



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 10

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FEB 06 2009

Department of Environmental Quality  
State Water Quality Programs

FEB 04 2009

Reply To: OWW-134

Mr. Barry N. Burnell, Administrator  
Water Quality Program  
Department of Environmental Quality  
1410 North Hilton  
Boise, ID 83706

Re: Partial Approval/Partial Disapproval of Idaho's Final 2008 303(d) List

Dear Mr. Burnell:

The U.S. Environmental Protection Agency has conducted a complete review of Idaho's 2008 Section 303(d) List<sup>1</sup>, supporting documentation and information. Based on our review of the submittal, EPA has determined that Idaho's 2008 list of 929 waterbodies (as identified by assessment units (AU)) still requiring TMDLs meets the requirements of Section 303(d) of the Clean Water Act (CWA) and EPA's implementing regulations. However, Idaho has failed to include two waterbodies which meet the requirements for 303(d) listing. Therefore, by this order, EPA hereby partially approves and partially disapproves Idaho's 2008 303(d) list. Specifically, EPA approves the State's decision to list the 929 AUs and associated pollutants identified in the State's 303(d) list. EPA is also disapproving the State's decision not to list two additional water bodies because EPA finds that these waters and pollutants meet the federal requirements for listing under Section 303(d). The statutory and regulatory requirements, and a summary of EPA's review of Idaho's compliance with each requirement, are described in the enclosure to this letter.

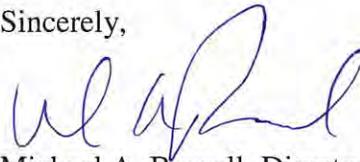
EPA is identifying for inclusion on Idaho's Section 303(d) list the Lower Boise River (ID17050114SW001\_06) and Hem Creek (ID17060307CL007\_02b). EPA will open a public comment period to receive comments concerning our proposed decision to add waters to the State's Section 303(d) list. After we consider comments received from the public, we will make a final decision regarding the addition of the two waters to the 2008 303(d) list.

EPA has received Idaho's long-term schedule for TMDL development for all waters on the State's 2008 Section 303(d) list. As a policy matter, EPA has requested that States provide such schedules. EPA is not taking any action to approve or disapprove this schedule pursuant to Section 303(d).

In 1994, in response to a federal District Court order, EPA published a 303(d) list for the State of Idaho which identified all impaired waters within the State of Idaho, including some waters within Indian Country as defined at 18 USC 1151. EPA's partial approval/partial disapproval of the State's 2008 303(d) list does not apply to any waters, or portions thereof, that are within Indian Country. EPA is taking no action to approve or disapprove the State's list with respect to any waters within Indian Country.

We recognize and appreciate the excellent work of staff and managers at IDEQ in developing the final 2008 303(d) List. We look forward to continuing to work with you on this process to address the water quality issues in the State. If you have any questions please contact Tracy Chellis, Impaired Waters Program Manager at (206)553-6326, or Dave Croxton, Manager, Watershed Unit at (206) 553-6694.

Sincerely,



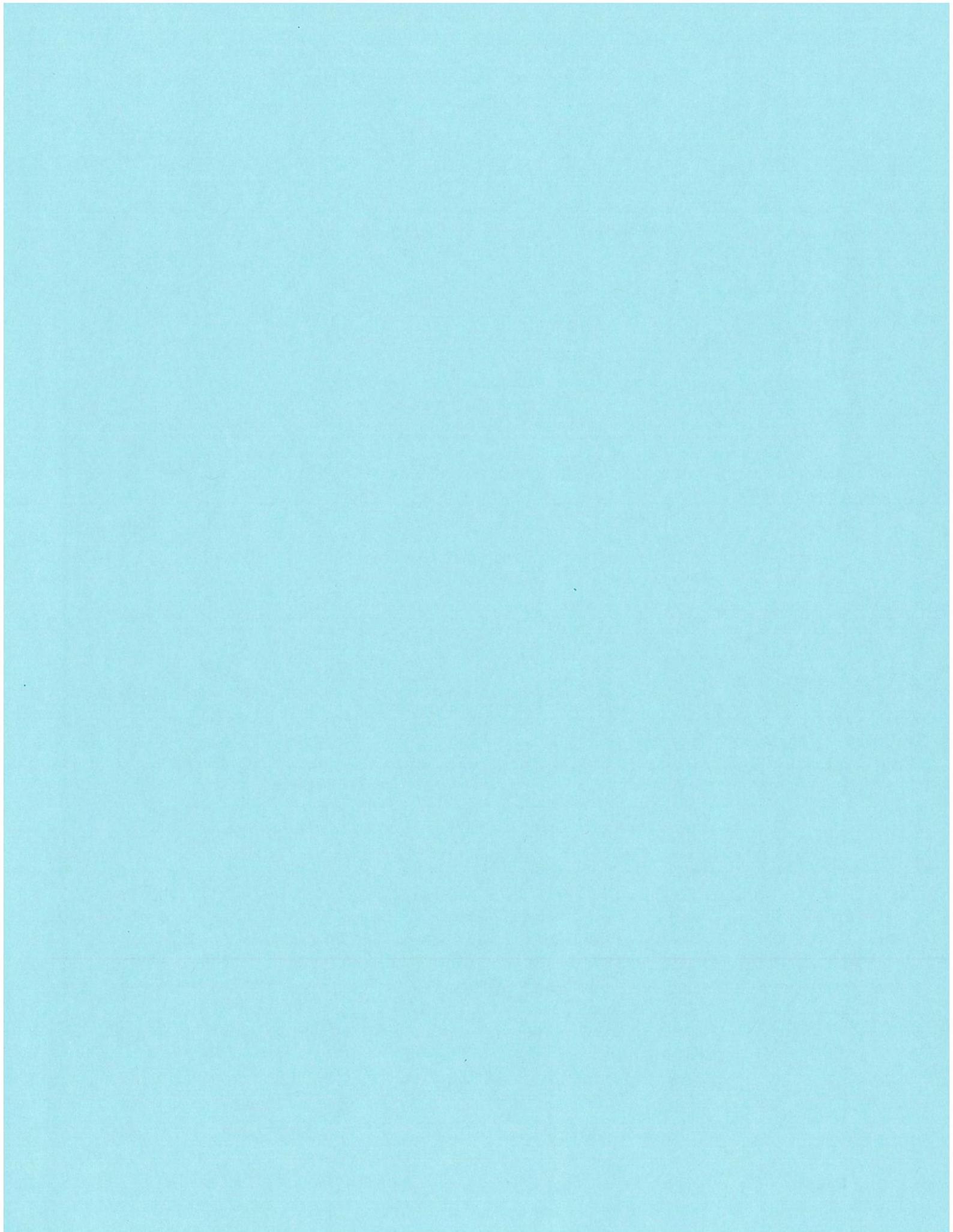
Michael A. Bussell, Director  
Office of Water and Watersheds

Enclosures

cc: Michael McIntyre, IDEQ  
Marti Bridges, IDEQ

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<sup>1</sup> For tracking purposes, Idaho did not submit a 303(d) list in 2004 or 2006. The last 303(d) list submittal was in 2002.



## **Purpose**

The Environmental Protection Agency (EPA) has conducted a complete review of Idaho's 2008 Section 303(d)<sup>1</sup> list and supporting documentation and information. Based on our review of the submittal, EPA has determined that Idaho's 2008 list of 929 assessment units (AU) still requiring TMDLs meets the requirements of Section 303(d) of the Clean Water Act (CWA) and EPA's implementing regulations. Therefore, by EPA's final action letter, EPA partially approved and partially disapproved Idaho's 2008 303(d) list. Specifically, EPA approved the State's decision to list the 929 AUs and associated pollutants identified on the 303(d) list. However, EPA disapproved the State's decision not to list 2 additional water bodies because EPA found that these waters and pollutants meet the federal requirements for listing under Section 303(d). The statutory and regulatory requirements of CWA Section 303(d), and EPA's review of Idaho's compliance with each requirement, are described in the attached analysis.

## **Statutory and Regulatory Background**

### **I. Identification of Water Quality Limited Segments (WQLS) for Inclusion on Section 303(d) List**

Section 303(d)(1) of the Clean Water Act (CWA) directs States to identify those waters within its jurisdiction for which effluent limitations required by Section 301(b)(1)(A) and (B) are not stringent enough to achieve any applicable water quality standard, and to establish a priority ranking for such waters, taking into account the severity of the pollution and the uses to be made of such waters. The Section 303(d) listing requirement applies to waters impaired by point and/or nonpoint sources, pursuant to EPA's long-standing interpretation of Section 303(d).

EPA regulations provide that States do not need to list waters where the following controls are adequate to implement applicable standards: (1) technology-based effluent limitations required by the Act, (2) more stringent effluent limitations required by federal, State or local authority, and (3) other pollution control requirements required by State, local, or federal authority. See 40 CFR 130.7(b)(1).

### **II. Consideration of Existing and Readily Available Water Quality-Related Data and Information**

In developing Section 303(d) lists, States are required to assemble and evaluate all existing and readily available water quality-related data and information, including, at a minimum, consideration of existing and readily available data and information about the following categories of waters: (1) waters identified as partially meeting or not meeting designated uses, or as threatened, in the State's most recent Section 305(b) report; (2) waters for which dilution calculations or predictive modeling indicate nonattainment of applicable standards; (3) waters for which water quality problems have been reported by governmental agencies, members of the public, or academic institutions; and (4) waters

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<sup>1</sup> The 303(d) List is also known as Category 5 of the Integrated Report.

identified as impaired or threatened in any Section 319 nonpoint assessment submitted to EPA. See 40 CFR 130.7(b)(5). In addition to these minimum categories, States are required to consider any other data and information that is existing and readily available. EPA's 1991 Guidance for Water Quality-Based Decisions describes categories of water quality-related data and information that may be existing and readily available. See EPA 1991, Appendix C. While States are required to evaluate all existing and readily available water quality-related data and information, States may decide not to use particular data or information in determining whether to list particular waters.

In addition to requiring States to assemble and evaluate all existing and readily available water quality-related data and information, EPA regulations at 40 CFR 130.7(b)(6) require States to include as part of their submissions to EPA documentation to support decisions to list or not list waters. Such documentation must include, at a minimum, the following information: (1) a description of the methodology used to develop the list; (2) a description of the data and information used to identify waters; and (3) a rationale for any decision to not use any existing and readily available data and information an (4) any other reasonable information requested by the Region.

### **III. Priority Ranking**

EPA regulations also codify and interpret the requirement in Section 303(d)(1)(A) of the Act that States establish a priority ranking for listed waters. The regulations at 40 CFR 130.7(b)(4) require States to prioritize waters on their Section 303(d) lists for TMDL development, and also to identify those WQLSs targeted for TMDL development in the next two years. In prioritizing and targeting waters, States must, at a minimum, take into account the severity of the pollution and the uses to be made of such waters. See Section 303(d)(1)(A). As long as these factors are taken into account, the Act provides that States establish priorities. States may consider other factors relevant to prioritizing waters for TMDL development, including immediate programmatic needs, vulnerability of particular waters as aquatic habitats, recreational, economic, and aesthetic importance of particular waters, degree of public interest and support, and State or national policies and priorities. See 57 FR 33040, 33045 (July 24, 1992), and EPA 1991.

### **Analysis of Idaho's Submission**

#### **I. Identification of Waters and Consideration of Existing and Readily Available Water Quality-Related Data and Information.**

EPA has reviewed the State's submission, and has concluded, with the exception of the Lower Boise River and Hem Creek, that the State developed its Section 303(d) list in compliance with Section 303(d) of the Act and 40 CFR 130.7. EPA's review is based on its analysis of whether the State reasonably considered existing and readily available water quality related data and information and reasonably identified waters required to be listed.

## **A. Idaho's List Development Process**

Idaho's 2002 303(d) list was used as a starting point for developing the 2008 303(d) list. The Idaho Department of Environmental Quality (IDEQ) actively sought data collected by federal agencies (including the U.S. Geological Society, U.S. Forest Service and the Bureau of Land Management), state agencies (including Idaho Department of Fish and Wildlife), tribes, local governments, watershed councils and private and public organizations and individuals. Idaho solicited public comment on its draft 303(d) list and Integrated Report.

IDEQ prepared a final list of impaired waters using data they collected and data received during the public processes. IDEQ categorized the data into three tiers of scientific rigor with more weight given to data with a higher level of scientific rigor. The scientific rigor is explained in the state's listing methodology, Water Body Assessment Guidance, Second Edition, Final January 2002 (WBAG II). IDEQ communicated its three tier collection methods with requirements to the public in the draft and final list methodology, which were available in hard copy and on the internet.

IDEQ submitted their final 2008 303(d) list, including a response to public comment, a final list methodology, a priority ranking and an Integrated Report on the Status of Idaho's waters, to EPA on July 14, 2008. EPA received Idaho's 303(d) list as a hard copy on July 16, 2008. During EPA's review of Idaho's final submittal a number of questions arose regarding the information Idaho provided. EPA communicated regularly with Idaho and received additional information from Idaho to support listing decisions on the following dates: August 5, August 8, September 8, September 9, September 11, September 12, September 24, September 26, October 22 and October 23, 2008.

An online mapping database is also available online at:  
<http://global.deq.idaho.gov/Website/wq2004/run.htm>

## **B. Public Participation**

For the 2008 303(d) list, Idaho solicited data and comments until February 20, 2008, seeking technical information and data on the conditions of Idaho's surface waters. Data received during the "call for data" period and data collection by IDEQ were used to develop the draft Integrated Report (IR) and 303(d) lists. The draft 2008 IR 303(d) list and list methodology were released for public review from January 10 to February 20, 2008 to provide the public an opportunity to look at and comment on the IR, including the draft 303(d) list. The summary document includes an index of people and organizations who provided comments, a table of comments and IDEQ's specific response to each commenter. Idaho received 25 written comment letters from individuals and organizations.

### **C. EPA's Review Process**

EPA received Idaho's Final 2008 303(d) list as a hard copy on July 16, 2008. EPA also reviewed both an on-line version of IDEQ's database, which has a mapping tool, available via Internet at: <http://global.deq.idaho.gov/Website/wq2004/run.htm>, and the electronic copy of the Assessment Database (ADB) of the 303(d) list provided in CD format. The final 2008 303(d) list submittal included the following supporting documentation: Integrated Report (Categories 1-5), the 2008 Principles and Policies document which includes Idaho's listing methodology, a summary of public comments with IDEQ's response to the comments, and priority ranking and targeting. The Integrated Report identifies the information that was considered and what actions were taken. IDEQ provided a hard copy spreadsheet of all the water bodies that were de-listed during this cycle of the 303(d) list to make it possible to compare changes between the 2002 and 2008 lists.

EPA reviewed IDEQ's electronic copy of the database to determine which waters had been added to or removed from Idaho's final 2008 303(d) list. IDEQ's electronic version was a complete download of their ADB that is accessible to view on Microsoft's Access software. This download provided a snapshot of the assessed data which is currently known as the final 2008 Integrated Report. This electronic database allows tremendous accessibility to supporting data and records for individual water bodies. EPA extensively reviewed Idaho's draft and final 2008 303(d) lists. In addition, EPA communicated regularly with IDEQ and developed an administrative record that includes the draft and final 303(d) list, final list methodologies, prioritization schedule, public notices, e-mails and matrix showing changes between the 2002 list and 2008 lists. IDEQ has provided descriptions of the data and information considered. During EPA's review of Idaho's final submittal a number of questions arose regarding the information Idaho provided. EPA communicated regularly with Idaho and received additional information from Idaho to support listing decisions on the following dates: August 5, August 8, September 8, September 9, September 11, September 12, September 24, September 26, October 22 and October 23, 2008.

With the exception of the Lower Boise River and Hem Creek, EPA concluded that the State properly assembled and reasonably evaluated all existing and readily available data and information, including data and information relating to the categories of waters specified in 40 CFR 130.7(b)(5). The State provided to EPA its rationale for not using particular existing and readily available water quality-related data and information as a basis for listing waters.

Please see Enclosures 2 and 3 for EPA's basis for disapproval of Idaho's delisting of the Lower Boise River and Hem Creek. In both cases, EPA found that Idaho did not consider all readily available data and information when making their listing decision.

## **II. Consideration of Existing and Readily Available Water Quality-Related Data and Information**

There are 929 AU pollutant combinations on the 2008 303(d) list. The state has demonstrated good cause for not including the previously listed AU pollutant combination discussed below on its 2008 303(d) list. As provided in 40 CFR 130.7(b)(6)(iv), EPA requested that the State demonstrate good cause for not including these waters.

