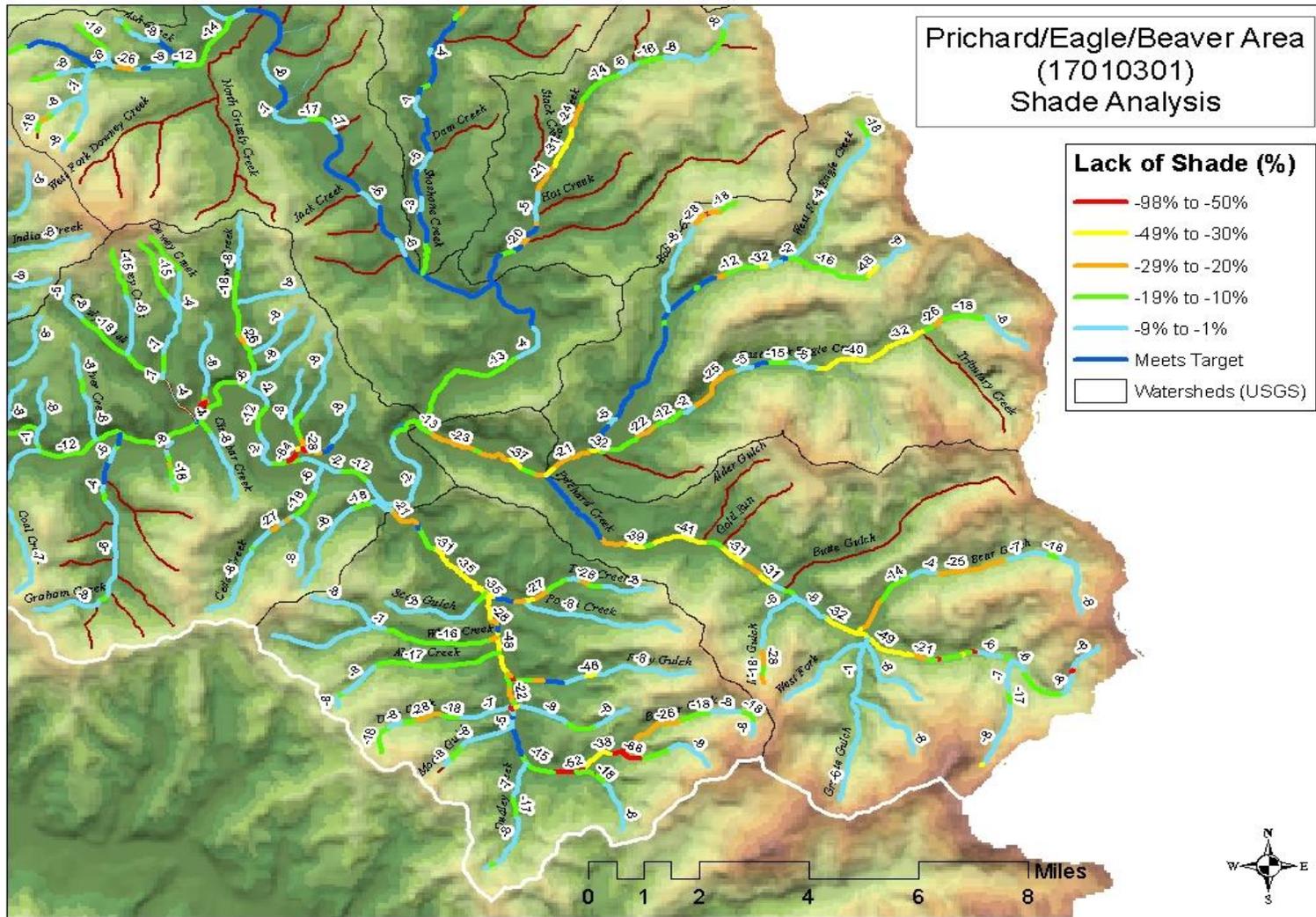


Figure H-1. Shade deficit for the Lost Creek to Beaver Creek area.

