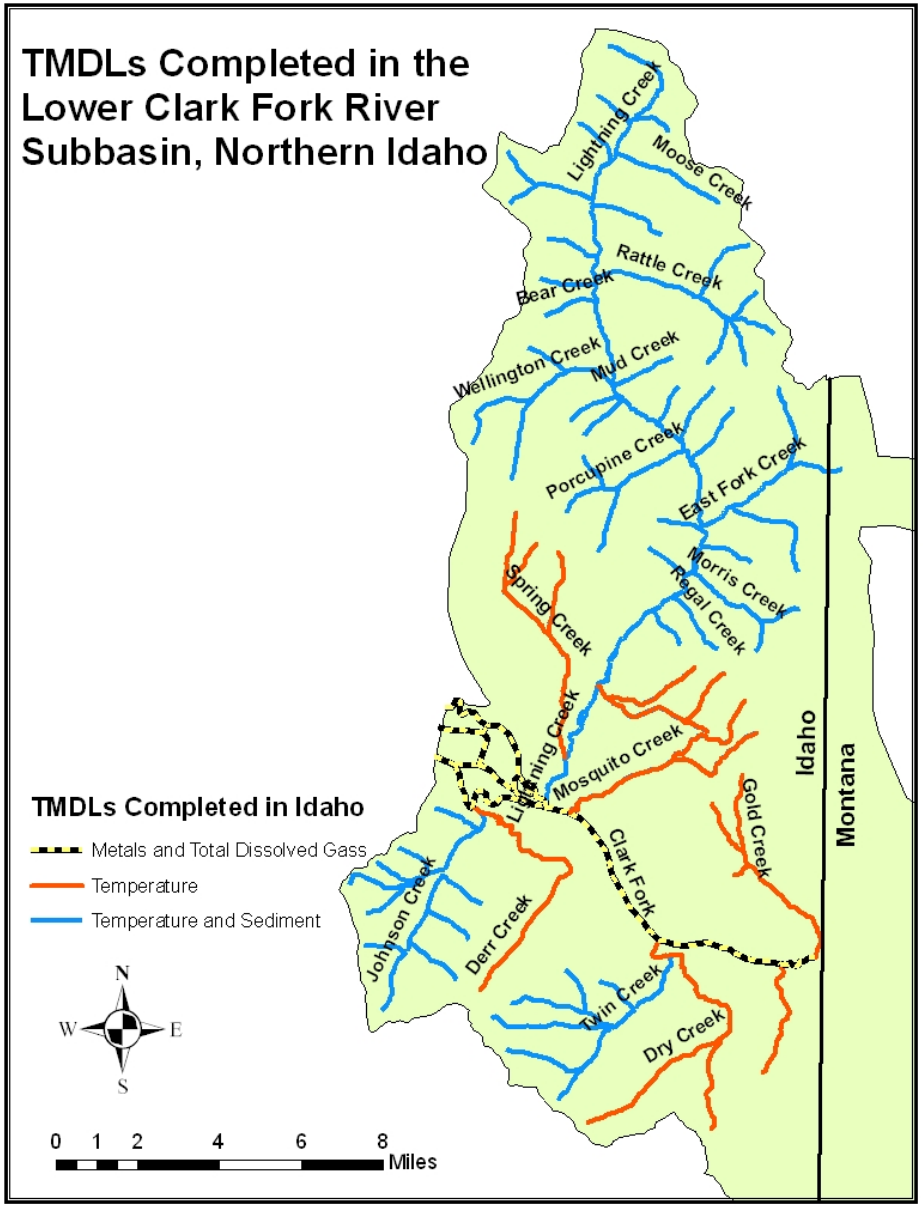
Lower Clark Fork River TMDL Summary

January 30, 2007

Proposed Agenda

- Where is the Study Area?
- Who has been involved?
- Subbasin Assessment
  - Water Quality Information in the Area
- Why are we developing TMDLs?
- What were are findings?
- How did we determine our findings?
- What next?
  - Clark Fork and other watersheds

Study Area


TMDLs Completed in the Lower Clark Fork River Subbasin, Northern Idaho
Lightning Creek
Moose Creek
Rattle Creek
Bear Creek
Wellington Creek
Mud Creek
Porcupine Creek
East Fork Creek
Morris Creek
Regal Creek
Spring Creek
Lightning Creek
Mosquito Creek
Gold Creek
Clark Fork
Johnson Creek
Derr Creek
Twin Creek
Dry Creek
Idaho
Montana
TMDLs Completed in Idaho
Metals and Total Dissolved Gass
Temperature
Temperature and Sediment
N
W
E
S
0 1 2 4 6 8
Miles

Public Involvement Process

- Watershed Advisory Group met monthly from September 05 – June 06
  - Participation from various agencies, organizations and local landowners
  - All meetings were open to the public and locally announced on community calendars
- Public Comment Opportunity Now through March 5, 2007

Water Quality Information Used

- DEQ stream monitoring data
  - "BURP": Beneficial Use Reconnaissance Program
  - Macroinvertebrates, habitat, fish
- Idaho Fish and Game redd counts
- Watershed Assessment for Lightning Creek drainage
- Bull Trout Problem Assessment

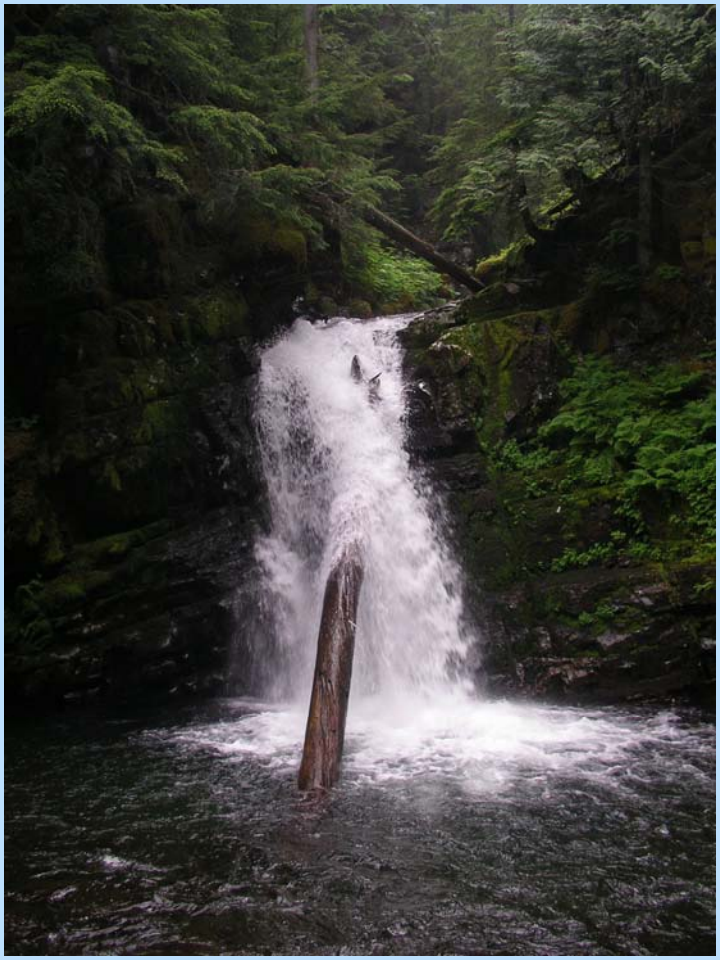
Water Quality Information (cont)