### **A. Waters not required to be listed**

1. Waters not listed due to water quality standards attainment. IDEQ removed a total of 381 (Idaho reported 383, but that included the Lower Boise River and Hem Creek which EPA is disapproving) assessment units paired with a pollutant because information shows they were meeting applicable water quality standards. Three hundred and seventy three of the AU pollutant combinations were removed from the list because additional data showed they met water quality standards. Four of the AU pollutant combinations meet water quality standards because Idaho utilized a new assessment method and four others meet standards because the original basis for the listing was incorrect. The remainder of the waters, EPA has determined that IDEQ's removal of these waters from Idaho's Section 303(d) list is consistent with the requirements of Section 303(d) of the Act and 40 CFR 130.7.

2. Waters not listed due to TMDL approved. For the 2008 list cycle, IDEQ removed 1,486 assessment units from the 303(d) list based on EPA approval of TMDLs for these waters. These assessment units were placed in Category 4A, TMDLs Approved, of the Integrated Report. Under EPA regulations at 40 CFR 130.7, the 303(d) list is an inventory of water bodies impaired by pollutants and requiring a TMDL. Thus, EPA has determined that IDEQ's removal from the 303(d) list of the 1,486 assessment units with an EPA approved TMDL meet the requirements of CWA Section 303(d).

### **B. An Analysis of Waters Removed from Idaho's 2008 303(d) list**

#### 1. Waters Removed from the 303(d) list due to Flaws in the Original Analysis

Consistent with 40 CFR 130.7(b)(6)(iv), EPA concluded that IDEQ provided "good cause" for the decisions to remove 57 AU pollutant combinations. An aspect of good cause is a "flaw in the original analysis that leads to the water being listed in the categories at 130.7(b)(5)." Idaho removed these water segments paired with a pollutant from the 303(d) list because the original listing was in error. The errors in listing are due because the original listing was in error. The errors in listing are due to technical listing errors, such as accidental comparison to incorrect criteria, sampling error and duplicate records. Therefore, EPA has determined that the delisting of these 57 waters is consistent with the requirements of 40 CFR 130.7(b)(6).

2. Water not listed because waters not in state's jurisdiction. Idaho has identified 3 AU pollutant combinations that are being delisted because they are wholly contained within

Indian Reservations and not within the state's jurisdiction. EPA has determined that these delistings are consistent with the requirements of 40 CFR 130.7(b)(6).

### **C. Basis for Decision to Add Waters to Idaho's 2008 303(d) list**

#### 1. Water not listed that EPA has determined do not meet the requirements of 40 CFR 130.7.

Idaho has identified 2 waters, the Lower Boise River and Hem Creek that were removed from the 303(d) list because the applicable water quality standards are attained.

However, EPA has disapproved these delisting based on our analysis of all readily available data and information which show the waters remain impaired.

##### **A. Lower Boise River**

EPA has reviewed Idaho's good cause rationale for delisting the Lower Boise River. In making its assessment, IDEQ focused on a few of the indicators of nutrient impairment while ignoring other parameters which are equally critical to assessing nutrient impairment. EPA concluded that IDEQ did not demonstrate good cause to delist the Lower Boise River for nutrients, and that IDEQ provided insufficient rationale to justify the exclusion of all existing and readily available data. While dissolved oxygen(DO), pH and planktonic chlorophyll-a are useful indicators of nutrient impairment, they do not provide sufficient rationale to exclude data on other key water quality parameters: total phosphorus, periphytic chlorophyll-a and macroinvertebrate data. While EPA 304(a) criteria are not legally binding, they are a valid basis to interpret state narrative standards. Total phosphorus, periphytic chlorophyll-a and macroinvertebrate data clearly indicate that the Lower Boise River is impaired for nutrients.

Data presented by IDEQ on DO, pH and planktonic chlorophyll-a do not demonstrate good cause to delist the Lower Boise for nutrients. The indicators IDEQ selected to make a delisting decision when considered in combination with other indicators are in fact supportive of the conclusion that the Lower Boise is impaired. DO grab samples show supersaturated levels indicative of higher than normal algal activity. Additionally, a 2004 USGS report shows an exceedance of pH at Middleton on the Lower Boise River of 9.1 (MacCoy, 2004). Information presented by IDEQ on nuisance algae reports is at least seven years old, and IDEQ does not consider more recent information on nuisance algae complaints. Recent photo logs show that algae are present. IDEQ's conclusions on scouring do not reconcile with field observations and data.

These water quality data discussed above and the water quality data which were excluded by IDEQ demonstrate that the Lower Boise River should not be delisted for nutrients from Idaho's 303(d) list. Based on EPA's review of the information and documentation provided by IDEQ, as well as the readily available data, IDEQ has not demonstrated good cause or sufficient rationale to exclude readily and existing information to support the delisting of nutrients from the Lower Boise River. The state has failed to demonstrate that the Lower Boise is meeting the state's water quality standards for nutrients. A more detailed analysis is in Enclosure 2.

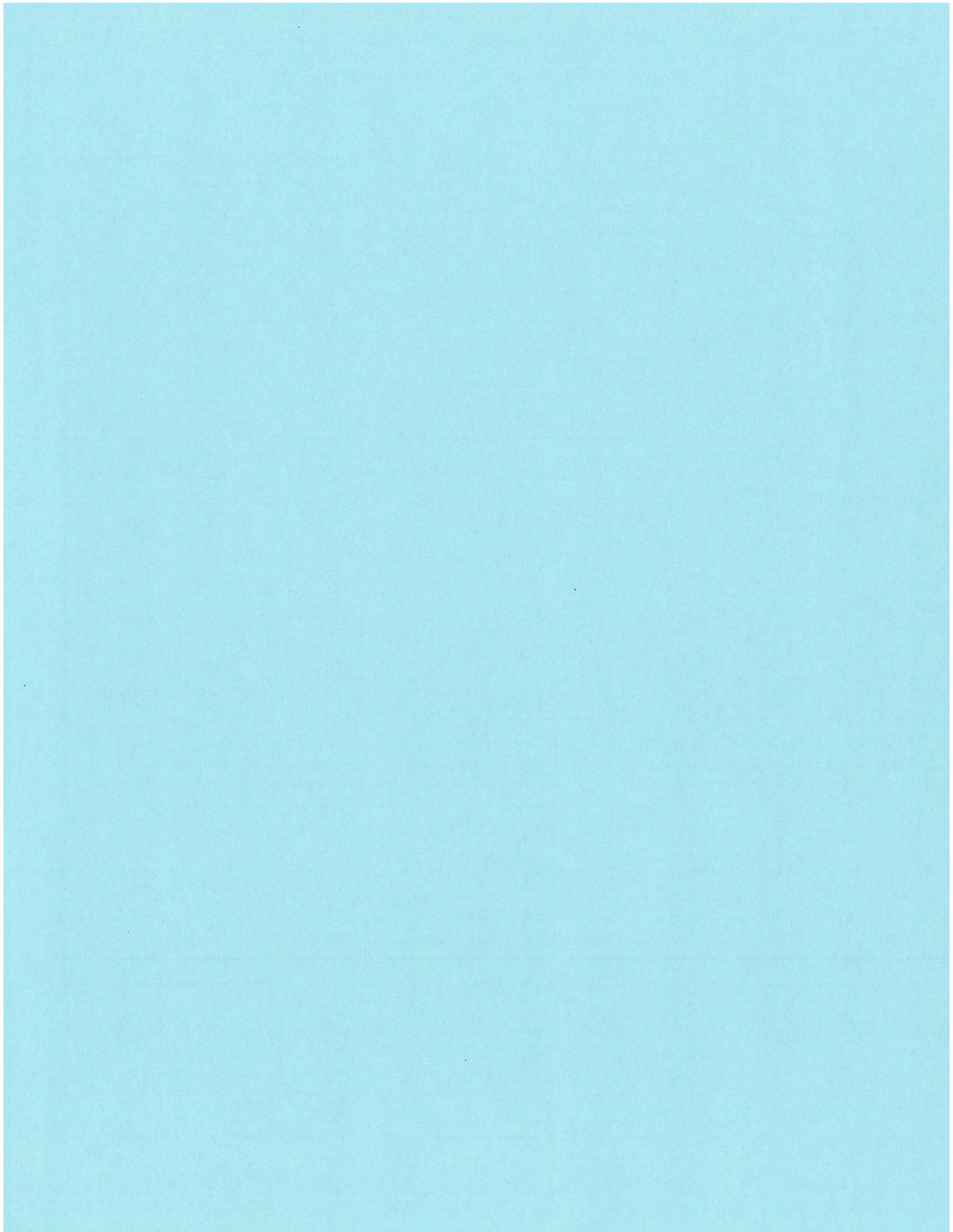
## B. Hem Creek

EPA evaluated the rationale provided by IDEQ for de-listing Hem Creek for temperature and concluded that the rationale provided by IDEQ does not support the conclusion that Hem Creek stream temperatures are natural. Based on our review it also appears that de-listing of Hem Creek for temperature is not consistent with IDEQ listing policies as provided in the Final Department of Environmental Quality Working Principles and Policies for the 303(d)/305(b) (IDEQ, 2008b).

Idaho presented the following five lines of evidence in its Final 303(d) list to support its proposal to de-list Hem Creek for temperature: 1) Hem Creek has the least temperature criteria exceedances of any stream in the Upper North Fork Clearwater River (UNFCR) subbasin., 2) only a small amount of logging has occurred in the watershed, and no shade was removed from the Stream Protection Zone, 3) biological scores were very high in sampling conducted in Hem Creek, 4) The Clearwater National Forest Recommended Hem Creek as a reference stream for BURP monitoring, and 5) INFISH applies and is equivalent to meeting a natural vegetation canopy cover, since it results in "no entry" 300' stream setbacks. EPA reviewed IDEQ's de-listing rationale in the context of "good cause" provisions for de-listing established under 40 CFR 130.7(b)(6)(iv). Our review has concluded that that state failed to demonstrate good cause to remove this water from the 303(d) list. A more detailed analysis of this review is in Enclosure 3.

## III. Priority Ranking and Targeting

EPA also reviewed the State's priority ranking of listed waters for TMDL development as per 40 CFR 130.7(b)(4), which requires that states "shall include a priority ranking for all listed water quality limited segments still requiring TMDLs," and concludes that the State properly took into account the severity of pollution and the uses to be made of such waters. EPA reviewed the State's identification of WQLSs targeted for TMDL development in the next two years, and concluded that the targeted waters are appropriate for TMDL development in this time frame. In prioritizing and targeting waters, States must, at a minimum, take into account the severity of the pollution and the uses to be made of such waters. See Section 303(d)(1)(A). As long as these factors are taken into account, the Act provides that States establish priorities.



## Enclosure 2: EPA review of Idaho's Delisting Rationale for the Lower Boise River

In January 2008, the Idaho Department of Environmental Quality (IDEQ) released their draft 2008 Integrated Report for public comment. In that document, IDEQ sought to delist nutrient impairments in the Lower Boise River from Category 5 of Idaho's 2008 303(d) Integrated Report (IDEQ, 2008a). EPA provided comments to the proposed delisting (Croxtton, 2008), and IDEQ responded and submitted their Final 2008 Integrated Report to EPA in July 2008 (IDEQ, 2008b).

This document describes the nutrient listing history and evaluates the evidence provided by IDEQ in their Draft 2008 Integrated Report, Final 2008 Integrated Report, and Final Response to Comments to delist nutrients in the Lower Boise River. It is organized in the following sections:

- Listing History of Nutrients in the Lower Boise River
- Idaho's Proposal to Delist Nutrients from Lower Boise River in 2008 Integrated Report
- Federal Requirements to Evaluate Delisting from the 303(d) Integrated Report
- EPA's Evaluation of the Proposed Nutrient Delisting of the Lower Boise River
- Summary of Delisting Evaluation
- Conclusion

### **Listing History of Nutrients in the Lower Boise River**

IDEQ first identified the Lower Boise River as polluted in Appendix A of the draft 1986 305(b) report. In a letter to EPA, IDEQ states that the basis for the list of segments not fully supporting protected beneficial uses is based solely on best professional judgment. The draft 1986 305(b) report does not specify the pollutants impairing the Lower Boise River (Burr, 1986). In 1992, IDEQ more specifically identified the Lower Boise River as impaired for nutrients, siltation/sedimentation, and organic enrichment/dissolved oxygen on Idaho's 1992 305(b) report, but not on Idaho's 1992 303(d) list. The 1992 305(b) report includes data from four stations: Boise River at Lucky Peak Dam, Glenwood Bridge, Middleton, and Parma. The narrative states:

*"Stations in the Southwest Basin have the most complete data record. The Boise River Stations indicate a decline in water quality between the Lucky Peak and Parma stations, which was noted in the past. The water quality indices show a trend similar to trends reported in 1988 (IDEQ, 1992)."*

The report analyzes the trophic status at each station on the Boise River. At Lucky Peak Dam, the trophic status is good, but progressively worsens downstream. Boise River at Glenwood Bridge and Middleton show a fair trophic status, and Boise River at Parma shows a poor trophic status. Dissolved oxygen and pH measurements are good and fair (IDEQ, 1992).

The Lower Boise River was not included on Idaho's 1992 303(d) list (IDEQ, 1992). EPA was subsequently challenged regarding its approval of Idaho's 1992 303(d) list because it did not include waters for which data were available that indicated they were impaired. EPA was ordered by the court to develop the 303(d) list for Idaho, which was published as the 1994 list. The Lower Boise River was included in the 1994 list for nutrients and sediment, and this listing continued in 1996, 1998, and 2002. In 2002, tributaries on the Lower Boise River were also

## Enclosure 2: EPA review of Idaho's Delisting Rationale for the Lower Boise River

listed for nutrients (IDEQ, 1994, 1996, 1998, 2005d). EPA approved each of these subsequent lists of impaired waters (EPA, 1993, 1994, 2001, 2005a).

### *Applicable Water Quality Standards for Nutrients in Idaho*

The Idaho water quality standards that address nutrients are as follows:

#### **Idaho Administrative Code (IDAPA 58.01.02-200.05, 06, 07)**

**05. Floating, Suspended or Submerged Matter.** Surface waters of the state shall be free from floating, suspended, or submerged matter of any kind in concentrations causing nuisance or objectionable conditions or that may impair designated beneficial uses. This matter does not include suspended sediment produced as a result of nonpoint source activities.

**06. Excess Nutrients.** Surface waters of the state shall be free from excess nutrients that can cause visible slime growths or other nuisance aquatic growths impairing designated beneficial uses.

**07. Oxygen-Demanding Materials.** Surface waters of the state shall be free from oxygen-demanding materials in concentrations that would result in an anaerobic water condition.

### **Idaho's Proposal to Delist Nutrients from Lower Boise River in 2008 Integrated Report**

In 2001, IDEQ completed the Lower Boise River Nutrient Subbasin Assessment (SBA) and concluded that nutrients were not impairing the river. In 2001, EPA provided several comment letters on the draft Lower Boise River Nutrient SBA and Tributary SBAs (Filippini, 2001). In these analyses, EPA concluded that

*"After review of the SBAs and an analysis of the State of Idaho water quality standards by EPA staff, including our Standards and Planning Unit, EPA concludes that we cannot support delisting the Lower Boise River for nutrient loading at this time (Filippini, 2002)."*

In subsequent letters and in EPA's comments to the Draft 2008 Integrated Report, EPA presented concerns regarding information provided by IDEQ, and EPA provided information to Idaho which supported the 303(d) listing of nutrients on the Lower Boise River in Category 5, the impaired waters list (Croxtton, 2008; Stewart, 2007; Cope, 2007; Nickel, 2007).

In January 2008, IDEQ released their draft 2008 Integrated Report for public comment, which included the proposal to delist the Lower Boise River for nutrients. Table 1 lists the impaired segments in the Lower Boise watershed which remained in Category 5 of the 2008 Draft Integrated Report. Table 2 lists the rationale provided by IDEQ to delist the Lower Boise River for nutrients.