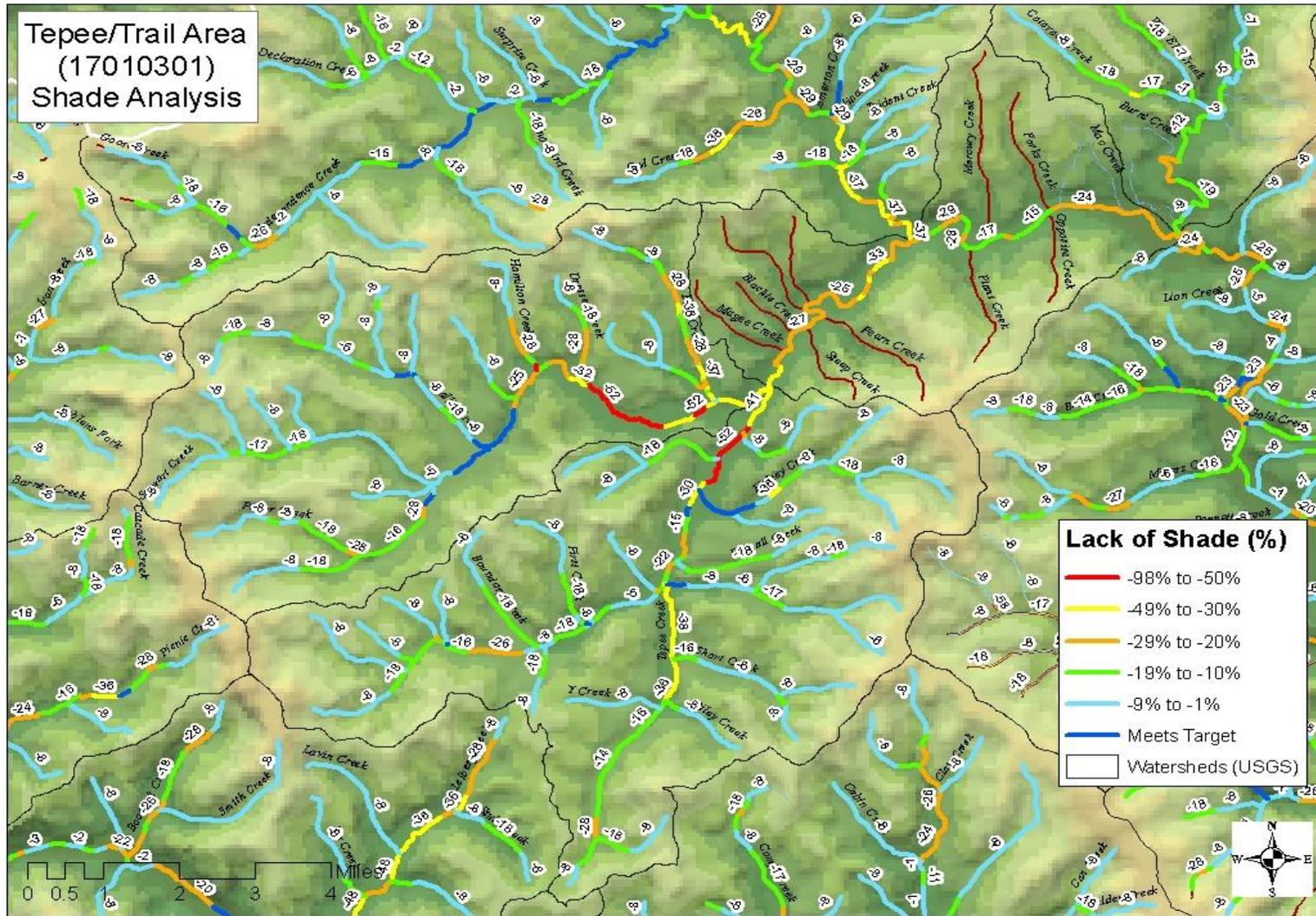


Figure H-2. Shade deficit for the Tepee Creek area.