Mainstem Lower Clark Fork River

- Tri-State Water Quality Council monitoring data above and below Cabinet Gorge Dam
  - Metals
  - Nutrients
- USGS Data below Cabinet Gorge Dam
  - Flow
  - Metals
- Avista FERC license reports
  - On-going Flow and total dissolved gas monitoring
  - Temperature
  - Habitat and tributary information as available as well

Background: Why do TMDL's?

- The Clean Water Act requires states to develop water quality standards
- Idaho's standards have been developed and approved by the EPA
- Standards are intended to protect, restore and preserve water quality so waters are available for their intended (beneficial) use
- Total Maximum Daily Loads (TMDLs) are required for all waterbodies not meeting water quality standards
- Targets for pollution reduction can focus protection and restoration efforts (implementation plan)



Protection of Beneficial Uses

- Fishable/Swimable Goals of Clean Water Act
- Idaho Water Quality Standards
  - Aquatic Life and Salmonid Spawning (Fish, Aquatic Insects)
  - Recreation (Swimming, Boating)
  - Water Supply (Domestic, Agricultural, Industrial)

What is a TMDL?

Simply put, a TMDL is a pollutant budget. A TMDL is a calculation of the maximum amount of a pollutant that a waterbody can receive from human-caused sources and still protect Idaho Beneficial Uses.

Loads and the TMDL Equation

- **TMDLs expressed in terms of loads**

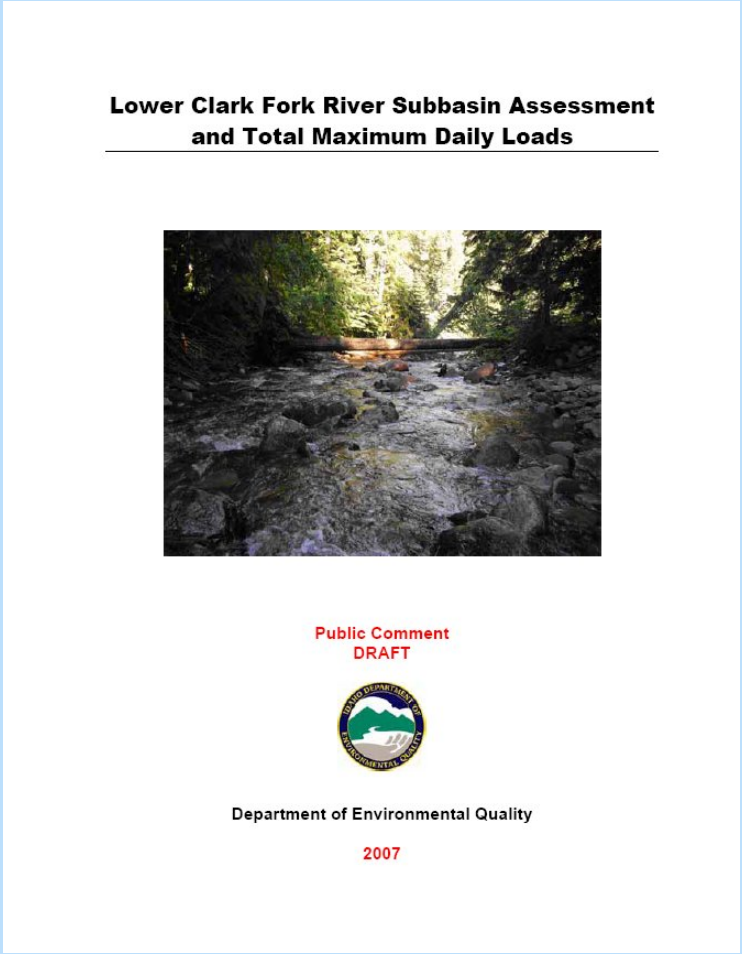
$$\mathbf{TMDL \leq LA + WLA + MOS}$$

  - TMDL, Total Maximum Daily Load
  - LA, Load Allocation (Nonpoint Source, e.g. forest practices, agriculture, roads)
  - WLA, Waste Load Allocation (Point Source, e.g. Wastewater Treatment)
  - MOS, Margin of Safety

TMDL Document

- Executive Summary

1. Subbasin Assessment
    1. Watershed Characterization
    2. Water Quality Concerns and Status
    3. Pollutant Source Inventory
4. Summary of Past and Present Pollution Control Efforts
5. Total Maximum Daily Load(s)



TMDL Status

Mainstem Clark Fork River

- Metals TMDL completed (Cadmium, Copper, Zinc)
- Temperature deferred to next TMDL cycle
- Total Dissolved Gas TMDL completed

Tributaries

- Sediment TMDLs completed on all listed tributaries (Rattle, Savage, Twin new listings for sediment)
- Temperature TMDLs completed for all tributaries. For those streams not listed as temperature impaired, advisory TMDLs completed

TMDLs Completed

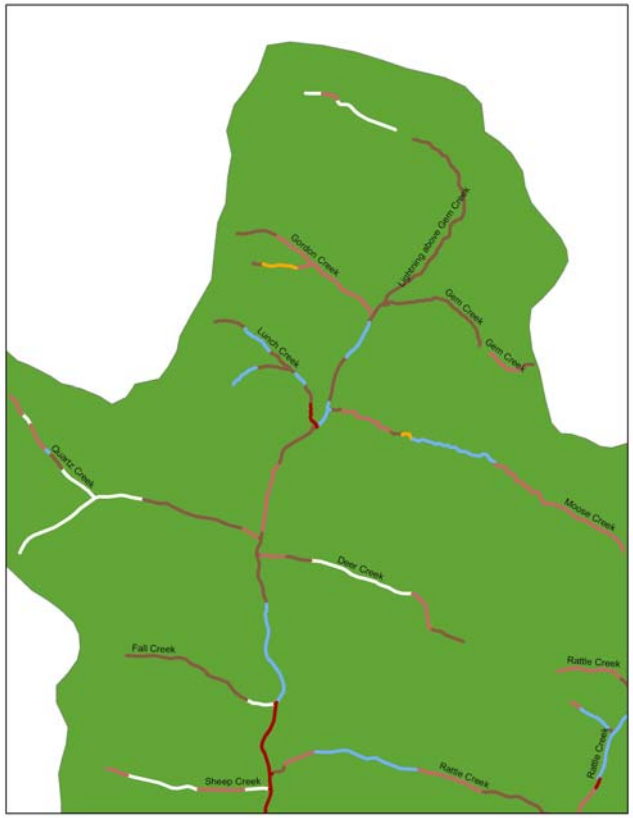
Stream	Pollutant(s)
Clark Fork River	Metals, TDG
Cascade Creek	Temperature
Dry Creek	Temperature
Mosquito Creek	Temperature
Twin Creek	Sediment, Temperature
East Fork Creek	Sediment, Temperature
Johnson Creek	Sediment, Temperature
Lightning Creek	Sediment, Temperature
Rattle Creek	Sediment, Temperature
Savage Creek	Sediment, Temperature
Wellington Creek	Sediment, Temperature