Enclosure 2: EPA review of Idaho's Delisting Rationale for the Lower Boise River

**Table 1. Lower Boise River Category 5 Impaired Segments in 2008 Final Integrated Report**

Waterbody Segment Number	Waterbody Name	River Miles	Impairment
ID17050114SW001_02	Boise River – Indian Creek to mouth	4.14	Temperature, water
ID17050114SW001_06	Boise River – Indian Creek to mouth	45.43	Temperature, water
ID17050114SW002_04	Indian Creek – 4 <sup>th</sup> order	10.93	Temperature, water; Fecal coliform
ID17050114SW003_02	Indian Creek – 1 <sup>st</sup> and 2 <sup>nd</sup> order	280.3	Sedimentation/Siltation; Fecal Coliform; Nutrient/Eutrophication Biological Indicators (added 3/27/06)
ID17050114SW003_03	Indian Creek – 3 <sup>rd</sup> order	57.21	Sedimentation/Siltation, Temperature, water; Nutrient/Eutrophication Biological Indicators (added 3/27/06)
ID17050114SW003_04	Indian Creek – 4 <sup>th</sup> order	27.26	Sedimentation/Siltation; Temperature, water; Cause Unknown (Low DO due to suspected organic enrichment)
ID17050114SW004_06	Lake Lowell	6056.53 acres	Cause unknown (nutrients suspected impairments, low DO suspected organic enrichment)
ID17050114SW005_06	Boise River – river mile 50 (T04N, R02W, Sec. 32) to Indian	44.1	Temperature, water
ID17050114SW006_02	Mason Creek – entire watershed	29.82	Sedimentation/siltation; cause unknown (nutrients suspected impairment, low DO due to suspected organic enrichment)
ID17050114SW008_03	Tenmile Creek – 3 <sup>rd</sup> order below Blacks Creek Reservoir	29.48	Fecal coliform; cause unknown nutrients suspected impairment
ID17050114SW009_02	Blacks Creek – 1 <sup>st</sup> and 2 <sup>nd</sup> order	56.2	Combined Biota/Habitat Bioassessments
ID17050114SW009_03	Blacks Creek – 3 <sup>rd</sup> order	7.49	Combined Biota/Habitat Bioassessments
ID17050114SW010_02	Fivemile Creek – 1 <sup>st</sup> and 2 <sup>nd</sup> order	65	Fecal coliform
ID17050114SW010_03	Fivemile Creek – 3 <sup>rd</sup> order	22.64	Combined Biota/Habitat Bioassessments; Fishes Bioassessment, Unknown (nutrients suspected impairment, low DO due to suspected organic enrichment)
ID17050114SW011a_06	Boise River – Diversion Dam to river mile 50 (T04N, R02W, Se)	32.15	Temperature, water;
ID17050114SW011b_06	Boise River – Lucky Peak Dam to Diversion Dam	2.31	Other flow regime alterations
ID17050114SW012_02	Stewart Gulch, Cottonwood and Crane Creeks – source to mouth	63.71	Combined Biota/Habitat Bioassessments
ID17050114SW012_03	Stewart Gulch, Cottonwood and Crane Creeks – source to mouth	5.92	Combined Biota/Habitat Bioassessments
ID17050114SW015_02	Willow Creek – source to mouth	77.72	Combined Biota/Habitat Bioassessments; Temperature/Water
ID17050114SW015_03	Willow Creek – source to mouth	18.36	Combined Biota/Habitat Bioassessments; Temperature/Water
ID17050114SW016_03	Langley/Graveyard Gulch complex	5.58	Sedimentation/Siltation; Cause unknown (low DO due to suspected organic enrichment)
ID17050114SW017_03	Sand Hollow Creek – source to mouth	18.24	Sedimentation/Siltation; Fecal coliform; Cause unknown (low DO due to suspected organic

Enclosure 2: EPA review of Idaho’s Delisting Rationale for the Lower Boise River

Waterbody Segment Number	Waterbody Name	River Miles	Impairment
ID17050114SW017_06	Sand Hollow Creek – source to mouth	2.67	enrichment) Sedimentation/Siltation; Cause unknown (nutrient suspected impairment, low DO due to suspected organic enrichment)

**Table 2. Proposed Delisted Assessment Units in the Lower Boise River, Final Integrated Report 2008**

<p><b>17050114 Lower Boise</b></p> <p>ID17050114SW001_06 Boise River- Indian Creek to mouth 45.43 MILES</p> <p>Phosphorus (Total) Applicable WQS attained; reason for recovery unspecified</p> <p>Lower Boise River Nutrient Sub-Basin Assessment, December 2001, pages 42-43:</p> <p>Nutrient 303(d) Listing Status The analysis indicates that nutrients are not impairing aquatic life or recreational beneficial uses in the lower Boise River. Hence, the DEQ proposes de-listing nutrients as a pollutant in the lower Boise River from the 2002 303(d) list. The proposal to de-list nutrients is consistent with 40 CFR 130.7 (6), whereby the state shall provide documentation that supports the listing determination. This assessment serves as the supporting documentation. <a href="http://www.deq.idaho.gov/water/data_reports/surface_water/tmdls/boise_river_tribs/boise_river_nutrient.pdf">http://www.deq.idaho.gov/water/data_reports/surface_water/tmdls/boise_river_tribs/boise_river_nutrient.pdf</a></p>
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**Federal Requirements to Evaluate Delisting from the 303(d) Integrated Report**

In order for impaired waters to be delisted from Category 5 of the Integrated Report (303(d) list), the State must demonstrate a good cause to delist (40 CFR 130.7(b)(6)(iv)) and the rationale for excluding existing and readily available information (40 CFR 130.7(b)(6)(iii)). Specifically, in order for impaired waters to be delisted from Category 5 of the Integrated Report,

*“each State must demonstrate good cause for not including a water or waters on the list. Good cause includes, but is not limited to, more recent or accurate data; more sophisticated water quality modeling; flaws in the original analysis that led to the water being listed in the categories in 130.7(b)(5); or changes in conditions, e.g., new control equipment, or elimination of discharges (40 CFR 130.7(b)(6)(iv)).*

In addition, the State must provide

*“A rationale for any decision to not use any existing and readily available data and information for any one of the categories of waters as described in 130.7(b)(5)(40 CFR 130.7(b)(6)(iii)).”*

EPA also describes the interpretation of these regulations in the report, “Guidance for 2006 Assessment, Listing, and Reporting Requirements Pursuant to Sections 303(d), 305(b) and 314 of the Clean Water Act (EPA, 2005b).”

## Enclosure 2: EPA review of Idaho's Delisting Rationale for the Lower Boise River

IDEQ's basis for delisting relies on the Lower Boise River Nutrient SBA published by IDEQ in December 2001 and on information included in IDEQ's 2008 Integrated Report Final Response to Comments (IDEQ, 2008b). The Lower Boise River Nutrient SBA asserts that if excess nutrients do not impair the aquatic and recreational uses, a waterbody is not impaired by nutrients. Based on this premise, the report puts forth the following lines of evidence as a basis to demonstrate that excess nutrients do not impair uses: dissolved oxygen (DO) and pH data (aquatic life use), planktonic chlorophyll-a data (aquatic life, recreational use), lack of complaints on nuisance algae from 1997-2000 (recreational use), and velocity of the river higher than scouring thresholds (recreational use) (IDEQ, 2001). The Final Response to Comments also asserts that diurnal dissolved oxygen data from the City of Boise taken from 2004 through 2007 meet Idaho's water quality standards (IDEQ, 2008b).

The lines of evidence are summarized in IDEQ's response to comments on the Draft 2008 Integrated Report.

*"Various nuisance thresholds have been established by different studies. However, no thresholds have been proposed in relation to the adverse impacts to aquatic life. Impacts to aquatic life are generally based on DO and pH problems and the reduction of living space for aquatic organisms due to excessive algal biomass. In August 1997, the USGS took hourly DO measurements over 24 hour periods at 5 sites (Eckert, Glenwood, Middleton, Caldwell and Parma). Normal diurnal DO patterns were observed but concentrations never dropped below the criteria. No DO measurements less than 6.0 mg/L have been recorded from Lucky Peak to the mouth of the river from 1986 to 1999 (by USGS). The City of Boise submitted diurnal dissolved oxygen data to IDEQ during the listing process. Dissolved oxygen data was collected at two sites, Glenwood and Linder bridges (both below the wastewater treatment plants), in 15 minute intervals July 2004 through 2007. Dissolved oxygen (mg/L) never dropped below 6.0 mg/L. 0.08% and 1.34% of the dissolved oxygen percent saturation values were below 75% saturation at Glenwood and Linder monitoring sites, respectively. The relationship between Lower Boise River channel hydraulics, nutrients, and periphyton growth was examined in the Lower Boise River Nutrient Subbasin Assessment (IDEQ 2001). Results indicated that during the irrigation season (April to October) when conditions are most suitable for periphyton growth, velocities in the Lower Boise River are higher than the scour threshold, even in low flow years. The absence of nuisance levels of periphyton indicates that the macroinvertebrates have ample living space and that the intergravel flows are not impeded. Hydraulic conditions in the Lower Boise River mitigate for nutrient enriched conditions. In addition, DEQ complaint logs (1997-2000) indicated no complaints of nuisance growth. Irrigation companies and other water users did not report algal impediment at river withdrawal locations during the same time period. Recreational and aesthetics beneficial uses are not impaired by algae (IDEQ, 2008b)."*

### **EPA's Evaluation of the Proposed Nutrient Delisting for the Lower Boise River**

To evaluate whether the proposed nutrient delisting is appropriate, EPA assesses the information IDEQ provides to support the delisting (40 CFR 130.7(b)(6)(iv)) and evaluates the rationale for excluding existing and readily available information (40 CFR 130.7(b)(6)(iii)).

#### **IDEQ's Rationale for Delisting**

The following section evaluates the five lines of evidence that IDEQ presents in its Draft 2008 Integrated Report, Final Integrated Report, and the Final Response to Comments to support its proposal to delist nutrients from the Lower Boise River. These are DO data, pH data, planktonic chlorophyll-a data, lack of nuisance complaints, and high river velocity.

#### ***DO as an indicator of nutrient impairment***

According to EPA's Ambient Water Quality Criteria Recommendations: Rivers and Streams in Nutrient Ecoregion III, total phosphorus, total nitrogen, chlorophyll-a, and some measure of turbidity "are considered to be the best suited for protecting designated uses," while "[o]ther indicators such as dissolved oxygen and macrophyte growth or speciation, and other fauna and flora are also deemed useful" in waters impaired by nutrients (EPA, 2000).

The segment of the Lower Boise River proposed for delisting nutrients is not currently listed for DO (IDEQ, 2008b), but DO is a useful indicator of excess nutrients when combined with nutrient, chlorophyll-a, and biological data. Nutrient enrichment can cause excessive algal growth which can result in high DO during daylight hours when algae photosynthesize, and low DO during nighttime hours when algae respire. Bacterial decomposition of algae and other organic matter also reduces oxygen levels. Either low DO or supersaturated DO can have harmful effects on aquatic life and both can be a result of excess nutrient levels. DO levels can vary significantly each day, usually reaching the lowest levels early in the morning.

It is important to verify whether measurements have been taken at critical times, in order to fully assess compliance with DO criteria. While low DO may indicate excess nutrients and algal growth, DO measurements that meet the numeric criteria are not sufficient to conclude that excess nutrients are not present. DO levels may comply with criteria, but nutrient levels may still be high enough to cause nuisance growth of algae, macrophytes, etc. Although DO can be an indicator of nutrient impairment, DO data alone do not provide a complete assessment of nutrient impairment. At a minimum, nutrient data must also be considered.

IDEQ presents the following information on dissolved oxygen.

*"In August 1997, the USGS took hourly DO measurements over 24 hour periods at 5 sites (Eckert, Glenwood, Middleton, Caldwell and Parma). Normal diurnal DO patterns were observed but concentrations never dropped below the criteria. No DO measurements less than 6.0 mg/L have been recorded from Lucky Peak to the mouth of the river from 1986 to 1999 (by USGS). The City of Boise submitted diurnal dissolved oxygen data to IDEQ during the listing process. Dissolved oxygen data was*

## Enclosure 2: EPA review of Idaho's Delisting Rationale for the Lower Boise River

*collected at two sites, Glenwood and Linder bridges (both below the wastewater treatment plants), in 15 minute intervals July 2004 through 2007. Dissolved oxygen (mg/L) never dropped below 6.0 mg/L. 0.08% and 1.34% of the dissolved oxygen percent saturation values were below 75% saturation at Glenwood and Linder monitoring sites, respectively (IDEQ, 2008a)."*

IDEQ presents data that USGS (1986 to 1999) and the City of Boise collected for the 2001 Lower Boise River Nutrient SBA. IDEQ states that the City of Boise's data is diurnal and DO samples were collected at two sites upstream of the most nutrient-impacted areas at 15-minute intervals from July 2004 through 2007. On at least three occasions, EPA requested from the City of Boise the 15-minute interval DO data cited in DEQ's Final Response to Comments to EPA. The information has not been provided, so EPA is only able to consider the data collected by USGS, and grab samples collected by the City of Boise.

DO data collected by USGS from 1994-2002 show that DO sags do not violate Idaho's water quality standards. However, USGS and City of Boise's data show DO levels that are at times supersaturated. DO saturation is defined as the amount of soluble DO. According to MacCoy's 2004 study,

*"Supersaturated DO conditions indicated that photosynthetic production of DO by aquatic plants (phytoplankton, periphyton, and aquatic macrophytes) was in excess of oxygen demands from respiration and decomposition at all the mainstem sites at some time during the study. Dissolved oxygen was supersaturated (>100 percent saturation) at all the main-stem water quality sampling sites during more than half of the measurements at each site (MacCoy, 2004)."*

Therefore, DO data from USGS and City of Boise grab samples show the presence of aquatic algae that increase DO to supersaturated levels. Supersaturated DO can harmfully impact macroinvertebrates (Hayslip, 2008). In addition, DO exhibits a diurnal pattern when algae undergo photosynthesis and respiration, such that oxygen levels can be supersaturated in the afternoon and severely depleted just before dawn (Chapra, 1997). Grab samples and August 1997 continuous monitoring data on a single day do not show DO violating water quality standards. However, more recent continuous DO data at downstream locations is necessary to evaluate the diurnal pattern and to assess minimum DO levels.

In summary, DO data alone are not sufficient to determine whether nutrients are impairing a system. Used in conjunction with total phosphorus, chlorophyll-a, and macroinvertebrate data, they can be useful to assess nutrient impairment. The limitations of this data are significant. With the exception of one day in August 1997, the data are not diurnal. Supersaturated DO levels in the Lower Boise River indicate the presence of aquatic plants contributing higher than normal DO levels that can be harmful to macroinvertebrates. In addition, the only continuous (hourly) DO collected in the Lower Boise to evaluate diurnal patterns was one day in August 1997. It is unclear whether DO sags in violation of water quality standards may have occurred more recently at downstream stations, particularly where DO levels are lowest. Even if diurnal DO data show that DO is within standards, DO measurements alone are not a sufficient basis for delisting nutrients.

### *pH as an indicator of nutrient impairment*

Similar to DO, pH is a secondary indicator of excess nutrients, since high pH may result from algal photosynthesis and harm aquatic life. Primary indicators are nutrients themselves, such as phosphorus or nitrogen. The segment of the Lower Boise River proposed for delisting is not currently listed for pH (IDEQ, 2008).

The 2001 Lower Boise Nutrient River SBA includes a figure of pH measured by USGS at four sites from 1990-1998. Idaho's water quality standard for pH is 6.5 to 9.0. pH increases downstream at Parma where the river becomes nutrient rich, but the pH values appear to be just within standards, with values equal to but not more than 9.0 in the 2001 Lower Boise Nutrient River SBA (IDEQ, 2001).

pH data from the Lower Boise River Nutrient SBA is limited to a graph and samples from Diversion, Glenwood, Middleton, and Parma summarizing information from 1990-1998. In the 2004 USGS Report, pH data taken at the same 4 stations from 1994-2002 is just within state standards, except at Middleton where a pH of 9.1 was recorded on October 31, 2002 (MacCoy, 2004). These more recent pH grab samples indicate pH levels close to exceeding the water quality standard, and in at least one case, exceeding Idaho's pH criteria. To demonstrate impacts on pH from algal growth, continuous pH monitoring is essential. It is unclear whether continuous pH data were collected.

In conclusion, pH data used with total phosphorus, chlorophyll-a, and macroinvertebrate data can be useful to assess nutrient impairment. However the pH data referenced by IDEQ does not support a basis for concluding the water is not impaired for nutrients. Moreover, continuous pH monitoring which would capture pH peaks has not been conducted. Moreover, pH data alone with no consideration of primary nutrient indicators could not be used as a basis to support delisting nutrients.

### *Chlorophyll-a measurements*

Chlorophyll-a is the primary pigment in all algae and is used as a measure for algae growth. Planktonic chlorophyll-a measures the amount of pigment in phytoplankton, or suspended algae. Phytoplankton consist of small plants that drift in the water column and have limited or no ability to move. Periphyton, also called attached or benthic algae, refers to microfloral growth on substrata on river bottoms (Wetzel, 2001). Both planktonic and periphytic chlorophyll-a data are used to reflect algal growth in river systems.