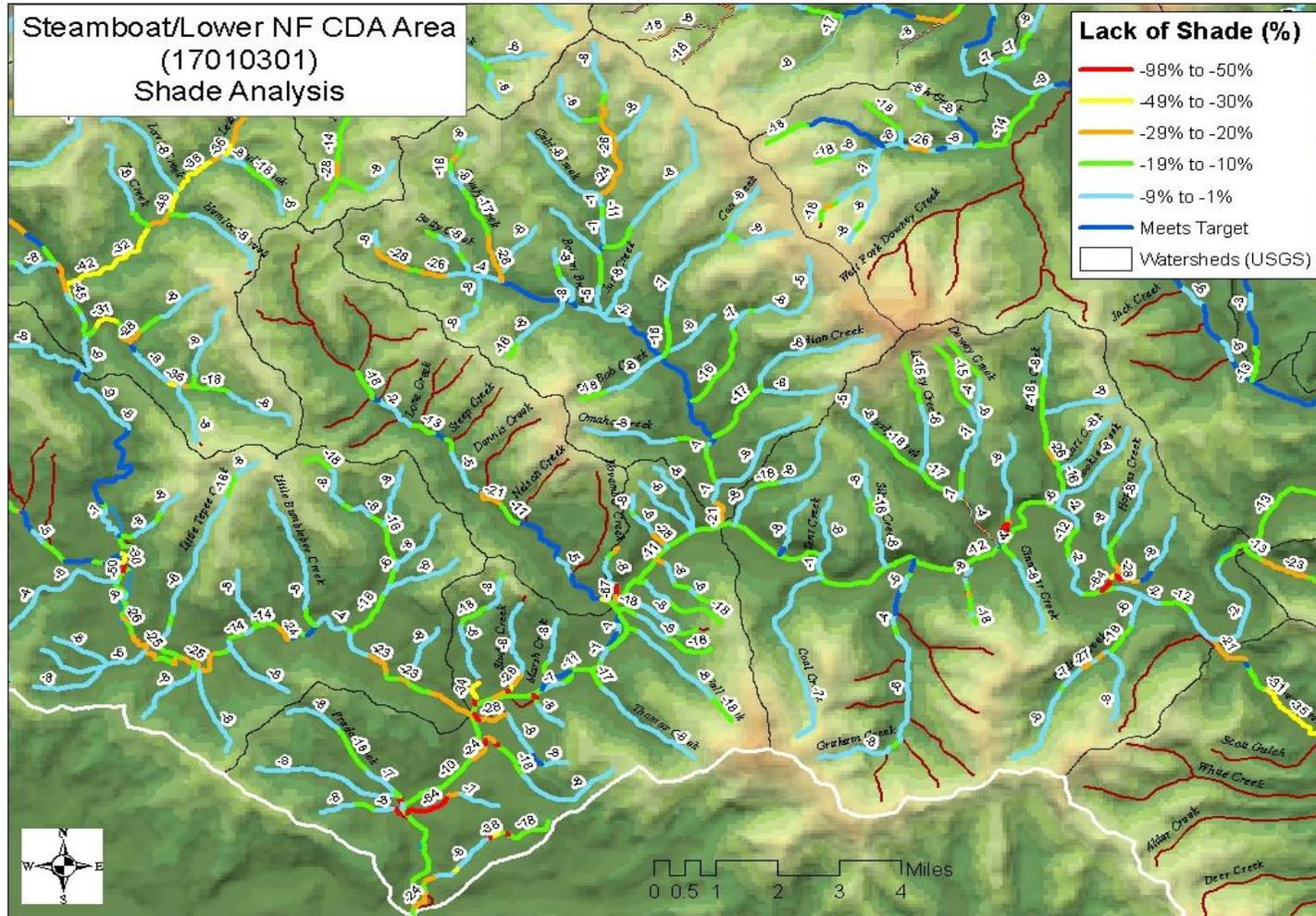


Figure H-3. Shade deficit for the Lower North Fork Coeur d'Alene River area.