Goal of Temperature TMDLs

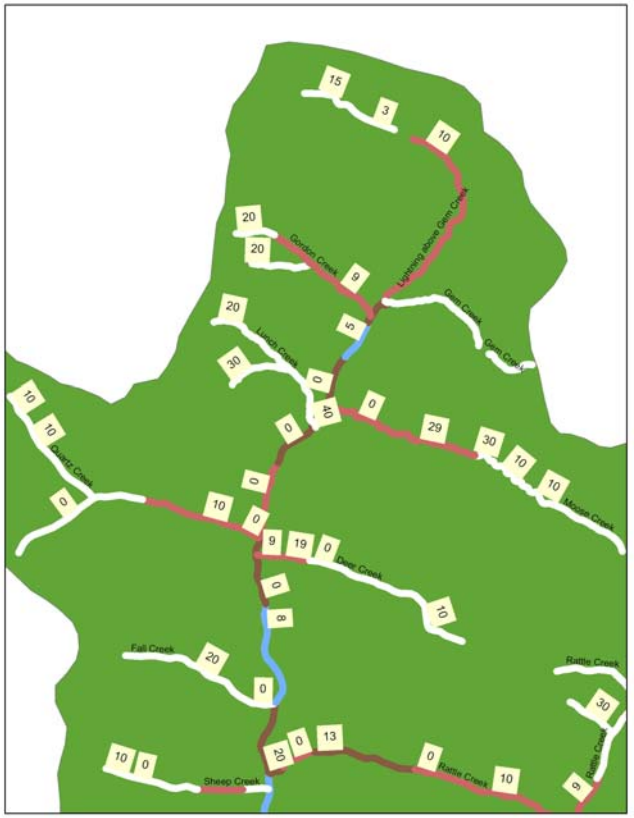
- Temperature TMDLs are based on the Potential Natural Vegetation Method
- Goal is to return streams to a condition of full potential natural vegetation shading.
  - This is also based on returning streams to natural stream width, so temperature and sediment TMDL implementation actions often are linked.
- Presumption is that a stream with full potential natural vegetation will provide stream conditions fully supporting of salmonid spawning
  - Represents a functioning riparian area. (Literature supports a riparian area at least one site potential tree lengths to protect riparian function, i.e. bank stability, water filtratition, stream shading, etc)

Upper Lightning Temperature TMDL Example

Existing Condition



Target Condition



See pages 90-100 of the draft TMDL.

Excess Solar Load and Percent Reduction to Achieve Loading Capacity for the Lower Clark Fork River Tributaries

Water Body	Excess Load (kWh/day)	Percent Reduction
Derr Creek (advisory)	183,840	30%
Twin Creek	124,344	51%
Gold Creek (Advisory)	73,635	67%
Mosquito Creek	54,548	54%
West Johnson Creek	36,571	73%
Dry Creek	38,830	48%
Unnamed Tributary (Advisory)	21,606	55%
WF Blue Creek (Advisory ID only)	37,661	52%
Johnson Creek	33,147	30%

Excess Solar Load and Percent Reduction to Achieve Loading Capacity for Lightning Creek and Associated Tributaries

Water Body	Excess Load (kWh/day)	Percent Reduction
Lightning Creek	4,802,544	64%
East Fork drainage	198,640	61%
Rattle Creek	86,076	57%
Mud, Steep, Silvertip, Trapper, unnamed between Mud and Trapper	30,101	61%
Spring Creek	57,736	56%
Cascade Creek	37,981	67%
Unnamed tributary	22,828	79%
Fall, Sheep & Bear Creeks	13,719	53%
Moose Creek	12,140	52%
Wellington Creek	30,465	44%
Morris Creek	32,734	67%
Porcupine Creek	36,545	58%
Gordon Creek	8,221	59%
Lunch Creek	7,158	73%
Gem Creek	5,830	66%
Quartz Creek	5,352	27%
Regal Creek	6,064	58%
Deer Creek	3,633	40%