Planktonic chlorophyll-a data are useful to assess whether floating, suspended, or submerged matter are present. The Lower Boise River Nutrient SBA presents two types of information collected by the USGS: planktonic chlorophyll-a and benthic (periphyton) chlorophyll-a. To evaluate these data, IDEQ uses a threshold value for chlorophyll-a from North Carolina of 40 µg/L. Because none of the measured values in the Lower Boise exceed 40 µg/l, IDEQ concludes that nutrients are not causing excessive growth of water column algae (IDEQ, 2001).

## Enclosure 2: EPA review of Idaho's Delisting Rationale for the Lower Boise River

This conclusion has two major flaws. First and most important, IDEQ's use of North Carolina's threshold of 40  $\mu\text{g/L}$  to evaluate planktonic chlorophyll-a data is not supported based on Idaho's own practices or on the biology of the ecosystem. The use of this threshold is inconsistent with past interpretations in Idaho TMDLs. IDEQ has used 15  $\mu\text{g/L}$  as a threshold or target in several recent TMDLs (IDEQ, 2008c, 2004, 2005b.) Furthermore, Oregon's ecosystem is much more similar to the Lower Boise River watershed than North Carolina's, and Oregon uses 15  $\mu\text{g/L}$  chlorophyll-a as a water quality standard (EPA, 2003). Additionally, North Carolina's listing criteria of 40  $\mu\text{g/L}$  is used for Class C waters and tidal waters not designated for trout. For waters designated as trout waters, North Carolina, consistent with Oregon and Idaho's past interpretations, uses a threshold of 15  $\mu\text{g/L}$  (EPA, 2003). The 15  $\mu\text{g/L}$  threshold for trout waters is more comparable to the Lower Boise River where salmonid spawning and coldwater biota are aquatic life beneficial uses. In our review, this is the only instance we could find where IDEQ used this 40  $\mu\text{g/L}$  reference standard. Finally, IDEQ's own data show exceedances at Middleton and Parma of the 15  $\mu\text{g/L}$  planktonic chlorophyll-a threshold used to define impairment in several Idaho TMDLs (Table 3).

The second flaw is that planktonic chlorophyll-a data alone is inadequate to assess whether excess nutrients cause excessive algae growth in the Lower Boise because it does not address algae attached to the substrate (periphyton). Planktonic chlorophyll-a represents algae suspended in the water column, but does not include periphyton, which is algal growth attached to substrate. According to the USGS, "*In the Lower Boise, the growth of aquatic plants is largely associated with periphyton* (MacCoy, 2004)." Periphytic chlorophyll-a data must also be considered in the delisting, because it is the most predominant form of algal growth in the Lower Boise, and relates to the narrative standards, which reference "submerged matter", "visible slime growths", and "other nuisance growths".

USGS sampled periphytic chlorophyll-a comparing it to the 100-200  $\text{mg/m}^2$  threshold that several authors suggest constitute a nuisance level (Horner et al., 1983, Watson and Gestring, 1996; Welch, et al., 1988; Welch, et al., 1989). The Lower Boise River Nutrient SBA cites data taken by the USGS from 1995 to 1999 and states that "chlorophyll-a in periphyton ranges from a low of 0.025  $\text{mg/m}^2$  at Eckert Road to a high of 933  $\text{mg/m}^2$  at Caldwell." In IDEQ's Boise River TMDL for sediment and bacteria (IDEQ, 1999), Figure 21 on page 46 shows 33 chlorophyll-a data points for five locations on the Lower Boise River. Fifteen of the measurements from Caldwell, Middleton and Glenwood Bridge are above 200  $\text{mg/m}^2$  with a maximum measurement above 900  $\text{mg/m}^2$  (Croxtan, 2008). Given that periphyton levels are regularly well above nuisance levels suggested in the literature, these data indicate impairment triggered by elevated nutrient levels. IDEQ's own report states that "periphytic chlorophyll-a values exceed the literature nuisance thresholds in these segments." However, IDEQ discounts this data and instead relies on DO and pH data to indicate that aquatic life beneficial uses are not impaired. (See further discussion below on p. 14.)

In summary, while planktonic chlorophyll-a values alone are not a complete representation of the algal community in the Lower Boise River, data collected by IDEQ show exceedances of planktonic thresholds used in prior Idaho TMDLs. Furthermore, IDEQ has not demonstrated that a 40  $\mu\text{g/L}$  planktonic chlorophyll-a threshold used in North Carolina is appropriate to determine impairment in the Lower Boise River. Finally, periphyton is the most predominant

## Enclosure 2: EPA review of Idaho's Delisting Rationale for the Lower Boise River

form of algae in the Lower Boise River, and periphyton levels regularly exceed nuisance thresholds suggested in the literature. Based on the above discussion, IDEQ's interpretation and use of the planktonic and periphytic chlorophyll-a data does not support delisting of the Lower Boise River for nutrients.

### ***Lack of complaints on nuisance algae (1997-2000)***

IDEQ's Final Response to Comments based on information from the 2001 Nutrient SBA states, "*In addition, DEQ complaint logs (1997-2000) indicated no complaints of nuisance growth.. Irrigation companies and other water users did not report algal impediment at river withdrawal locations during the same time period (IDEQ, 2001).*" IDEQ uses the lack of complaints to justify that the recreational use of the Lower Boise River is being met.

EPA has several concerns with IDEQ's explanation that there was a lack of complaints of nuisance algae from 1997-2000. First, IDEQ does not outwardly solicit or encourage public feedback on recreational use experiences or problems on an ongoing basis, nor indicate to the public the significance of making such comments. If the public was aware that their recreational experiences and perspective on the Lower Boise River could be a major factor in determining whether a water was impaired and could trigger development of a pollution reduction plan, IDEQ may have received more public input. As a result, it is unclear whether the lack of complaints received during 1997 – 2000 accurately reflects public opinion regarding water quality in the Lower Boise River, or whether it is a reflection of the lack of public awareness and significance of making such comments. Second, the delisting proposal does not include any information from 2001 to 2008. Third, in the Final Response to Comments, at least one commenter indicated that macrophytes in the Lower Boise River are impairing recreational beneficial uses (DEQ, 2008b, Final Response to Comments, #261.)

Instream algae data are supported by photo logs of the Lower Boise River which EPA completed on July 9, 2008 and August 13, 2008 (See attachments 1 and 2). These photo logs present evidence of high levels of algae growth in segments in and near Parma, Idaho. Additionally, periphytic chlorophyll-a levels are well above nuisance algae levels identified in the literature, as noted previously.

In summary, the lack of complaints on nuisance algae from 1997-2000 does not demonstrate that the recreational use is met and does not support delisting nutrients from the Lower Boise River.

### ***Velocity of the Lower Boise River higher than scouring thresholds***

The Lower Boise River Nutrient SBA cites a reference value for scouring thresholds and concludes that the velocity of the Lower Boise River during the algae growing season is higher than the scouring threshold, so algae are not expected to grow. It is unclear why IDEQ focuses on algae scouring thresholds, when direct in-stream measurements of algae levels are available. Both total phosphorus and periphytic and planktonic chlorophyll-a measurements are above recommended thresholds, during both low and high flow years, despite stream velocities cited in the Lower Boise SBA. Recent photo logs from July 8, 2008 and August 13, 2008 confirm high levels of algal growth in the Lower Boise River.

Since IDEQ's explanation that algae levels are sufficiently reduced by scouring river velocities is not supported by in-stream measurements of algae levels and photo logs, this explanation does not demonstrate that the recreational use is met and is not a basis to delist nutrients from the Lower Boise River.

### **Consideration of Existing and Readily Available Information**

In IDEQ's Draft Integrated Report, Final Integrated Report, and Final Response to Comments, IDEQ does not consider significant existing data to evaluate nutrient impairment and does not provide sufficient rationale to exclude these data. In some cases, water quality data collected over a 15-year period has not been considered. In order to evaluate whether nutrients are an impairment, nutrient data must be considered. To assess whether nuisance algae is an impairment, algal data must be considered. To determine whether beneficial uses are impaired, macroinvertebrate data must be considered. Finally, when determining the parameters to list or delist waters, IDEQ should apply consistent rationale. IDEQ has not provided sufficient rationale to exclude multiple years of data key to evaluating whether nutrients impair the Lower Boise River. The exclusion of pertinent, readily available information of nutrient-related parameters alone is a basis to deny IDEQ's proposal to delist nutrients from the Lower Boise River.

#### ***Nutrient data must be considered in a nutrient-impaired water.***

EPA's Ambient Water Quality Criteria Recommendations: Rivers and Streams in Nutrient Ecoregion III consider total phosphorus, total nitrogen, chlorophyll-a, and some measure of turbidity to be the best suited for protecting designated uses in waters impaired by nutrients (EPA, 2000).

Nutrient concentrations must be considered when evaluating whether a waterbody is impaired by nutrients. In the Lower Boise River, numerous studies have been conducted on nutrients such as phosphorus and nitrogen. The United States Geological Survey (USGS) collected information at five stations on the Lower Boise River from 1994 to 2002 (MacCoy, 2004), and continues to collect monthly or bi-monthly information on nutrients (USGS website [http://id.water.usgs.gov/projects/lwr\\_boise/](http://id.water.usgs.gov/projects/lwr_boise/)). The Lower Boise River Nutrient SBA includes information on total phosphorus data collected from 1989 to 2000 and on total nitrogen levels collected from 1990 to 1997. These data are not considered in IDEQ's proposal to delist nutrients for the Lower Boise River.

Over 15 years of data indicate nutrient impairment in the Lower Boise River. The following table compares data for phosphorus collected by USGS from 1994-2002 to targets recommended in EPA 304(a) guidance (ie. EPA's Water Quality Criteria Recommendations for Ecoregion III and EPA's Gold Book). Though recommended targets are not adopted as State water quality criteria, they may be used to interpret state narrative standards and may provide a baseline with

Enclosure 2: EPA review of Idaho’s Delisting Rationale for the Lower Boise River

which to assess the degree of impairment. Data below show that total phosphorus (TP) on the Lower Boise exceeds these targets.

**Table 3. Comparison of Measured TP to Reference Targets**

Location	Average TP Conc. (mg/L)	Range of TP (mg/L)	Example TP Targets
<b>Diversion Dam</b>	0.03	0.01 – 0.09	0.010-0.055 mg/L TP <sup>1</sup> 0.10 mg/L TP <sup>2</sup> 0.02 mg/L TP <sup>3</sup>
<b>Glenwood</b>	0.11	0.02 – 0.38	
<b>Middleton</b>	0.25	0.03 – 0.85	
<b>Parma</b>	0.29	0.08 – 0.55	

MacCoy, D.E., 2004

<sup>1</sup> EPA, 2000. Ambient Water Quality Criteria Recommendations, Nutrient Ecoregion III

<sup>2</sup> EPA, 1986. [Note: EPA’s Gold Book reference values have been updated with nutrient ecoregion numbers.]

<sup>3</sup> Watson and Gestring, 1996

Total phosphorus data collected by the USGS from 1994-2002 show average total phosphorus levels increase by more than 8 times from Lower Boise River at Diversion Dam to Lower Boise River at Parma. The maximum concentration of TP in MacCoy’s 2004 report in the Lower Boise River (0.85 mg/l) is 15 times higher than the upper range of EPA’s ecoregional nutrient criteria (0.055 mg/L).

While DEQ states that DO, pH and planktonic chlorophyll-a are sufficient water quality parameters to evaluate whether designated and existing beneficial uses are impaired by nutrients, the decision to exclude total phosphorus data is not supported by any scientific documents and is inconsistent with IDEQ’s interpretation of its narrative standard to list or delist waters for nutrients in other SBAs and TMDLs.

Table 4 describes the listing and delisting rationale for nutrients in IDEQ’s most recent TMDLs approved by EPA. Total phosphorus data were considered in all of these TMDL as a basis for listing decisions. Several other TMDLs use additional parameters to evaluate nutrient impairment such as planktonic chlorophyll-a, DO, pH and macroinvertebrate data. However, total phosphorus data are not excluded in any TMDL. Though EPA-recommended ecoregional nutrient targets for total phosphorus are not State water quality criteria, they provide a baseline to assess impairment. IDEQ’s rationale that EPA recommended targets are not legally enforceable is not an adequate justification to exclude 15 years of total phosphorus data. State development of numerical criteria should be based on EPA 304(a) guidance or other scientifically defensible methods. This approach is also appropriate for a State’s interpretation of their narrative standard (40 C.F.R. 131.11(b)).

**Table 4. Listing and Delisting Rationale in Nutrient TMDLs in Idaho**

Waterbody Name	Approval Date	Listing/Delisting Rationale
Bear River/ Malad River Basin	June 2006 (pages 112-125)	Listing rationale: * BURP data not supporting beneficial uses; * Water quality samples above 0.05 mg/L TP (EPA Gold Book, 1986), 0.075 mg/L TP (Ecosystems Research Institute, 1995); * DO below standards * Dense macrophyte stands
Lindsay Creek	June 2007	Listing rationale: * Taxa richness low; SMI = 0 * TP greater than 0.1 mg/L (EPA, 1986), TP greater than 0.030 mg/L (EPA, 2000). * High nitrite+nitrate-N concentrations in groundwater above 2 mg/L (IDWR, 1995).
Upper Hangman	September 2007	Delisting rationale: * TP less than 0.1 mg/L (EPA, 1986)
North Fork Payette River	August 2005	Delisting rationale for NF Payette River: * TP less than 0.1 mg/L TP (EPA, 1986) * DO meeting standards
Weiser (Mark, Leigh)	January 2007	Delisting Rationale: * Diel DO data below standards * TP less than 0.1 mg/L TP (EPA, 1986)
Salmon Falls Creek	February 2008	Listing rationale for free-flowing rivers: * TP greater than 0.1 mg/L monthly average, 0.16 mg/L TP daily maximum * Planktonic chlorophyll-a greater than 15 µg/L.
Snake River-Hells Canyon	September 2004	Listing rationale for free-flowing rivers: * TP greater than 0.070 mg/L monthly average * Planktonic chlorophyll-a greater than 15 µg/L * DO below standards
Beaver-Camas Creek	August 2005	Delisting rationale: * TP less than 0.05 mg/L and nitrite + nitrate-N less than 0.3 mg/L (EPA Gold Book, 1986).
Camas Creek	September 2005	Delisting rationale for Soldier Creek: * Planktonic chlorophyll-a below 15 µg/L * TP below 0.1 mg/L average TP; below 0.16 mg/L instantaneous TP * DO, pH and turbidity show that beneficial uses are fully supported

In summary, IDEQ has not provided an adequate rationale for excluding phosphorus data to evaluate whether the Lower Boise River is impaired for nutrients. Over fifteen years of total phosphorus data indicate the Lower Boise River significantly exceeds recommended EPA 304(a) criteria targets and is impaired for nutrients.

***Periphytic Chlorophyll-a must be considered when evaluating impairment from algae.***

IDEQ has also not provided sufficient rationale to exclude periphytic chlorophyll-a data. Periphytic chlorophyll-a measure the pigment in periphyton and are the most direct measurement of periphyton. All algae data should be considered when determining impairment from nuisance

Enclosure 2: EPA review of Idaho’s Delisting Rationale for the Lower Boise River

algae. The 2001 Lower Boise River Nutrient SBA presents information on periphytic chlorophyll-a data collected by the USGS from 1995 to 1999 (IDEQ, 2001). The USGS continued to collect periphytic chlorophyll-a data until 2005 (USGS website: [http://id.water.usgs.gov/projects/lwr\\_boise/site\\_list.html#null](http://id.water.usgs.gov/projects/lwr_boise/site_list.html#null)). MacCoy’s 2004 USGS report states that aquatic plants in the Lower Boise River are mainly periphyton.

In the 2001 Lower Boise River Nutrient SBA, the report states that DO and pH supersede periphytic chlorophyll-a data in importance, since those parameters link directly to beneficial uses (IDEQ, 2001). We agree DO and pH have a direct bearing on aquatic life uses, but periphyton growth also has a direct bearing on aquatic life uses. Changes in plant assemblage structure also can affect habitat structure, for example by changing the availability of refugia, smothering coarse substrates and/or the trapping of fine organic matter particles (Hayslip, 2008).