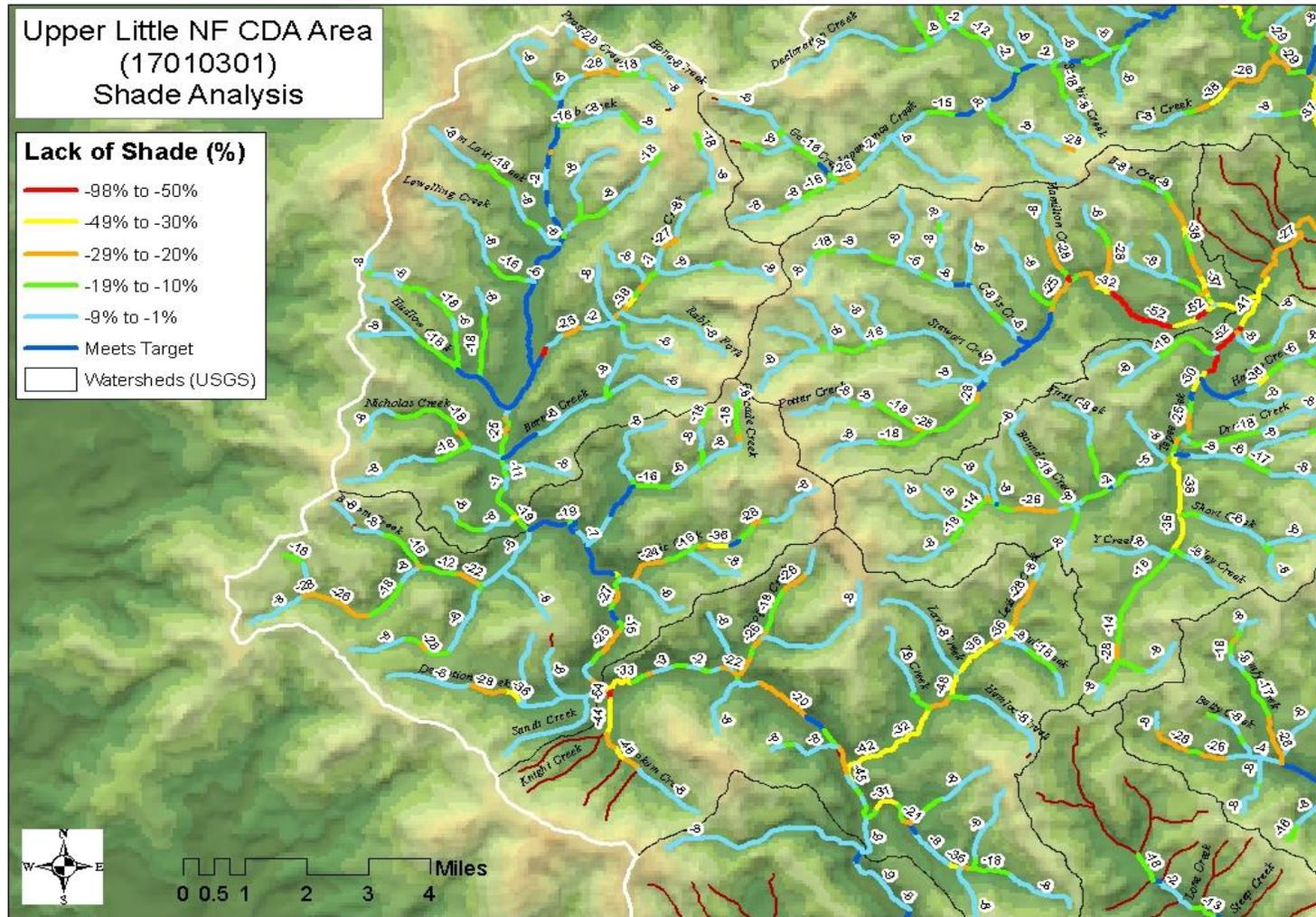


Figure H-4. Shade deficit for the Upper Little North Fork Coeur d'Alene River area.