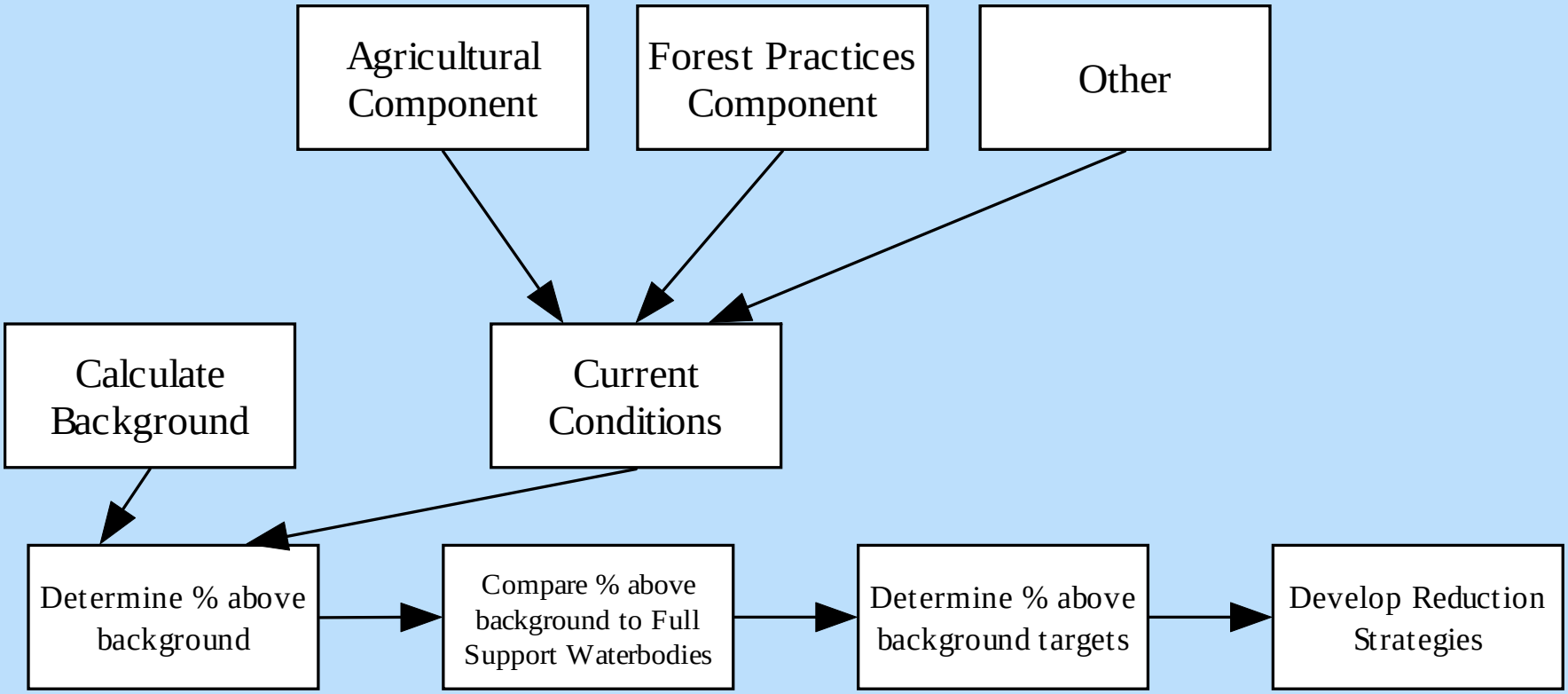
Temperature TMDLs Have Been Developed for all Assessment Units in the Subbasin (exculding mainstem Clark Fork River).
The TMDLs for the Assesment Units below are Advisory at this time, because they are currently not on the 303(d) list.

Water Body Name	Assessment Unit	2002 Boundaries	Temperature TMDL Status	Recommended Changes to Integrated Report
West Fork Elk Creek	17010213PN006_02	West Fork Elk Creek Source to Idaho/Montana Border	Advisory TMDL Only	
West Fork Blue Creek	17010213PN007_02	West Fork Blue Creek source to Idaho/Montana border	Advisory TMDL Only	
Gold Creek	17010213PN008_02	Gold Creek source to Idaho/Montana border	Advisory TMDL Only	
Spring Creek	170213PN021_02	Spring Creek Source to confluence with Lightning Creek	Advisory TMDL Only	
Johnson Creek delta area	17010213PN001_03	Johnson Creek – third order portion in the delta area of the Lower Clark Fork River	Advisory TMDL Only	
Clark Fork River	17010213PN003_02	First and second order unnamed tributaries to Clark Fork River	Advisory TMDL Only	
Derr Creek	17010213PN001_02		Advisory TMDL Only	

Goal of Sediment TMDLs

- Excess Sediment can alter stream structure and contribute to stream warming
- Excess bedload identified as critical concern in Lightning Creek system
- IDEQ BURP data showed moderate to impaired stream conditions to support Cold Water Aquatic Life and Salmonid Spawning
- Sediment TMDLs set targets for reducing human-caused sediment inputs into impaired streams

% over background concept

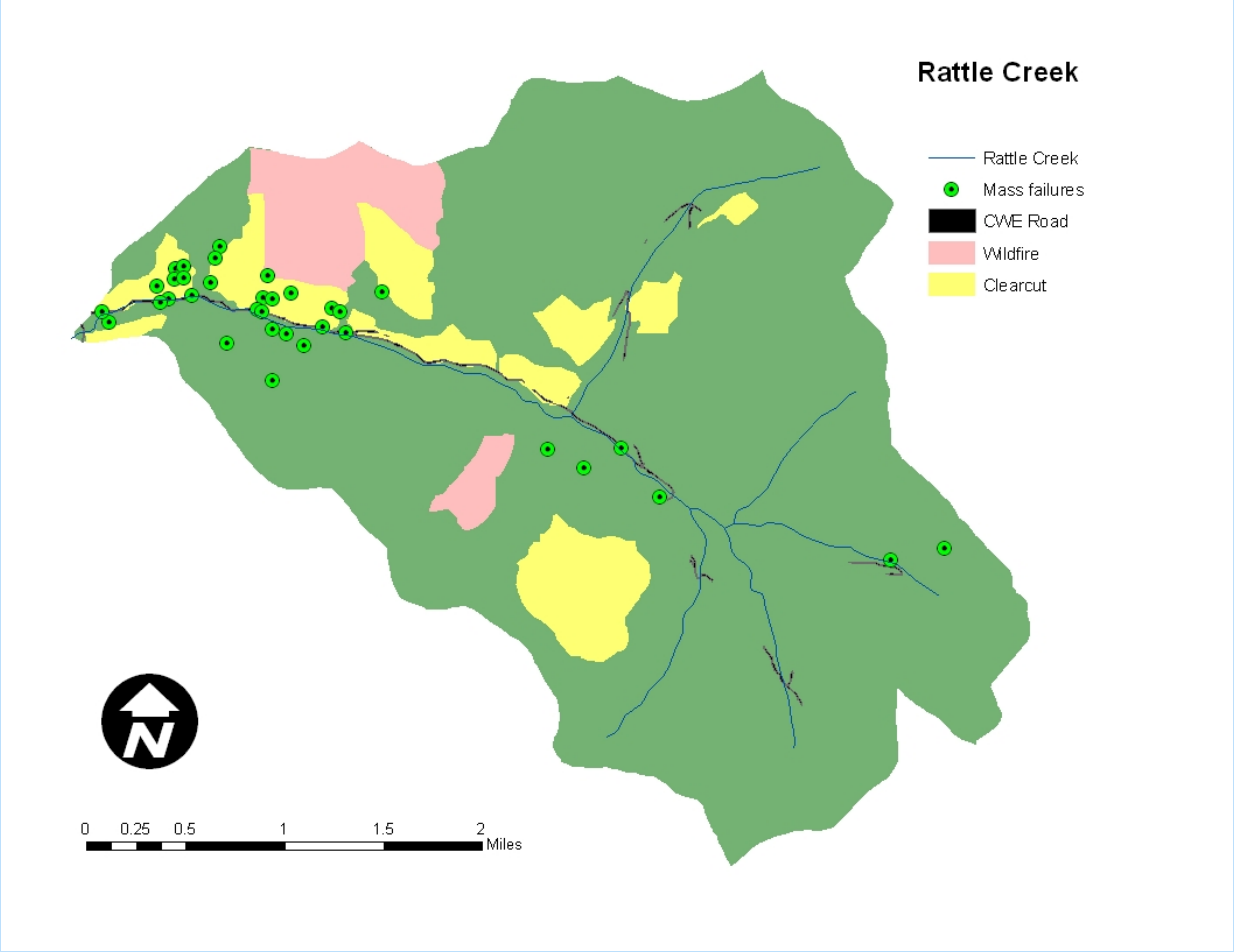


Estimating Sediment Delivery to Streams

- Background
  - Forested landscape sediment production
  - Fire
  - Mass wasting delivery to streams not associated with a clearcut or road*
- Anthropogenic
  - High/Medium/Low harvested areas
  - Mass wasting delivery to streams associated with clearcuts or roads*
  - Roads
  - Stream Bank Erosion