Recreational beneficial uses also apply to the Lower Boise River, and periphytic chlorophyll-a data are a direct indicator of algae, which can be a nuisance and affect recreational uses. Nuisance thresholds described in the literature for chlorophyll-a are useful as a baseline comparison to determine the degree of impairment. Below are chlorophyll-a values collected from 1994 to 2002 in MacCoy’s USGS study compared to various reference thresholds. Table 5 shows periphytic chlorophyll-a in the Lower Boise river as being above widely used nuisance thresholds of 100-150 mg/m<sup>2</sup> (Watson and Gestring, 1996; Welch et al, 1988, Welch et al, 1989). This table does not include periphytic chlorophyll-a data from 1995 to 1997 in the Lower Boise River TMDL for bacteria and sediment. In that TMDL fifteen of 33 measurements from Caldwell, Middleton, and Glenwood Bridge have values higher than 200 mg/m<sup>2</sup> and a maximum measurement greater than 900 mg/m<sup>2</sup> (IDEQ, 2000). IDEQ has not provided sufficient rationale to exclude these data.

**Table 5. Comparison of Measured Periphyton Chl a to Reference Targets**

Location	Average Periphyton Chl a (mg/m <sup>2</sup> )	Range of Periphyton Chl a (mg/m <sup>2</sup> )	Example Periphyton Chl a Targets
Diversion Dam	9	<1 – 21	100 mg/m <sup>2</sup> <sup>1</sup>
Glenwood	116	22 – 267	100-150 mg/m <sup>2</sup> <sup>2</sup>
Middleton	264	23 – 477	
Parma	159	13 – 300	

<sup>1</sup> Nordin, 1985.

<sup>2</sup> Welch et al, 1987.

In summary, IDEQ has not provided an adequate rationale for excluding periphytic chlorophyll a data to evaluate whether the Lower Boise River is impaired for nutrients. Over ten years of periphytic chlorophyll-a data indicate the Lower Boise River significantly exceeds literature values and is impaired for nutrients.

***Macroinvertebrate data must be considered when considering beneficial use support.***

IDEQ also does not provide sufficient rationale to exclude macroinvertebrate data. Macroinvertebrate data are direct measurements of impacts to aquatic life. IDEQ states that the Lower Boise River is not nutrient-impaired, because beneficial uses are not impaired. However, IDEQ does not consider data on impaired macroinvertebrate assemblages in its proposal to delist. In IDEQ's Final Response to Comments to EPA, IDEQ concludes that impaired macroinvertebrate assemblages are due solely to sediment and not to nutrients. However, they do not present an adequate basis for their assertion that degraded macroinvertebrate assemblages are only due to sediment.

The following are EPA's comments on macroinvertebrate data:

*"In the Boise River TMDL (1999), DEQ evaluated macroinvertebrate data available from the USGS for five sites sampled in October of 1995 and 1996. The macroinvertebrate data indicated that the Boise River had degraded conditions from Eckert Road to its mouth. Ephemeroptera, Plecoptera, and Trichoptera (EPT) taxa richness is a traditional metric that consistently has been used to detect impacts to macroinvertebrate assemblages in rivers and streams. In the Lower Boise, a limited number of EPT taxa was found at all sites indicating that the macroinvertebrate assemblage was in poor condition. In addition, there were other metrics (i.e. Plecoptera taxa richness, % predators, etc.) that also indicated poor biological condition.*

*Since the time of the TMDL, USGS has continued to monitor water quality and biological conditions in the Lower Boise River (MacCoy, 2004). Macroinvertebrates were collected at five sites in the Lower Boise from 1995 to 2002. The average number of EPT taxa in the Lower Boise was less than half the average number at four least-impacted, similar-sized rivers in Idaho. USGS calculated the RMI (River Macroinvertebrate Index, developed by DEQ in 2002) scores for the Lower Boise and most scores indicated poor water quality and impaired biotic integrity. In addition, USGS used a fine-sediment index to evaluate the effect of fine sediment on insect populations (Relyea et al, 2000). This index, the Fine Sediment Biotic Index (FSBI), indicated fine sediments impacted macroinvertebrates in the Lower Boise.*

*Macroinvertebrate assemblages are monitored in rivers because they are a direct measure of the aquatic life uses. Another reason that they are used in monitoring is because macroinvertebrates integrate the effects of multiple environmental factors such as water quality, substrate quality, and habitat. In both the TMDL and in more recent USGS studies, it is clear that the macroinvertebrate assemblages in the Lower Boise River are in poor condition. The more recent USGS study shows that fine sediments impact macroinvertebrates in the Lower Boise River, however*

*this does not mean that fine sediment is the sole stressor. The macroinvertebrates are also exposed to increased temperatures, altered flow regimes, increased phosphorus and other anthropogenic environmental factors. The cumulative and synergistic effects of these pollutants in the Lower Boise may exceed the tolerance levels of many of these taxa (Croxtton, 2008)."*

IDEQ concludes that sediment is the sole stressor for macroinvertebrate impairment. However, impairments to macroinvertebrate assemblages increase downstream. This parallels the increase in both sediment and total phosphorus loads as one moves downstream. No evidence is presented as to why only the increase in sediment load contributes to impairment (Hayslip, 2008). In conclusion, IDEQ does not provide a sufficient rationale to exclude macroinvertebrate data in its proposal to delist nutrients from the Lower Boise River.

### **Summary of Delisting Evaluation**

The following summarizes key points in EPA's evaluation of IDEQ's delisting of the Lower Boise River for nutrients:

- **Nutrients must be considered when evaluating a nutrient-impaired waterbody.** IDEQ has not provided sufficient rationale to exclude total phosphorus data in the Lower Boise River. The USGS has collected over 15 years of data on nutrients which are not included in IDEQ's evaluation of whether nutrients should be delisted. Total phosphorus data in the Lower Boise River are as high as 3 mg/L TP, 300 times the EPA's 1986 Gold Book standard of 0.1 mg/L, and 600 times higher than EPA's recommended Ecoregion Criteria. Ecoregional values are recommended criteria under CWA section 304(a) and appropriate for use in interpreting State narrative standards. The levels of TP in the Lower Boise River clearly show significant enrichment and nutrient impairment relative to the recommended 304(a) criteria. There is no adequate rationale to exclude nutrient TP data in assessing whether a water is impaired for excess nutrients.
- **All algae data in the Lower Boise River must be considered when evaluating a waterbody impaired by nutrients.** IDEQ has not provided sufficient rationale to exclude periphytic chlorophyll-a data. Periphytic chlorophyll-a data were collected from 1995 to 2005, and MacCoy's 2004 report notes that periphyton is the key algae of concern in the Lower Boise River. More than ten years of periphytic chlorophyll-a data show that concentrations are significantly above nuisance thresholds recommended in the literature.
- **Macroinvertebrate data must be considered when evaluating the potential impacts of nutrients on aquatic life.** Macroinvertebrate data are a direct measurement of aquatic life beneficial uses. Insufficient rationale has been provided to conclude that nutrients do not impair macroinvertebrate assemblages. Macroinvertebrate data show impairments increasing downstream, which parallels downstream increases in both nutrient and sediment loading and impairments.

## Enclosure 2: EPA review of Idaho's Delisting Rationale for the Lower Boise River

- **DEQ must apply a consistent listing and delisting methodology.** Based on IDEQ's recent nutrient TMDLs, IDEQ has considered total phosphorus data in its basis to list or delist nutrients (IDEQ, 2008c, 2007a, 2007b, 2007c, 2006, 2005a, 2005b, 2005c, 2004). For the Lower Boise River, IDEQ has not been consistent with its past actions as to which information to consider to delist nutrients.
- **DO and pH data alone are insufficient to conclude whether nutrients can be delisted.** DO and pH data alone are not sufficient to determine whether nutrients impair a waterbody. They are only sufficient to determine whether a waterbody is impaired for DO or pH. It is not clear as to whether DO and pH data presented in IDEQ's proposal to delist are even adequate to conclude that DO and pH are not impaired in the Lower Boise River. pH data presented in the delisting proposal were collected from 1990-1998. In more recent data presented in the 2004 USGS Report, pH reaches 9.1 at the Middleton station in data collected from 1994 to 2002, exceeding Idaho's state standard of 9.0 (MacCoy, 2004). USGS and City of Boise DO data show supersaturated levels at all stations monitored, which indicates heightened algal growth that can be harmful to macroinvertebrates. Supersaturated DO during photosynthesis (afternoon) is often associated with DO sags during respiration (early morning). However, continuous DO monitoring has been limited to one day in August 1997. In summary, DO and pH data in the Lower Boise River do not support delisting nutrients from the Lower Boise River.
- **Planktonic chlorophyll-a do not support a delisting of nutrients.** IDEQ uses North Carolina's threshold of 40  $\mu\text{g/L}$  to assess planktonic chlorophyll-a levels. However, North Carolina's threshold is used for non-trout bearing streams. For streams with trout, North Carolina uses 15  $\mu\text{g/L}$  which is identical to Oregon's and several other states with ecoregions similar to Lower Boise Watershed's (EPA, 2003). IDEQ data shows that planktonic chlorophyll-a levels exceed 15  $\mu\text{g/L}$ . Additionally, algae in the Lower Boise River is primarily periphyton, so planktonic chlorophyll-a data alone cannot be used to conclude that nutrients do not impair the Lower Boise River. Planktonic chlorophyll-a data presented by IDEQ do not support delisting nutrients from the Lower Boise River.
- **The record of complaints for nuisance algae does not include information from 2001 to 2008.** IDEQ presents information from 1997 to 2000. However, IDEQ does not advertise or outwardly solicit on Boise River water quality on a regular basis and has no information from 2001 to 2008. Water quality data indicate nuisance algae levels and activity. Photo logs taken by EPA on July 8, 2008 and August 13, 2008 show algae present in the Lower Boise River. This rationale is not sufficient to support delisting nutrients from the Lower Boise River.
- **Elevated periphyton levels are still present despite river velocities cited by IDEQ.** IDEQ cites that river velocities in the Lower Boise River are above algae scouring thresholds even at low flow. However, periphytic chlorophyll-a have been measured at levels more than four times above the least stringent nuisance threshold of 200  $\text{mg/m}^2$ , and recent photo logs confirm the presence of attached and filamentous algal growth. The rationale above is not a sufficient basis to delist nutrients from the Lower Boise River.

### **Conclusion**

In making its assessment, IDEQ has focused on a few of the indicators of nutrient impairment while ignoring other parameters which are equally critical to assessing nutrient impairment. EPA concludes that IDEQ has not demonstrated sufficient good cause to delist the Lower Boise River for nutrients, and that IDEQ has provided insufficient rationale to justify the exclusion of all existing and readily available data. While DO, pH and planktonic chlorophyll-a are useful indicators of nutrient impairment, there is not sufficient rationale to exclude data on other key water quality parameters: total phosphorus, periphytic chlorophyll-a and macroinvertebrate data. While EPA 304(a) criteria are not legally binding, they are a valid basis to interpret State narrative standards. Total phosphorus, periphytic chlorophyll-a and macroinvertebrate data clearly indicate that the Lower Boise River is impaired for nutrients (Croxtton, 2008).

Data presented by IDEQ on DO, pH and planktonic chlorophyll-a do not demonstrate good cause to delist the Lower Boise for nutrients. The indicators IDEQ selected to make a delisting decision when considered in combination with other indicators are in fact supportive of the conclusion that the Lower Boise is impaired. DO grab samples show supersaturated levels indicative of higher than normal algal activity. Additionally, the 2004 USGS report shows an exceedance of pH at Middleton of 9.1 (MacCoy, 2004). Information presented on nuisance algae reports is at least seven years old, and IDEQ does not present more recent information on nuisance algae complaints. Recent photo logs show that algae are present. IDEQ's conclusions on scouring do not reconcile with field observations and data.

These water quality data and the water quality data which were excluded show that nutrients should not be delisted from Idaho's 303(d) Integrated Report. Based on EPA's review of the information and documentation provided, IDEQ has not demonstrated good cause or sufficient rationale to exclude readily and existing information to support the delisting of nutrients from the Lower Boise River.

**Attachment 1: July 8, 2008 photo log**

**Attachment 2: August 13, 2008 photo log**

**Attachment 3: Hayslip memo**

## Enclosure 2: EPA review of Idaho's Delisting Rationale for the Lower Boise River

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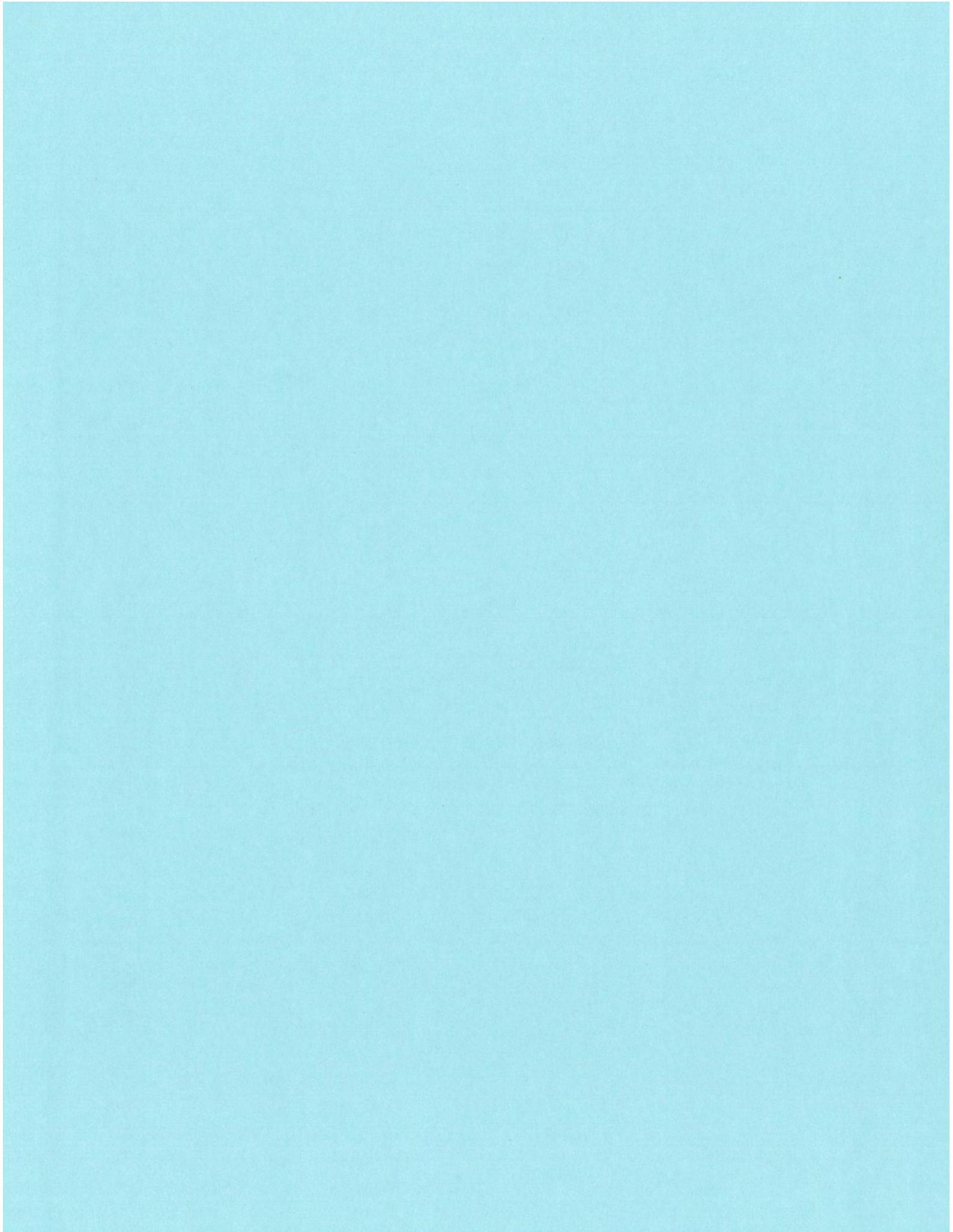


Photo Log of the Lower Boise River  
Ada and Canyon Counties, Idaho  
July 9, 2008

This photo log will document the appearance of the Lower Boise River on the date of July 9, 2008. This log begins at Lucky Peak Reservoir and the photos will run downstream to the mouth of the River where the Lower Boise enters the Snake River. Each photo site will give a latitude and longitude position where the photos were taken. The latitude and longitude was obtained through the use of a Garmin hand-held GPS unit at the time the photos were taken.