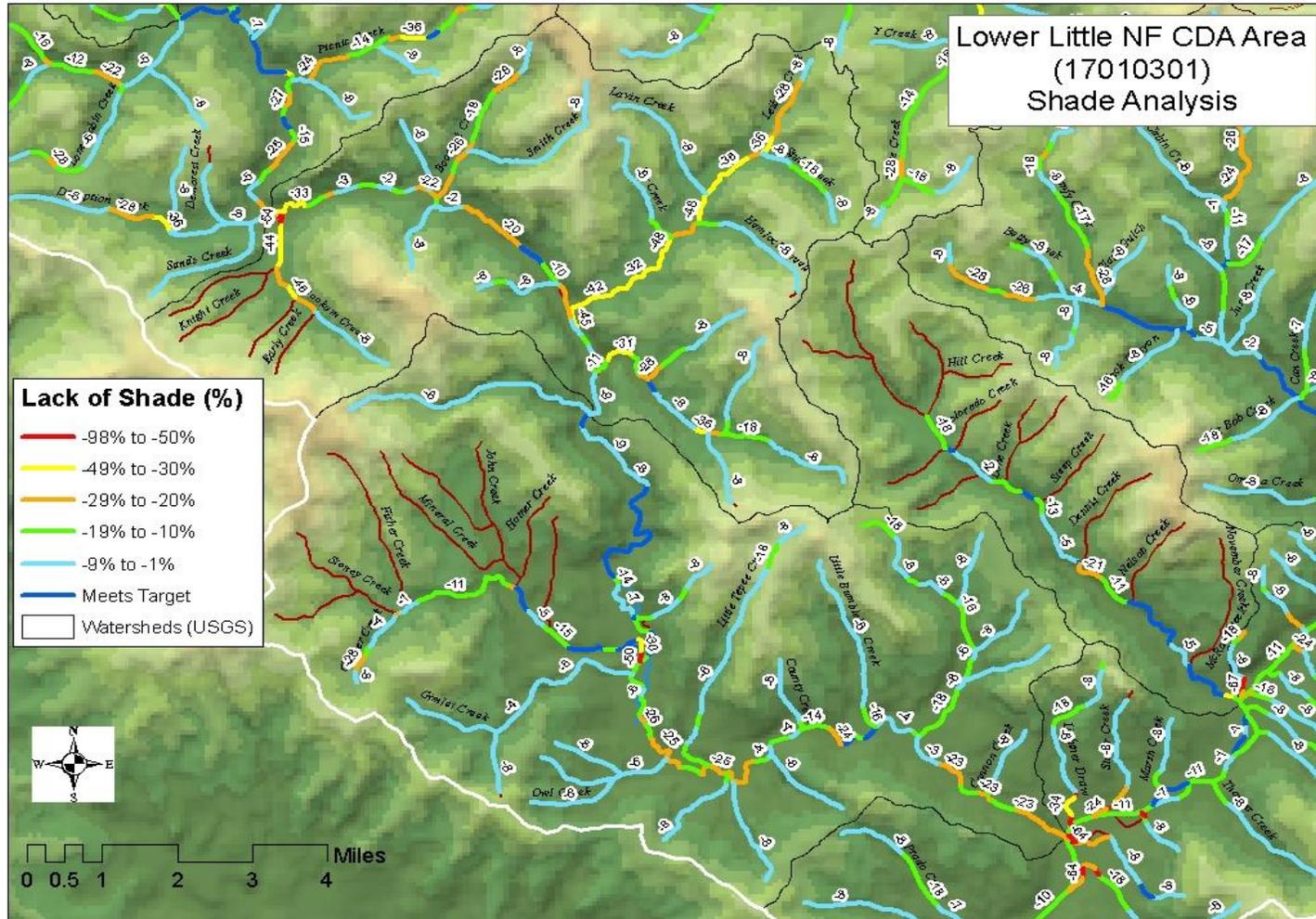


Figure H-5. Shade deficit for the Lower Little North Fork Coeur d'Alene River area.