*Source Cacek, 1989 and IDL CWE Reports

Rattle Creek Example



Defining Targets

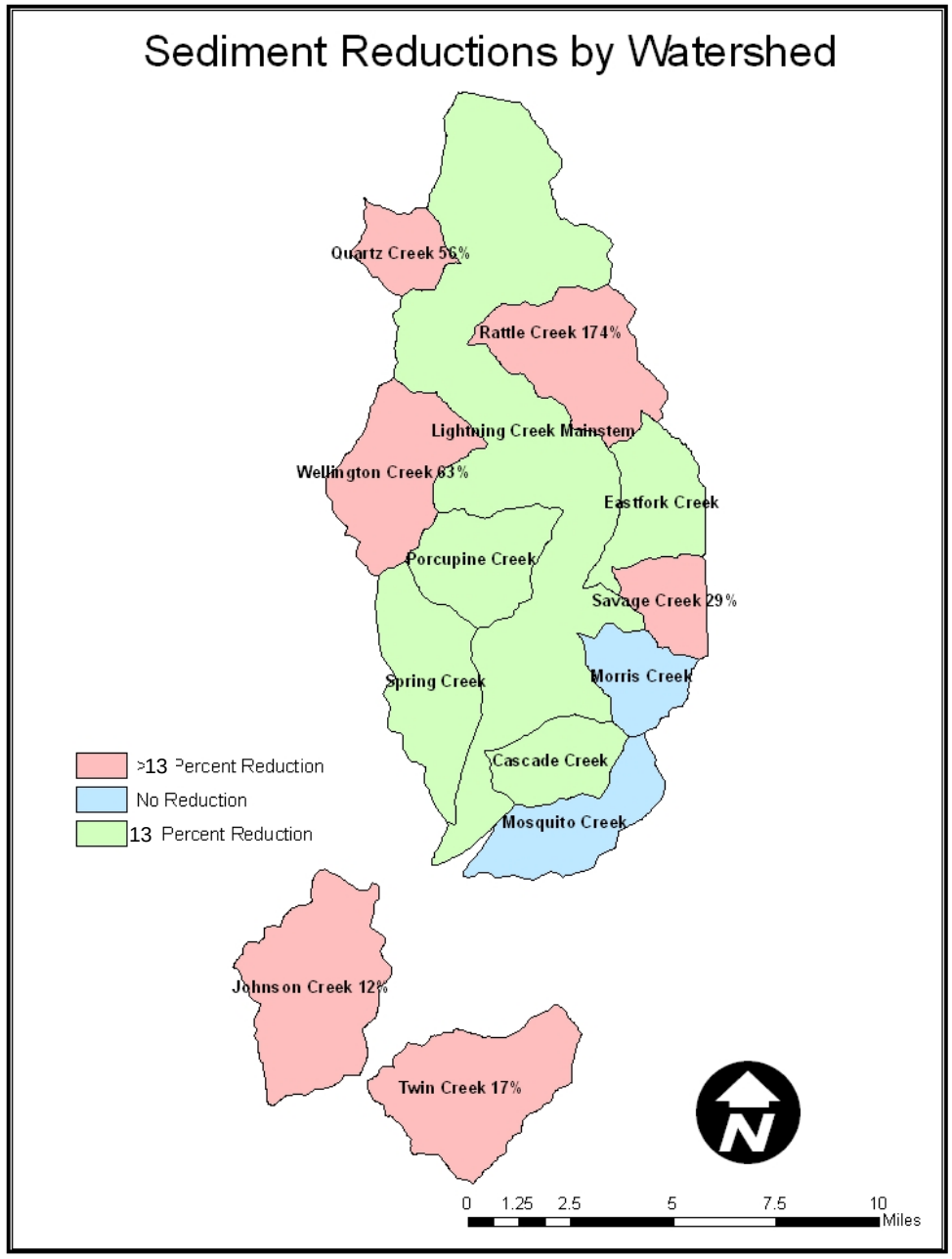
Goal: When a watershed meets its sediment target, full support of beneficial uses should be achieved.

Method: Look at range of sediment loading throughout the basin and in reference watersheds considered to be stable versus those not meeting beneficial uses. Use paired watershed comparisons where possible.

Note: Consistently throughout the state it has been found that the threshold for full support watersheds is approximately 50% above background sediment levels.

Reference Watersheds Used to Develop Sediment Target

	Morris Creek	**Savage Creek**	**Lightning Creek Headwaters**	**Trestle Creek**
Watershed type	Reference watershed	Reference watershed	Reference watershed	Reference watershed
Watershed size (acres)	3,016	2,485	3,884	12,606
Ecoregions	Purcell-Cabinet-Northern Bitterroot Mountains High Northern Rockies	Purcell-Cabinet-Northern Bitterroot Mountains High Northern Rockies	Purcell-Cabinet-Northern Bitterroot Mountains High Northern Rockies	Purcell-Cabinet-Northern Bitterroot Mountains High Northern Rockies
Land use Types	**% Land use (acres)**	**% Land use (acres)**	**% Land use (acres)**	**% Land use (acres)**
High Canopy Removal	0% (0)	0% (0)	2% (78)	2.7% (331)
Medium Canopy Removal	0.1% (3)	9.5% (235)	4.8% (187)	1.6% (195)
Low Canopy Removal	0% (0)	0% (0)	0% (0)	0.4% (55)
Forest (natural background)*	99.5% (3,000)	89.1% (2,215)	91.8% (3,561)	93.4% (11,571)
Agriculture	0% (0)	0% (0)	0% (0)	0% (0)
Forest Road	0.4% (12)	1.3% (32)	1.2% (47)	1.7% (211)
Forest Road with 200 feet of stream	0% (1)	0.1% (3)	0.2% (9)	0.2% (30)
Recent Fire*	0% (0)	0% (0)	0% (2)	0% (0)
Historic Fire*	0% (0)	0% (0)	0% (0)	0% (0)
	Number of Mass wasting events	**Number of mass wasting events**	**Number of mass wasting events**	**Number of mass wasting events**
Natural Slides*	0	5	0	0
Anthropogenic Slides	0	11	0	4


Sediment Reductions by Watershed
Quartz Creek 56%
Rattle Creek 174%
Lightning Creek Mainstem
Wellington Creek 63%
Eastfork Creek
Porcupine Creek
Savage Creek 29%
Spring Creek
Morris Creek
Cascade Creek
Mosquito Creek
Johnson Creek 12%
Twin Creek 17%
>13 Percent Reduction
No Reduction
13 Percent Reduction
N
0 1.25 2.5 5 7.5 10
Miles

Model Results for Current sediment load, background load and load capacity at sediment target for watersheds above sediment load target.