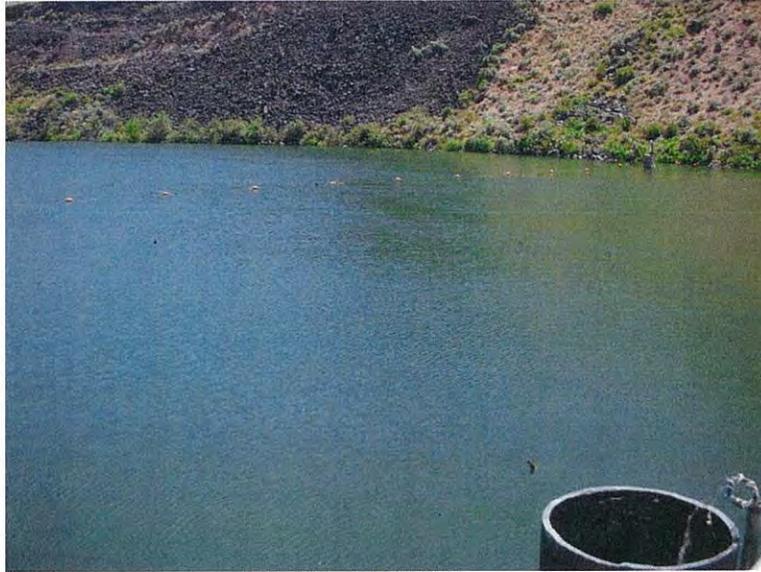
1. This photo was taken on the dam of the Lucky Peak Reservoir. No GPS coordinates were collected at this location. All other locations have GPS coordinates. The weather was clear and hot. The water appeared to be very clear in the reservoir.



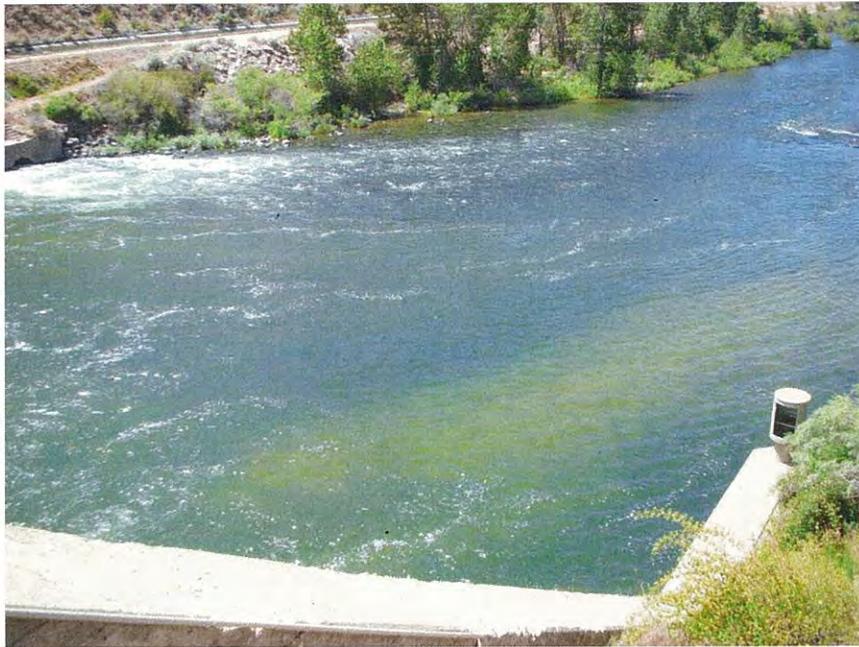
2. This is another view of the reservoir from the same location as photo 1. Lucky Peak is the source of water in the Lower Boise River.



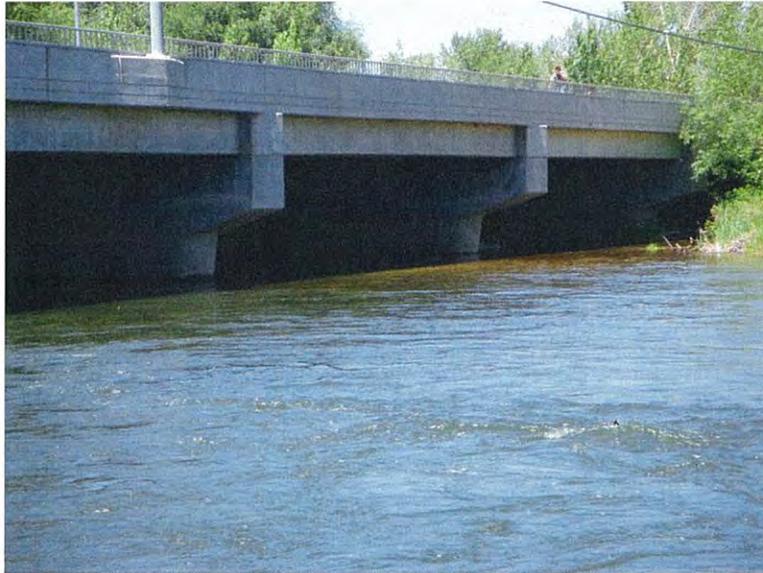
3. The Lower Boise River Diversion Dam.  $N 43^{\circ} 32.304' W 116^{\circ} 05.562'$   
This structure on the Lower Boise River separates the flow into the New York Canal and down the main river channel. The water at this location was clear and appeared to be in good shape.



4. The Lower Boise River Diversion Dam. N 43<sup>0</sup> 32.304' W 116<sup>0</sup> 05.562'  
This photo shows the water upstream of the diversion dam. As stated earlier, the water appeared to be in good condition.



5. The Lower Boise River Diversion Dam. N 43<sup>0</sup> 32.304' W 116<sup>0</sup> 05.562'  
This photo shows the flow in the Lower Boise River channel below the diversion dam after water is diverted to the New York Canal, upstream from the City of Boise.



6. City of Boise, Glenwood Bridge N 43<sup>0</sup> 39.643' W 116<sup>0</sup> 16.764'  
This photo was taken just upstream of the Glenwood Bridge in the City of Boise. The river was running with a good flow and the water appeared clear.



7. City of Boise, Glenwood Bridge N 43<sup>0</sup> 39.643' W 116<sup>0</sup> 16.764'  
There was some vegetation noticeable on the rocks at this location. Not immediately noticeable nuisance levels at this location.



8. City of Boise, Glenwood Bridge N 43<sup>0</sup> 39.643' W 116<sup>0</sup> 16.764'  
For some reason, the vegetation at this location was visible on the rocks in riffle areas of the river.



9. City of Boise, Glenwood Bridge N 43<sup>0</sup> 39.643' W 116<sup>0</sup> 16.764'  
This is a view of the river looking upstream from the Glenwood Bridge.



10. North Channel of the Lower Boise River on Eagle Road.  
N 43<sup>0</sup> 39.643' W 116<sup>0</sup> 16.764'

The river in this location was slightly turbid but still fairly clear. There was a little more periphyton visible on the rocks.



11. North Channel of the Lower Boise River on Eagle Road.  
N 43<sup>0</sup> 39.643' W 116<sup>0</sup> 16.764'

This is a view of the water at the north channel of the Lower Boise River near eagle Idaho.



12. North Channel of the Lower Boise River on Eagle Road.  
N 43<sup>0</sup> 39.643' W 116<sup>0</sup> 16.764'

There was some periphyton visible in the photo but the water was very clear.



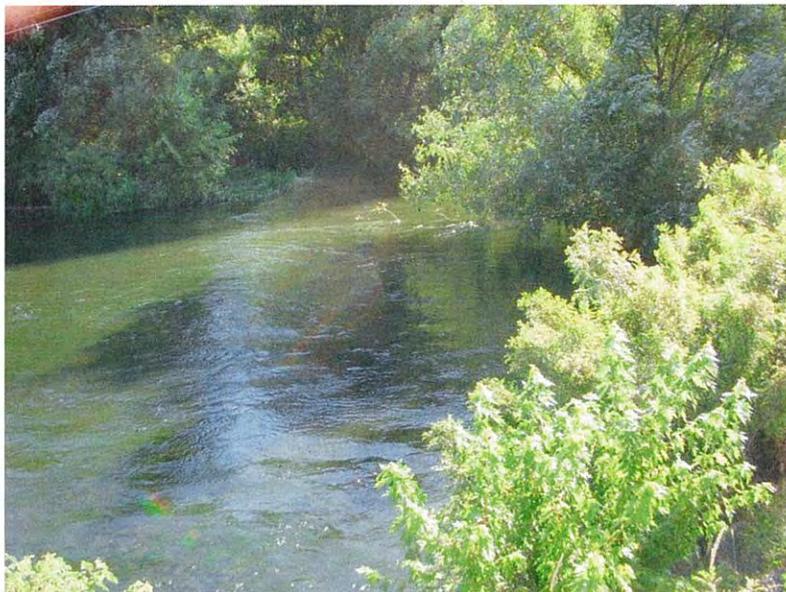
13. South Channel of the Lower Boise River on Eagle Road.  
N 43<sup>0</sup> 40.517' W 116<sup>0</sup> 21.217'

The Lower Boise River splits into a north channel and a south channel at eagle. The West Boise Wastewater Treatment Plant discharges just upstream of this crossing on Eagle Road.



14. South Channel of the Lower Boise River on Eagle Road.  
N 43<sup>0</sup> 40.517' W 116<sup>0</sup> 21.217'

The rocks on the bottom of the stream clearly show what appears to be heavy periphyton growth.



15. South Channel of the Lower Boise River on Eagle Road.  
N 43<sup>0</sup> 40.517' W 116<sup>0</sup> 21.217'

This view of the river is looking upstream from the bridge on Eagle Road.



16. Lower Boise River at Eagle Island State Park.  
N 43<sup>0</sup> 41.356' W 116<sup>0</sup> 23.135'

This photo shows a view of the Lower Boise River at Eagle Island State Park. It was difficult to get to the river due to construction of a new bridge in the park. Special permission was required to get to this part of the park.



17. Lower Boise River at Eagle Island State Park.  
N 43<sup>0</sup> 41.356' W 116<sup>0</sup> 23.135'

This is a photo of the water and a rock at the state park.



18. Lower Boise River from Linder Bridge  
N 43<sup>0</sup> 41.240' W 116<sup>0</sup> 24.825'

This is a view of the river, looking upstream of the Linder Bridge. Turbidity appears to have increased slightly.



19. Lower Boise River from Linder Bridge  
N 43<sup>0</sup> 41.240' W 116<sup>0</sup> 24.825'

This is a view of the river, looking downstream of the Linder Bridge.



20. Lower Boise River from Linder Bridge  
N 43<sup>0</sup> 41.240' W 116<sup>0</sup> 24.825'

This is a view of the water flowing under the Linder Bridge. Turbidity appears to have increased slightly.



21. Lower Boise River from Sportsman Access near Middleton, ID.  
N 43<sup>0</sup> 41.095' W 116<sup>0</sup> 34.400'

This is a view of the river, looking downstream of the Sportsman Access.



22. Lower Boise River from Sportsman Access near Middleton, ID.  
N 43<sup>0</sup> 41.095' W 116<sup>0</sup> 34.400'

This is a view of the water with periphyton and macrophytes visible in the river.



23. Lower Boise River from Sportsman Access near Middleton, ID.  
N 43<sup>0</sup> 41.095' W 116<sup>0</sup> 34.400'

Turbidity increasing in the water when compared to earlier pictures, and some aquatic macrophytes visible in the photo.



24. Lower Boise River from Sportsman Access near Middleton, ID.  
N 43<sup>0</sup> 41.095' W 116<sup>0</sup> 34.400'

This slack water area near a bend in the river had beds of submerged macrophytes.



25. Lower Boise River near Notus, Idaho.  
N 43<sup>0</sup> 43.228' W 116<sup>0</sup> 47.872'

This is the view of the Lower Boise River facing upstream on the bridge at Notus. There was a cattle feeding operation immediately to the right of the photo.



26. Lower Boise River near Notus, Idaho.  
N 43<sup>0</sup> 43.228' W 116<sup>0</sup> 47.872'

This is the view of the Lower Boise River facing downstream on the bridge at Notus.



27. Lower Boise River near Notus, Idaho.  
N 43<sup>0</sup> 43.228' W 116<sup>0</sup> 47.872'

This photo was taken looking down from the bridge at Notus. Note the increase in turbidity of the water from the previous photos.



28. Lower Boise River near the mouth near Parma Idaho.  
N 43<sup>0</sup> 48.853' W 117<sup>0</sup> 01.296'

This is a photo of the last access to the Lower Boise River before it enters the Snake River.



29. Lower Boise River near the mouth near Parma Idaho.  
N 43<sup>0</sup> 48.853' W 117<sup>0</sup> 01.296'

This is a photo shows macrophytes and general water color in this location.



30. Lower Boise River near the mouth near Parma Idaho.  
N 43<sup>0</sup> 48.853' W 117<sup>0</sup> 01.296'

This is a photo of submergent macrophytes in the Lower Boise River which were growing along the river bank.



31. Lower Boise River near the mouth near Parma Idaho.  
N 43<sup>0</sup> 48.853' W 117<sup>0</sup> 01.296'

This is a photo of some submergent vegetation and filamentous algae growing on the rocks along the river bank.



32. Lower Boise River near the mouth near Parma Idaho.  
N 43<sup>0</sup> 48.853' W 117<sup>0</sup> 01.296'

This is a photo of two dead bluegills and trash, vegetation, etc along the river. The cause of the fish mortality is unknown and these were the only dead fish seen.



33. Lower Boise River side channel approximately 50 feet from the mouth on the Main Lower Boise River. N 43<sup>0</sup> 48.813' W 117<sup>0</sup> 01.297

Note the emergent vegetation, submergent vegetation and filamentous algae in the water.



34. Lower Boise River side channel approximately 50 feet from the mouth on the Main Lower Boise River. N 43<sup>0</sup> 48.813' N 43<sup>0</sup> 48.813' W 117<sup>0</sup> 01.297

Note the emergent vegetation, submergent vegetation and filamentous algae in the water.



35. Lower Boise River side channel approximately 50 feet from the mouth on the Main Lower Boise River. N 43<sup>0</sup> 48.813' W 117<sup>0</sup> 01.297

Note the emergent vegetation, submergent vegetation and filamentous algae in the water.



36. Lower Boise River side channel approximately 50 feet from the mouth on the Main Lower Boise River. N 43<sup>0</sup> 48.813' W 117<sup>0</sup> 01.297'

Note the heavy growth of Periphyton on the rocks in the water.



37. Main Lower Boise River near Parma. N 43<sup>0</sup> 48.812' W 117<sup>0</sup> 01.347'

This photo shows macrophytes growing near shore.



38. Main Lower Boise River near Parma. N 43<sup>0</sup> 48.812' W 117<sup>0</sup> 01.347'

This photo shows macrophytes hanging on a dead snag from earlier high water period.



39. Main Lower Boise River near Parma. N 43<sup>0</sup> 48.812' W 117<sup>0</sup> 01.347'

This photo shows a closer view of the macrophytes growing near shore. The water in this area was very turbid.



40. Snake River at Ft. Boise Wildlife Management Area, downstream of the mouth of the Lower Boise River. N 43<sup>0</sup> 49.297' W 117<sup>0</sup> 01.174'  
This view is the Snake River approximately .5 – 1 mile downstream of the mouth of the Lower Boise River. The water was very turbid and a sandbar is visible in the upper right of the photo.



41. Snake River at Ft. Boise Wildlife Management Area, downstream of the mouth of the Lower Boise River. N 43<sup>0</sup> 49.297' W 117<sup>0</sup> 01.174'  
This vegetation was growing along the bank of the Snake River in this location.



42. Snake River at Ft. Boise Wildlife Management Area, downstream of the mouth of the Lower Boise River. N 43<sup>o</sup> 49.297' W 117<sup>o</sup> 01.174'

The red arrow in this photo is marking the floating vegetation on the Snake River in this location.