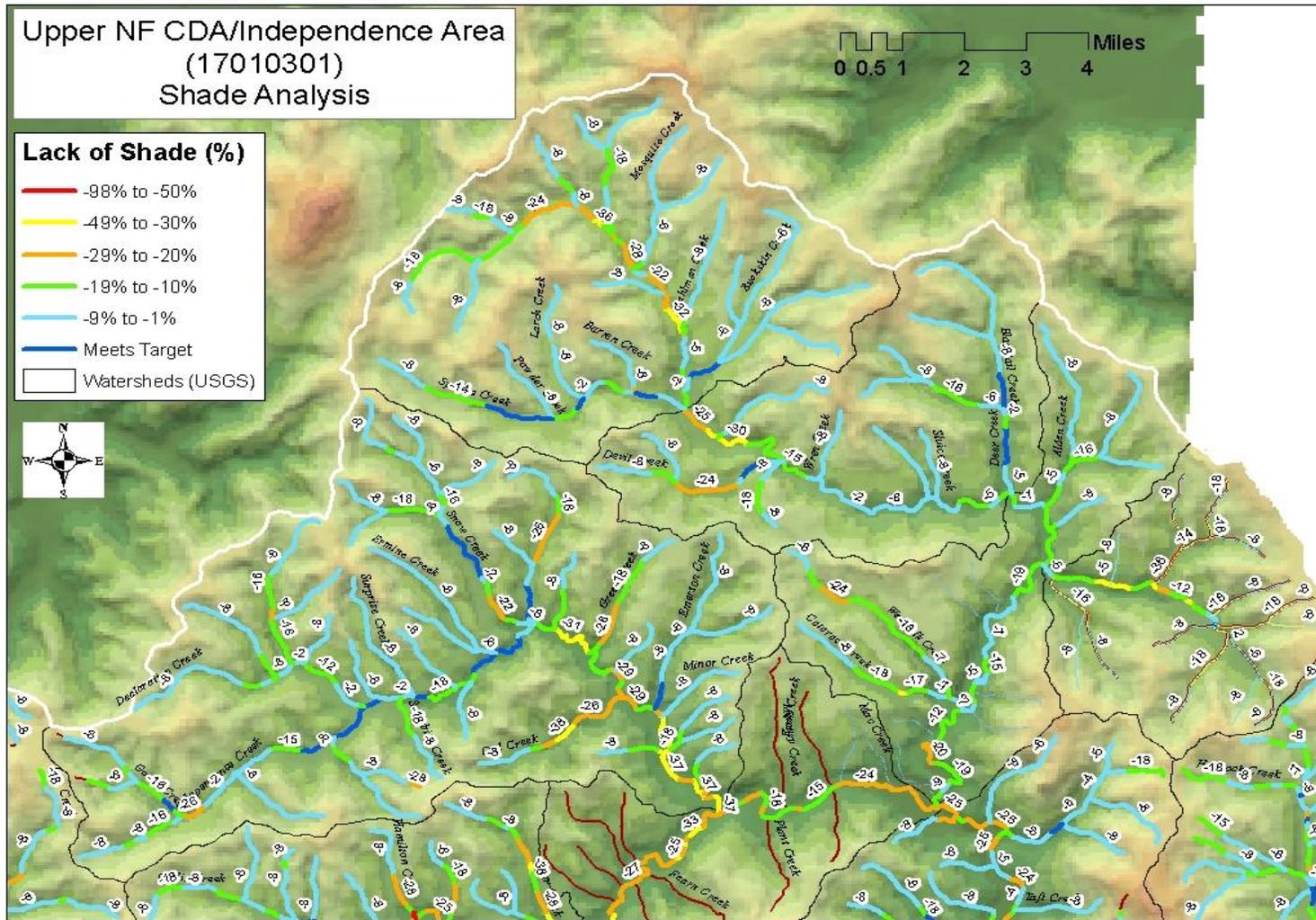


Figure H-6. Shade deficit for the Upper North Fork Coeur d'Alene River area.