Watershed	Load type	Watershed acreage	Modeled % above background	Estimated existing load (tons/year)	Natural background (tons/year)	Load capacity at 54% above natural background (tons/year)	Load Reduction Required (tons/year)	% Load Reduction Required
Rattle Creek	Sediment	6,770	228%	636	194	299	337	174%
Wellington Creek	Sediment	6,405	177%	407	147	226	181	123%
Quartz Creek	Sediment	3,226	139%	130	54	83	47	85%
Lightning Creek Mainstem*	Sediment	44,859	66%	3,932	2,362	3,637	295	13%
Twin Creek	Sediment	7,567	71%	297	174	268	29	17%
Johnson Creek	Sediment	9,166	66%	352	212	326	26	12%

* Main stem Lightning Creek including Spring, Cascade, Porcupine and East Fork Creeks and excluding Rattle, Wellington, Quartz, Morris, Savage and Lightning Creek headwater streams above Moose Creek.

Metals TMDL

- The goal of the metals TMDLs are to insure that water quality standards to protect aquatic life are not exceeded in the mainstem Lower Clark Fork River.
- The WAG directed IDEQ at the December 2005 meeting that given current listing, and data available that a TMDL expressing limits at Idaho Water Quality Standards is advised
- TMDLs are presented for Cadmium, Zinc, Copper

Metals TMDL Data

Parameter	Measured Value (ug/l)	Date	Flow (cfs)	Data Source
Dissolved Cadmium	1	11/25/1990	27,100	USGS
	2	5/13/1991	34,200	USGS
	1	7/16/2003	18,200[1]	Tri-State
Dissolved Copper	38	5/12/1992	34,400	USGS
	12	11/16/1992	25,600	USGS
Dissolved Zinc	80.8	10/15/2003	6,040[1]	Tri-State

[1] Flows were not recorded at the time of sample. USGS station below Cabinet Gorge Dam reported daily mean flow is shown in table.

Metals Standards

	Acute Exposure Criterion CMC[1] (ug/l)	Chronic Exposure Criterion CCC[2] (ug/l)
Cadmium	1.30	0.74
Copper	11.2	7.8
Zinc	80.3	80.9

[1] Criterion Maximum Concentration
[2] Criterion Continuous Concentration

Cadmium Load Capacity

	Flow (cfs)	Cadmium CCC (ug/L)	Load Capacity (lb/day)
7Q10[1]	6,054	0.74	24
10th percentile[2]	8,400	0.74	34
50th percentile	16,900	0.74	67
90th percentile	44,600	0.74	178

[1] 7Q10 is the minimum 7-day average flow over a ten year period. Data from 1994-2004 were used to better reflect current operations at the Cabinet Gorge and Noxon Rapids dams.

[2] 10th, 50th, and 90th percentile flows are based on USGS dataset below Cabinet Gorge Dam from 1960-2004.

Copper Load Capacity

	Flow (cfs)	Copper CCC (ug/L)	Load Capacity (lb/day)
7Q10	6,054	7.8	255
10th percentile	8,400	7.8	353
50th percentile	16,900	7.8	711
90th percentile	44,600	7.8	1,876

Zinc Load Capacity

	Flow (cfs)	Zinc CCC (ug/L)	Load Capacity (lb/day)
7Q10	6,054	80.3	2622
10th percentile	8,400	80.3	3638
50th percentile	16,900	80.3	7320
90th percentile	44,600	80.3	19317

Example cadmium Load Reductions at exceedance conditions (7/16/2003).

Measured Flow (cfs)	Dissolved Cadmium Existing Load (lb/day)	Dissolved Cadmium Load Capacity (lb/day)	Load Reduction Required (lb/day)	Percent Reduction
18,200	98	73	26	26%

Example copper load reduction at exceedance conditions (11/16/1992).

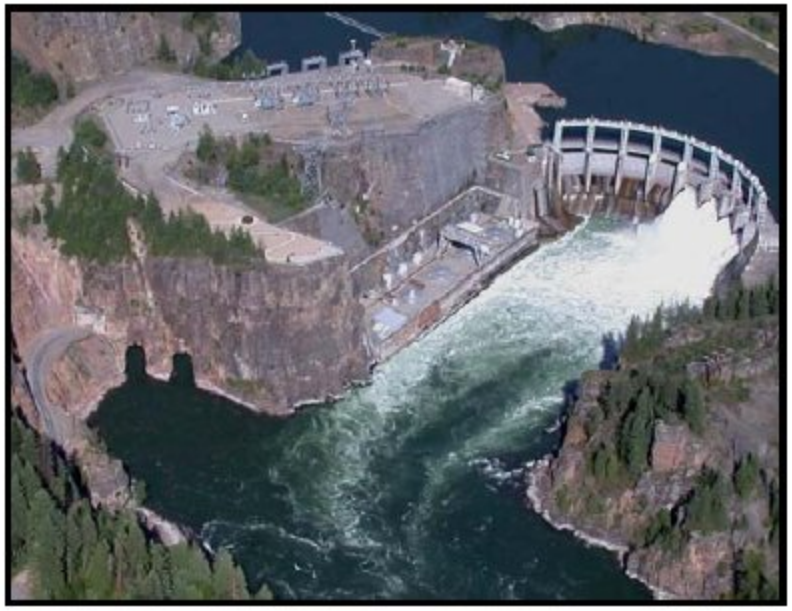
Measured Flow (cfs)	Dissolved Copper Existing Load (lb/day)	Dissolved Copper Load Capacity (lb/day)	Load Reduction Required (lb/day)	Percent Reduction
25,600	1657	1077	580	35%

Example zinc load reduction at exceedance conditions (10/15/2003).