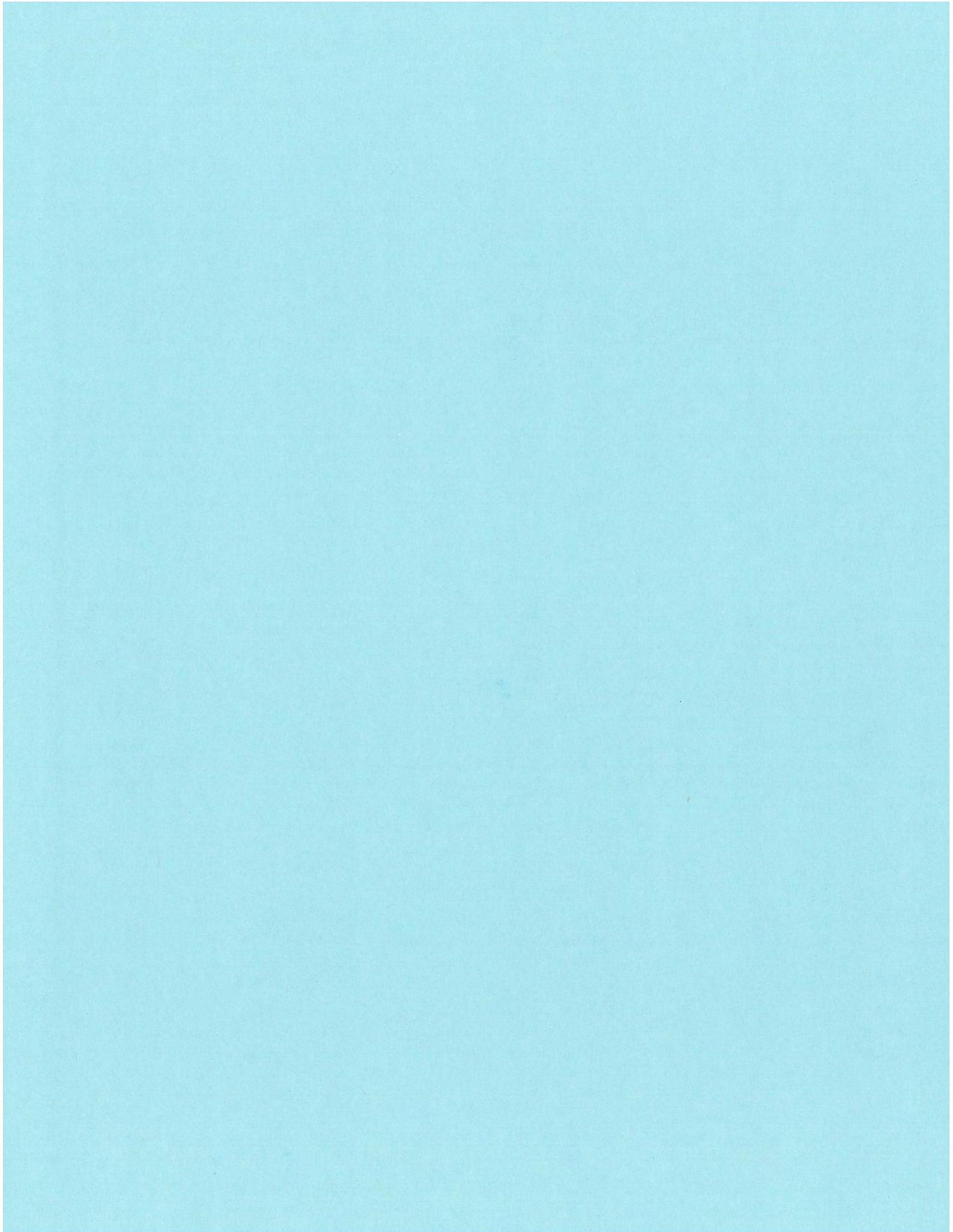


Photo Log of the Lower Boise River  
Ada and Canyon Counties, Idaho  
August 13, 2008

This photo log will document the appearance of the Lower Boise River on the date August 13, 2008. This log begins at the bridge on Eagle Road on the south channel of the Lower Boise River and the photos will run downstream to the mouth of the River where the Lower Boise enters the Snake River. Each photo site will give a latitude and longitude position where the photos were taken. The latitude and longitude was obtained through the use of a Garmin handheld GPS unit at the time the photos were taken.



1. South Channel of the Lower Boise River on Eagle Road.  
N 43<sup>0</sup> 40.496' W 116<sup>0</sup> 21.237'

The Lower Boise River splits into a north channel and a south channel at eagle. The West Boise Wastewater Treatment Plant discharges just upstream of this crossing on Eagle Road.



2. South Channel of the Lower Boise River on Eagle Road.  
N 43<sup>0</sup> 40.517' W 116<sup>0</sup> 21.217'

This photo was taken from the bridge on Eagle Road looking upstream. The water appeared to be clear on this day, in this location.



3. North Channel of the Lower Boise River on Eagle Road.  
N 43<sup>0</sup> 41.175' W 116<sup>0</sup> 21.274'

This photo was taken standing on the bank of the river looking across, downstream of the bridge. The water was clear with some vegetation visible.



4. North Channel of the Lower Boise River on Eagle Road.  
N 43<sup>0</sup> 41.175' W 116<sup>0</sup> 21.274'

This photo was taken standing on the bank of the river looking downstream near the bridge. The water was clear with some vegetation visible. The arrow is pointing at some vegetation in the channel.



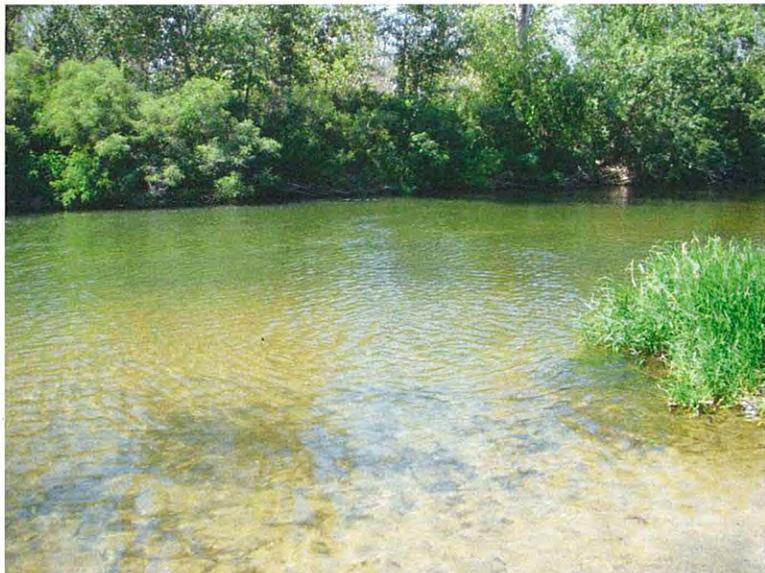
5. North Channel of the Lower Boise River on Eagle Road.  
N 43<sup>0</sup> 41.175' W 116<sup>0</sup> 21.274'

This photo shows a weed bed in a sheltered small bay along the channel in this location.



6. North Channel of the Lower Boise River on Eagle Road.  
N 43<sup>0</sup> 41.175' W 116<sup>0</sup> 21.274'

This photo shows a weed bed in a sheltered small bay along the channel in this location. The red arrow points to a macrophyte bed and the yellow arrow points to what appears to be algae in the water.



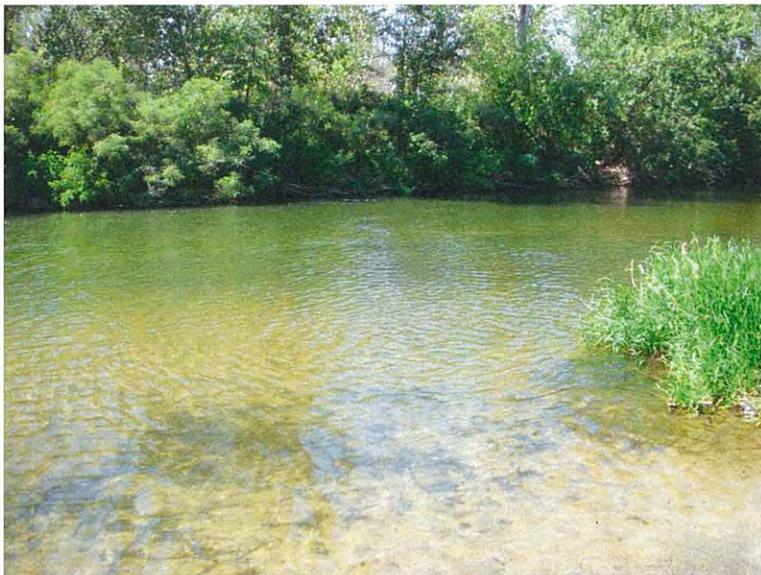
7. Lander Street Bridge on the Lower Boise River. N 43<sup>0</sup> 41.311' W 116<sup>0</sup> 24.806'

This photo was taken standing under the Lander Street Bridge on the Lower Boise River. The water in this photo appeared to be clear. The dark material in the water in the foreground was dead vegetation, sticks, etc.



8. Lander Street Bridge on the Lower Boise River. N 43<sup>0</sup> 41.311' W 116<sup>0</sup> 24.806'

There was a large number of tiny fish swimming in the shallow water at this location. They don't show up very well in this photo.



9. Lander Street Bridge on the Lower Boise River. N 43<sup>0</sup> 41.311' W 116<sup>0</sup> 24.806'

This photo was taken from the same location as the previous photos, looking downstream.



10. Sportsman Access where 15-Mile Creek enters Lower Boise River. N 43<sup>0</sup> 41.209' W 116<sup>0</sup> 35.615'

This photo was taken standing near the confluence of 15-Mile Creek and the Lower Boise River. The turbid water in the foreground is from the creek. See Arrow.



11. Sportsman Access where 15-Mile Creek enters Lower Boise River. N 43<sup>0</sup> 41.209' W 116<sup>0</sup> 35.615'

This is another photo of 15-Mile Creek and the Lower Boise River. The turbid water in the foreground is from the creek. See Arrow.



12. Sportsman Access where 15-Mile Creek enters Lower Boise River. N 43<sup>0</sup> 41.209' W 116<sup>0</sup> 35.615'

This photo shows a close up of the turbid water coming from the creek with some vegetation growing on the substrate in the Lower Boise River.



13. Lower Boise River from the bridge at Notus, Idaho. N 43<sup>0</sup> 43.335' W 116<sup>0</sup> 47.881'

This photo was taken from the bridge looking downstream at Notus. The water appeared to be turbid at this location.



14. Lower Boise River from the bridge at Notus, Idaho. N 43<sup>0</sup> 43.335' W 116<sup>0</sup> 47.881'

In this picture, the Lower Boise River is in the foreground with a opening to a side channel. The side channel appeared to be full of vegetation.



15. Lower Boise River from the bridge at Notus, Idaho. N 43<sup>0</sup> 43.335' W 116<sup>0</sup> 47.881'

This photo was taken from the bridge looking upstream at Notus. This feedlot was located near the bank of the river.



16. Lower Boise River approx. 1 mile upstream of the Parma Gage. N 43<sup>0</sup> 46.699' W 116<sup>0</sup> 58.355'

This photo was taken from the road looking upstream above Parma, Idaho. The water appeared to be turbid at this location. The vegetation in the center of the channel is growing from what appears to be deposited sediment in the channel.



17. Lower Boise River approx. 1 mile upstream of the Parma Gage. N 43<sup>0</sup> 46.699' W 116<sup>0</sup> 58.355'

This photo shows the turbidity in the water at this location.



18. Lower Boise River at the Parma Gage. N 43<sup>0</sup> 46.899' W 116<sup>0</sup> 58.372'

This picture shows the Parma Gauge on the Lower Boise River near the Bridge at Parma.



19. Lower Boise River at the Parma Gage. N 43<sup>0</sup> 46.899' W 116<sup>0</sup> 58.372'

This picture shows the Lower Boise River, looking downstream on the bridge at Parma. The water in this location appeared to be very turbid and it was impossible to see the substrate on the bottom of the river.



20. Lower Boise River at the Parma Gage. N 43<sup>0</sup> 46.899' W 116<sup>0</sup> 58.372'

This picture shows some vegetation growing near the riparian vegetation along the banks of the Lower Boise River near the Bridge at Parma.



21. Sportsman Access Mouth of the Lower Boise River. N 43<sup>0</sup> 48.852' W 117<sup>0</sup> 01.294'

This picture was taken standing at the mouth of the Lower Boise River looking upstream. Vegetation was growing around a log jam near the mouth.



22. Sportsman Access Mouth of the Lower Boise River. N 43<sup>0</sup> 48.852' W 117<sup>0</sup> 01.294'

This picture was taken standing at the mouth of the Lower Boise River looking upstream. Vegetation was growing around a log jam near the mouth. Note the algae and what appears to be lemna (sp).



23. Sportsman Access Mouth of the Lower Boise River. N 43<sup>0</sup> 48.852' W 117<sup>0</sup> 01.294'

This picture was taken standing at the mouth of the Lower Boise River looking downstream to the Snake River.



24. Lower Boise River side channel approximately 100 ft. from the mouth of the river. N 43<sup>0</sup>  
48.722' W 117<sup>0</sup> 01.331'

This picture was taken standing on a side channel very near the mouth of the river.  
Vegetation was thick in the side channel and the water appeared to be very eutrophic.



25. Lower Boise River side channel approximately 100 ft. from the mouth of the river. N 43<sup>0</sup>  
48.722' W 117<sup>0</sup> 01.331'

This picture was taken standing on a side channel looking towards the mouth of the river.  
Vegetation was thick in the side channel and the water appeared to be very eutrophic.



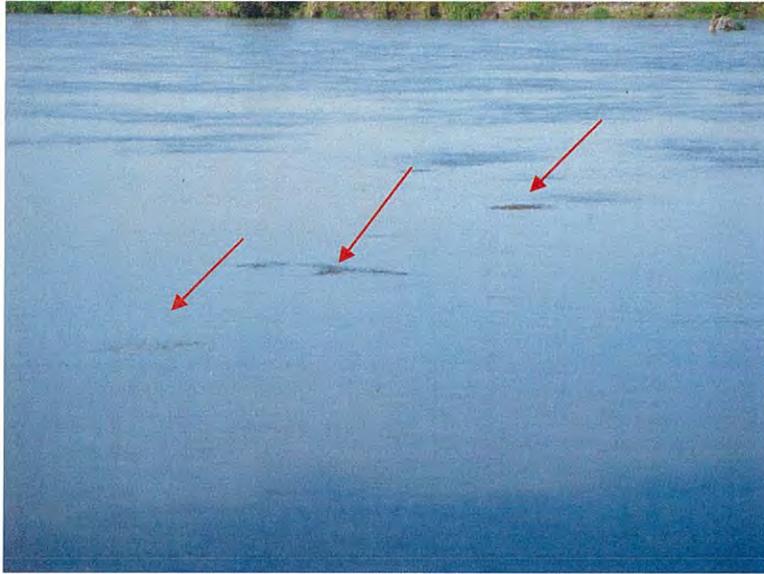
26. Lower Boise River side channel approximately 100 ft. from the mouth of the river. N 43<sup>0</sup> 48.722' W 117<sup>0</sup> 01.331'

This picture was taken standing on a side channel very near the mouth of the river. This is a closer view of the filamentous algae and other vegetation in the side channel.



27. Snake River at Old Fort Boise approximately 1-2 miles downstream from the mouth of the Lower Boise River. N 43<sup>0</sup> 49.335' W 117<sup>0</sup> 01.183'

This section of the Snake River had lots of aquatic vegetation and the water was turbid.