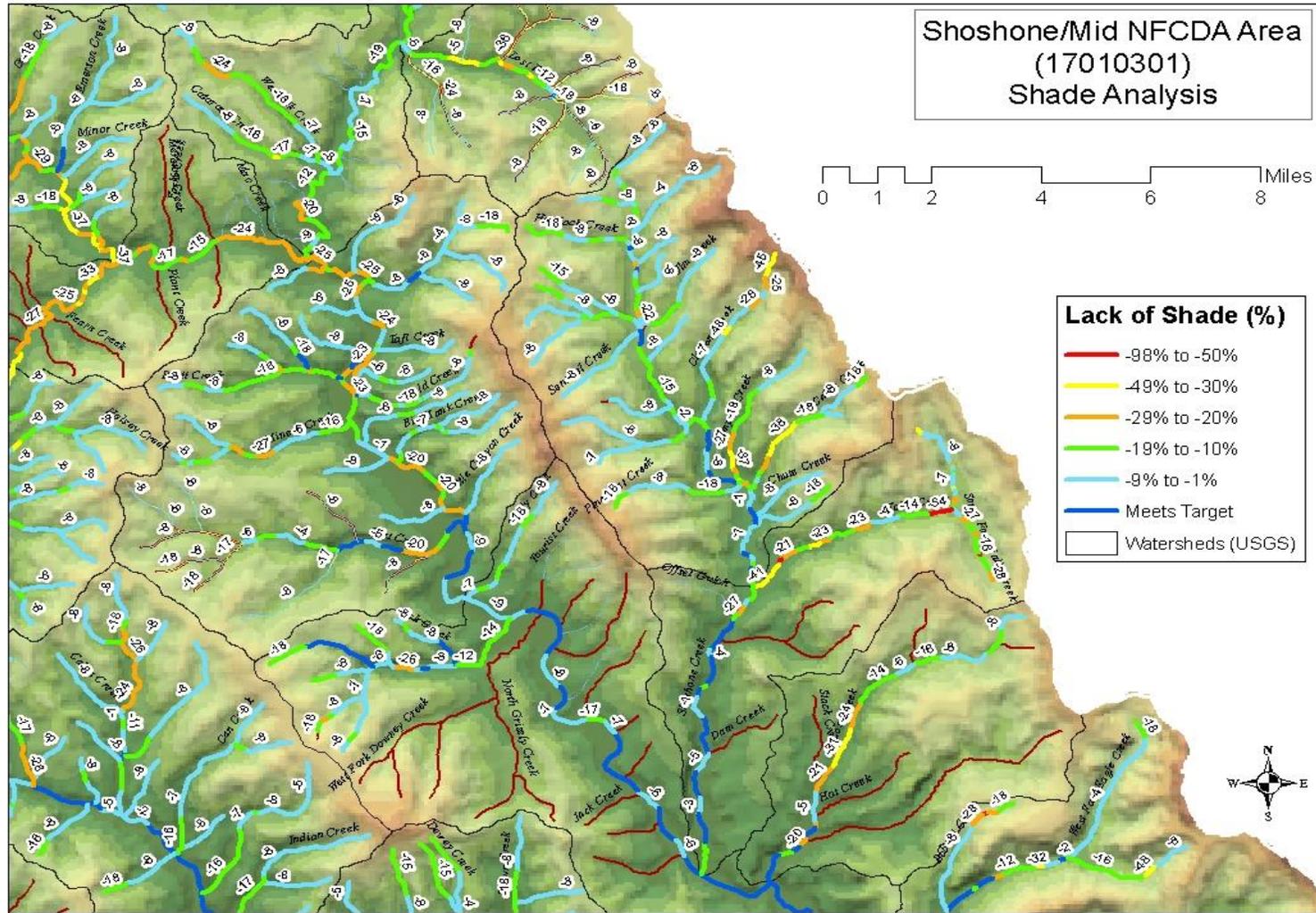


Figure H-7. Shade deficit for the Middle North Fork Coeur d'Alene River area.

## **Appendix I. Distribution List**

[To be inserted following public comment period.]

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## **Appendix J. Public Comments**

[To be inserted following public comment period.]

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