Measured Flow (cfs)	Dissolved Zinc Existing Load (lb/day)	Dissolved Zinc Load Capacity (lb/day)	Load Reduction Required (lb/day)	% Reduction
6040	2632	2616	16	0.62%

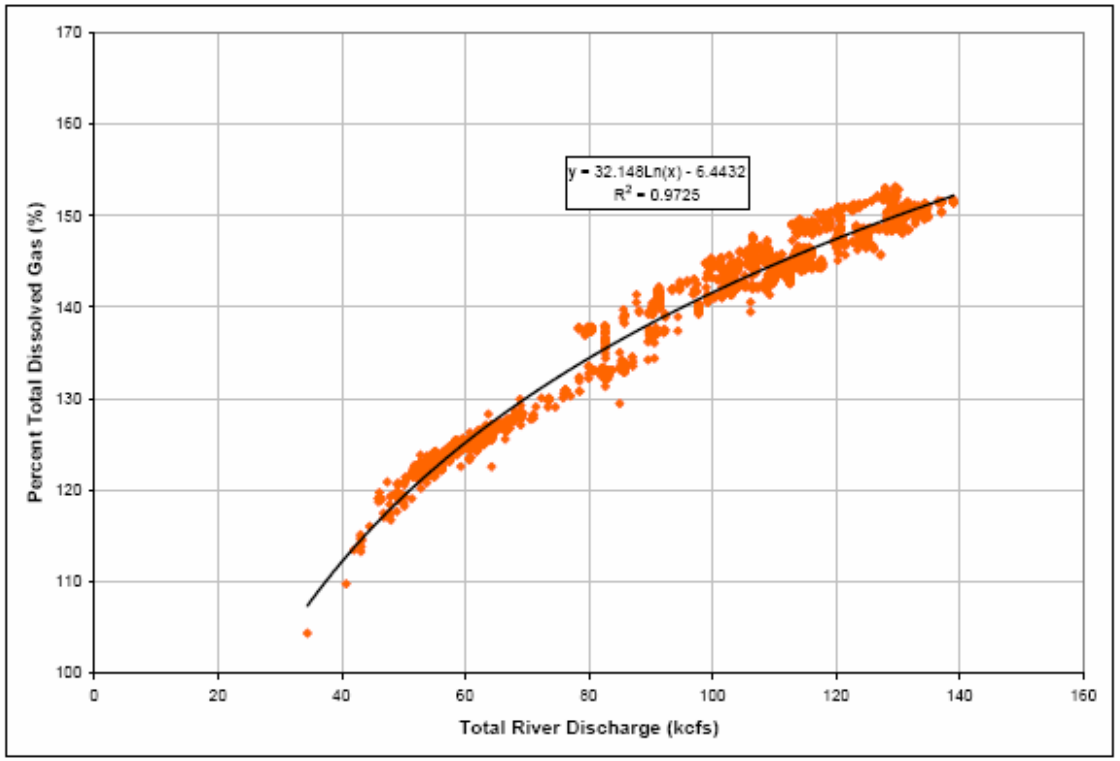
Total Dissolved Gas TMDL

- The goal of the TDG TMDL is to insure that Idaho Water Quality Standards for TDG (110% saturation) are met in the mainstem Lower Clark Fork River in order to protect aquatic life in the Clark Fork/Pend Oreille system.
- The standard is set at Idaho Water Quality Standard less a 2% Margin of Safety at the Idaho/Montana border.
- No net increase of TDG will be allowed between Cabinet Gorge forebay and below Cabinet Gorge dam.



Avista Utilities

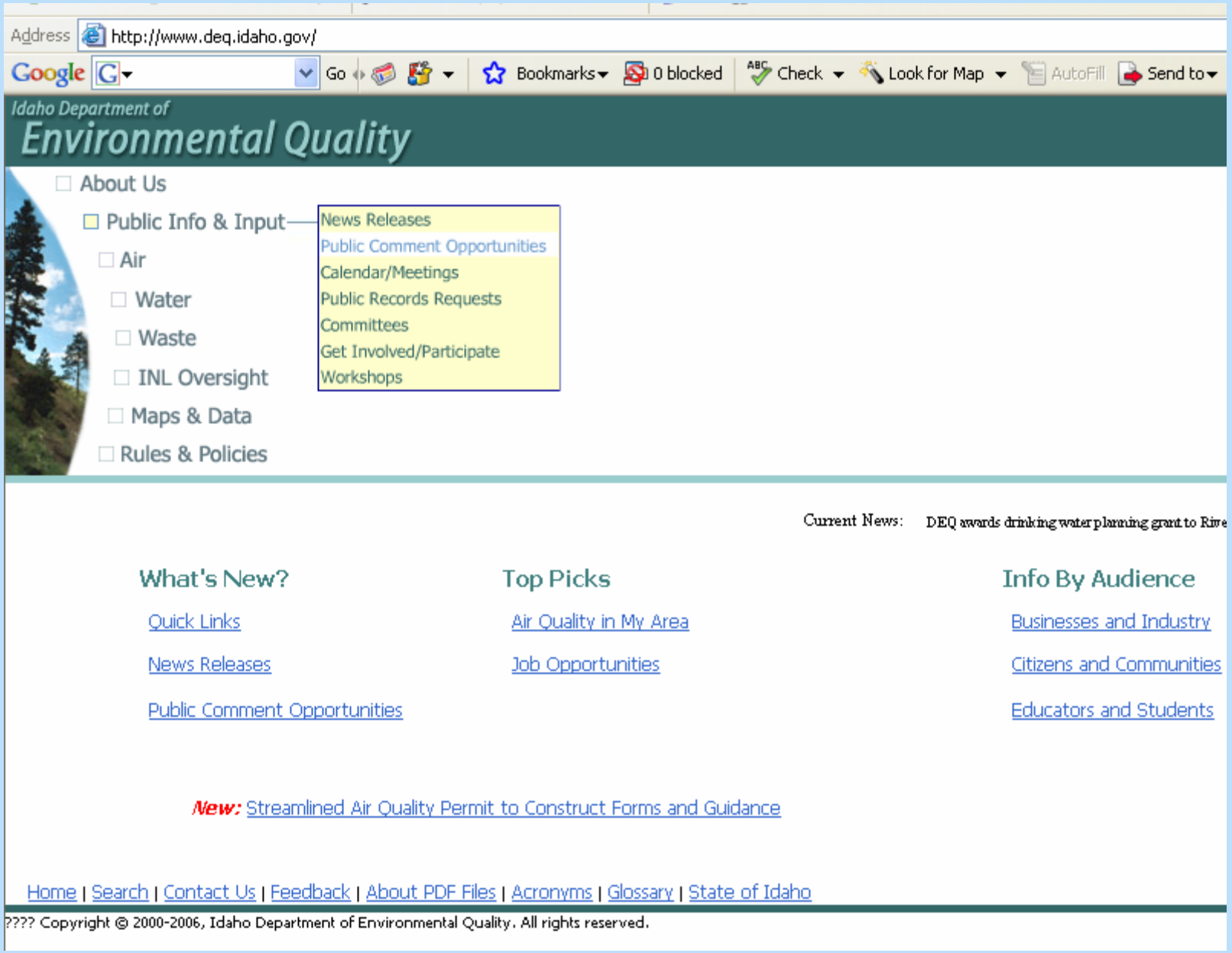
Existing TDG Levels



Note: Total gas level vs. river discharge assumes powerhouse is operating at maximum capacity for the indicated total river discharge, in addition to the required discharge through the spillway.

Public Comment Process

- Open January 19 – March 5, 2007 (45-days)
- Newspaper ads and letter to interested parties
- Available on DEQ web-page, local libraries
- Public Meeting January 30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New: Streamlined Air Quality Permit to Construct Forms and Guidance
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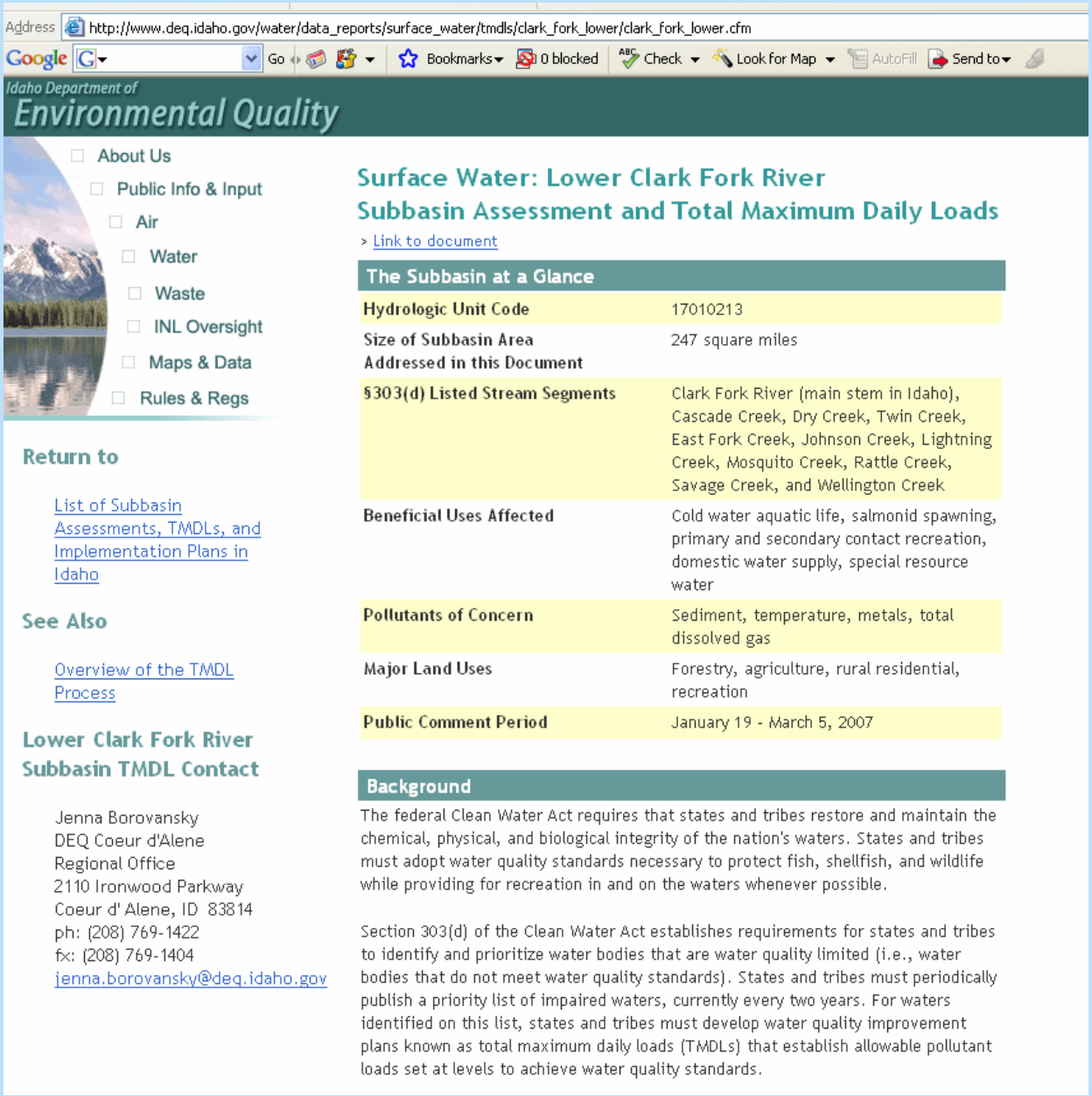
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Public Info & Input
Air
Water
Waste
INL Oversight
Maps & Data
Rules & Regs
Return to
List of Subbasin Assessments, TMDLs, and Implementation Plans in Idaho
See Also
Overview of the TMDL Process
Lower Clark Fork River Subbasin TMDL Contact
Jenna Borovansky
DEQ Coeur d'Alene
Regional Office
2110 Ironwood Parkway
Coeur d' Alene, ID 83814
ph: (208) 769-1422
fx: (208) 769-1404
jenna.borovansky@deq.idaho.gov
Surface Water: Lower Clark Fork River
Subbasin Assessment and Total Maximum Daily Loads
› Link to document
The Subbasin at a Glance
Hydrologic Unit Code 17010213
Size of Subbasin Area Addressed in this Document 247 square miles
§303(d) Listed Stream Segments Clark Fork River (main stem in Idaho), Cascade Creek, Dry Creek, Twin Creek, East Fork Creek, Johnson Creek, Lightning Creek, Mosquito Creek, Rattle Creek, Savage Creek, and Wellington Creek
Beneficial Uses Affected Cold water aquatic life, salmonid spawning, primary and secondary contact recreation, domestic water supply, special resource water
Pollutants of Concern Sediment, temperature, metals, total dissolved gas
Major Land Uses Forestry, agriculture, rural residential, recreation
Public Comment Period January 19 - March 5, 2007
Background
The federal Clean Water Act requires that states and tribes restore and maintain the chemical, physical, and biological integrity of the nation's waters. States and tribes must adopt water quality standards necessary to protect fish, shellfish, and wildlife while providing for recreation in and on the waters whenever possible.
Section 303(d) of the Clean Water Act establishes requirements for 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 of impaired waters, currently every two years. For waters identified on this list, states and tribes must develop water quality improvement plans known as total maximum daily loads (TMDLs) that establish allowable pollutant loads set at levels to achieve water quality standards.