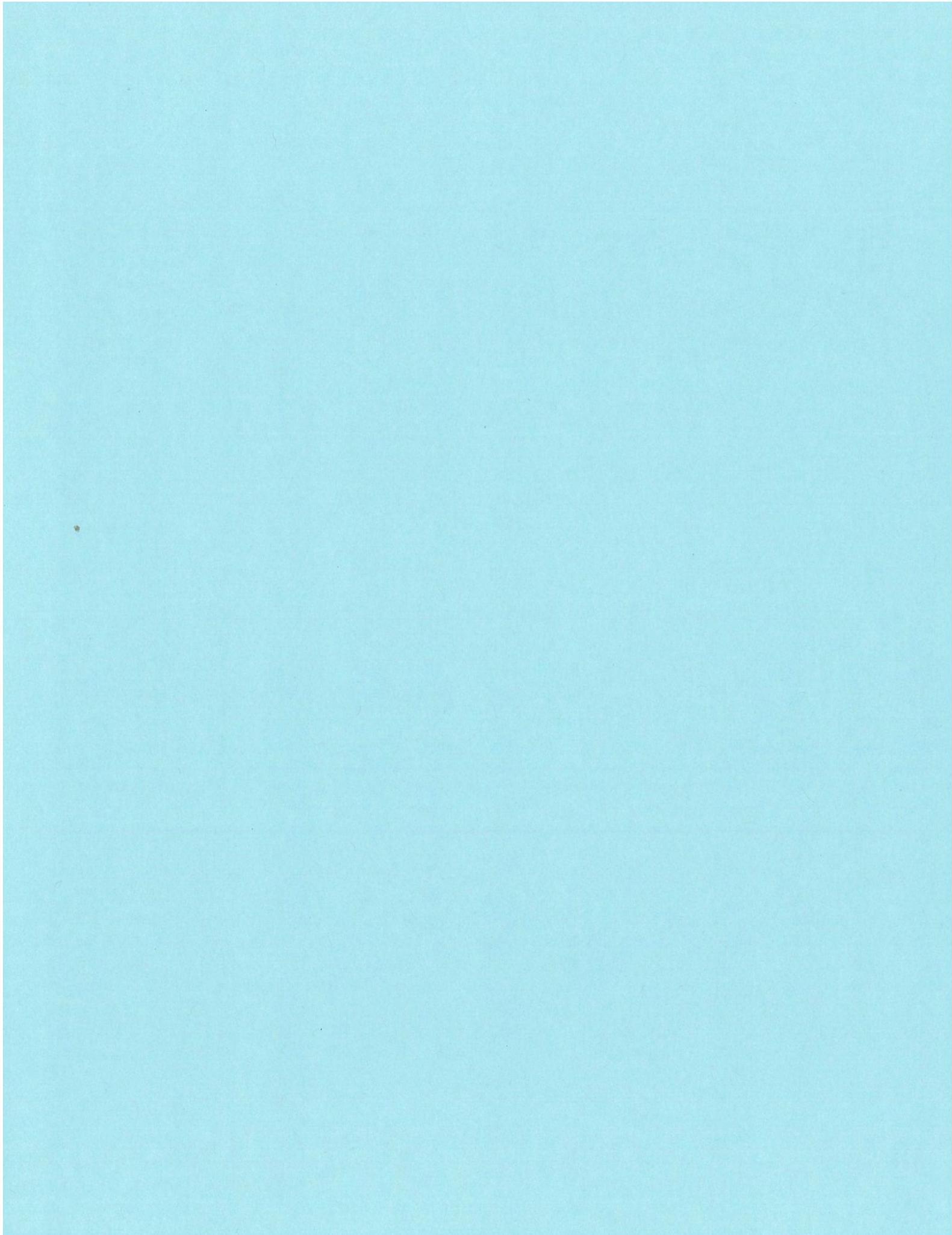
28. Snake River at Old Fort Boise approximately 1-2 miles downstream from the mouth of the Lower Boise River. N 43<sup>0</sup> 49.335' W 117<sup>0</sup> 01.183'

This photo shows floating mats of vegetation on the Snake River.



29. Snake River at Old Fort Boise approximately 1-2 miles downstream from the mouth of the Lower Boise River. N 43<sup>0</sup> 49.335' W 117<sup>0</sup> 01.183'

Aquatic vegetation was growing thick along the bank of the Snake River in this location.





UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 10  
1200 Sixth Avenue, Suite 900  
Seattle, Washington 98101-3140

September 25, 2008

Reply To: OEA-095

**MEMORANDUM**

**SUBJECT:** Macroinvertebrate Data Related to the Delisting of Nutrients on the Lower Boise River

**FROM:** Gretchen Hayslip  
Aquatic Biologist, Office of Environmental Assessment

**TO:** Jennifer Wu  
Watershed Unit, Office of Water and Watersheds

An increase in algal growth resulting from increased nutrient loadings can affect the food webs of aquatic ecosystems, including the macroinvertebrates. Increasing nutrient levels in rivers and streams can increase in primary producer biomass or production. Primary producers include periphyton, macrophytes, and phytoplankton. This increase in plant material can influence other organisms via several routes. First, plant photosynthesis and respiration both may increase. Enhanced photosynthesis can lead to supersaturated dissolved oxygen concentrations, which adversely affect biota. In addition, increased respiration by plants will consume oxygen, and may drive dissolved oxygen concentrations below critical levels, especially at times when photosynthesis is limited (e.g, at night or on cloudy days). Finally, increased plant material can lead to increased suspended organic matter and turbidity, which decreases visibility, which impacts visual predators.

Increases in primary producers can directly affect both food quantity and food quality. In response to nutrient enrichment certain plant taxa may increase while others decrease, leading to changes in plant assemblage structure. Thus, increases in plant production do not necessarily translate to increases in food availability. Also, changes in plant assemblage structure also can affect habitat structure, for example by changing the availability of refugia, smothering coarse substrates and/or the trapping of fine organic matter particles.

More sensitive taxa such as Plecoptera (stonefly) often decrease with increases in many types of stress, including nutrient enrichment (Klemm et al., 2003). This decrease in sensitive taxa (such as stoneflies) is due to changes in dissolved oxygen, decreasing

visibility, increasing habitat simplification and among other factors. In the lower Boise, Plecoptera decrease in the downstream direction and are completely absent from the lower sites.

Tolerant species increase as result of nutrient enrichment (Miltner and Rankin, 1998). More tolerant taxa can take advantage of more simplified, less varied habitat structure and poorer water quality conditions. In the lower Boise, tolerant species increase in the downstream direction. Specifically, Molluscs and Crustaceans are tolerant of nutrient enrichment (Griffith et al., 2005). In the lower Boise, the taxa richness of Molluscs and Crustaceans increase in the downstream direction.

Excess fine sediment can have similar effects on macroinvertebrates as nutrients. Excess sediments also change habitat structure, for example by changing the availability of refugia, and smothering coarse substrates. Excess sediment also decreases visibility. These changes can also result in decreases in sensitive taxa and increases in more tolerant taxa. The biological effects due to sediment stress are not sufficiently specific to be considered symptomatic of sediment impairment alone.

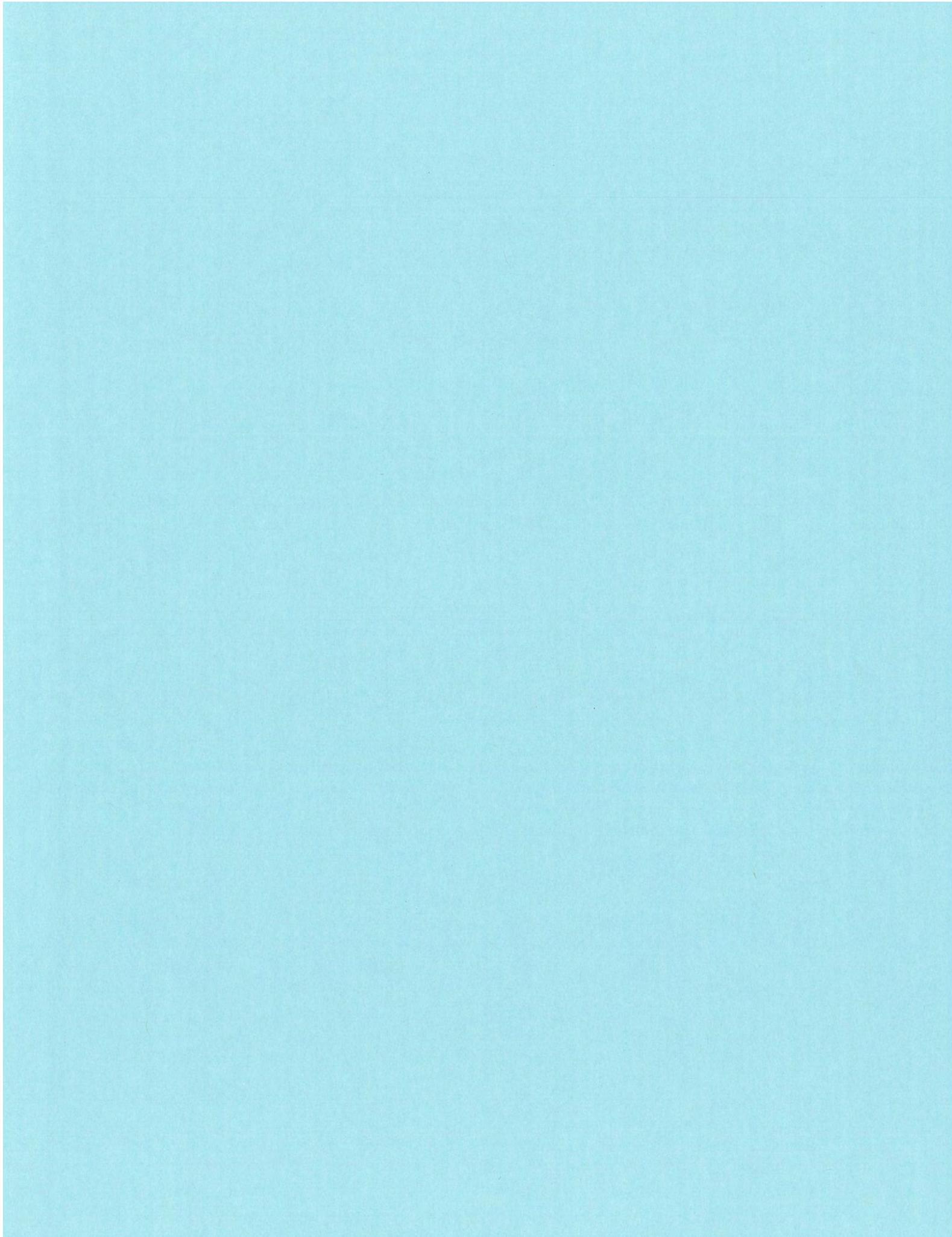
The lower Boise river macroinvertebrate assemblages are impaired, and this impairment increases in the downstream direction. There is evidence that sediment and nutrients are both likely sources of impairment. However there is not sufficient information to show that one stressor is causing this impairment exclusively of the other.

### **References**

Griffith, MB; Hill, BH; McCormick, FH; et al. (1995) Comparative application of indices of biotic integrity based on periphyton, macroinvertebrates, and fish to southern Rocky Mountain streams. *Ecol Indicators* 5:117-136.

Klemm, DJ; Blocksom, KA; Fulk, FA; et al. (2003) Development and evaluation of a macroinvertebrate biotic integrity index (MBII) for regionally assessing Mid-Atlantic Highlands streams. *Environ Manag* 31:656-669.

Miltner, RJ; Rankin ET. (1998) Primary nutrients and the biotic integrity of rivers and streams. *Freshwater Biol* 40:145-158.



### Enclosure 3: EPA Review of Idaho's Delisting Rationale for Hem Creek

In January 2008, the Idaho Department of Environmental Quality (IDEQ) released their draft 2008 Integrated Report for public comment. In that document, IDEQ sought to de-list temperature for Hem Creek from Category 5 of Idaho's 2008 Integrated Report [aka. 303(d) list] (IDEQ, 2008a). EPA provided comments on the proposed de-listing (USEPA, 2008), and DEQ responded and submitted their Final 2008 Integrated Report to EPA in July 2008 (IDEQ, 2008b).

This document describes the temperature listing history and evaluates the evidence provided by IDEQ to de-list temperature for Hem Creek in their Draft and Final 2008 Integrated Report, Final Response to Comments. Additional information subsequently provided by the USFS regarding Hem Creek is also considered. The conclusion of this evaluation is that Hem Creek should not be de-listed for temperature, and it is recommended that EPA disapprove Idaho's removal of Hem Creek for temperature from Category 5 of the Idaho 2008 Integrated Report.

#### **Listing History of Temperature in Hem Creek**

Hem Creek (HUC 17060307; AU: ID17060307CL007\_02b) was first included in Idaho's 303(d) list in 1994 for sediment (USEPA, 1994), and remained listed for sediment in 1996 (IDEQ, 1997) and 1998 (IDEQ, 1999). In Idaho's 2002 303(d) list, sediment was removed from 303(d) listing, and temperature was added (IDEQ, 2003). EPA approved the removal of sediment and addition of temperature for Hem Creek on Dec 20, 2005 (EPA, 2005b). In Idaho's draft 2008 303(d) list (IDEQ, 2008a); Idaho proposed to remove Hem Creek for temperature from the list. EPA provided comments raising concerns about the proposed de-listing on February 20, 2008 (USEPA, 2008). In Idaho's final 2008 303(d) list submittal (IDEQ, 2008b), temperature has been removed from listing for Hem Creek.

#### **Applicable Water Quality Standards for Temperature in Idaho**

The Idaho water quality standards which address temperature and are relevant to coldwater biota found in Hem Creek are as follows:

Idaho Administrative Code (IDAPA 58.01.02.250.02)

- 250.02. Cold water. Waters designated for cold water aquatic life are not to vary from the following characteristics due to human activities:
- b. Water temperatures of twenty-two (22) degrees C or less with a maximum daily average of no greater than nineteen (19) degrees C,
  - f. Salmonid spawning: waters designated for salmonid spawning are to exhibit the following characteristics during the spawning period and incubation for the particular species inhabiting those waters:

Enclosure 3: EPA Review of Idaho's Delisting Rationale for Hem Creek

- ii. Water temperatures of thirteen (13) degrees C or less with a maximum daily average no greater than nine (9) degrees C.

Idaho water quality standards which address natural conditions, and are relevant to issues in Hem Creek are as follows:

Idaho Administrative Code (IDAPA 58.01.02- 003.68, 200.09)

03.68. Natural Background Conditions. No measurable change in the physical, chemical, biological, or radiological conditions existing in a water body without human sources of pollution within a watershed.

200.09 Natural Background Conditions. 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 pollutant levels shall not exceed the natural background conditions, except that temperature levels may be increased above natural background conditions when allowed under section 401.

[Section 401 has to do with allowances for temperature increases from point sources and is not relevant to temperature issues on Hem Creek.]

**Idaho 303(d) Listing Policies Regarding Temperature and Natural Conditions Evaluations**

The following excerpts were taken from the Final Department of Environmental Quality Working Principles and Policies for the 303(d)/305(b) Report (IDEQ, 2008b):

*Natural conditions evaluations relevant to temperature (p. 27):*

***Waters to be Delisted Based on Natural Background***

This section further defines the process by which AUs would be removed from Section 5 of the Integrated Report, based upon application of the Natural Conditions Provision in the WQS, for temperature exceedances. For an AU to be considered for this exclusion process, it must have biological monitoring data that indicates the beneficial uses are fully supported, and there must be a continuous temperature record indicating <10% exceedance of DEQ's temperature criteria.

*Temperature evaluation: 10% rule (p. 19)*

determining compliance with the WQS for other purposes. While necessary to target the current water quality criteria in drafting a TMDL, if the frequency of exceedance of the temperature criteria is less than 10%, and there is no other evidence of thermal impairment, then it is possible to propose de-listing.

### Enclosure 3: EPA Review of Idaho's Delisting Rationale for Hem Creek

#### *Temperature evaluation: critical period of evaluation for salmonid spawning (p. 20)*

- Spawning often occurs when water temperatures are in a spring or fall transition. Therefore, for *salmonid spawning*, the critical period is the 22 days at the warmer end of the spawning period. For spring spawners, this will be at the chronological end of the period, while, for fall spawners, this will be at the chronological beginning of the period.

#### *Partial data records (p. 21)*

Idaho's listing policy includes extensive discussion of the use of partial data records, only a small portion of which is repeated here. In considering temperature data provided by the USFS, partial data records policies relevant to salmonid spawning (copied below) were followed to determine whether at a minimum 10% of measurements during the salmonid spawning period exceeded the salmonid spawning criteria.

If the partial data record includes all of the critical time period, it may be possible to infer that the frequency of exceedance is not more than 10%. For cold water aquatic life, if the partial data record includes the critical period from July 15 thru August 15, inclusive, and the frequency of exceedance is less than 10%, then it can be assumed the frequency of exceedance for the entire summer period of interest is less than 10%. Similarly, if the data record during *salmonid spawning* includes the warmest 22 days of the spawning period (end or beginning of the period, depending on whether spawning extends into spring or fall) and the frequency of exceedance is less than 10%, then it can be assumed that the frequency of exceedance is less than 10% for the entire spawning period.

#### **Idaho's Proposal to De-list Temperature from Hem Creek in 2008 Integrated Report**

In January 2008, IDEQ released their draft 2008 Integrated Report for public comment, which included the proposal to de-list Hem Creek for temperature. Table 1 lists the rationale provided by IDEQ to de-list this waterbody:

Enclosure 3: EPA Review of Idaho's Delisting Rationale for Hem Creek

**Table 1. IDEQ rationale for de-listing Hem Cr. for temperature.**

ID17060307CL007_02b	Hem Creek	9.96	MILES
<b>Temperature, water</b>		<b>State Determines water quality standard is being met</b>	
<p>Hem Creek is a third-order tributary of Sylvan Creek, which then empties into French Creek, and thence into Orogrande Creek, and finally into the North Fork Clearwater River. Hem Creek heads on Hemlock Butte and flows in a northeasterly direction to its confluence with Sylvan Creek. Elevations range from 4,000 feet at the confluence to 6,000 feet on Hemlock Butte. The predominant landtypes are Moderate Relief Uplands, Mountain Slopeplands, and Rounded Mountain Slopeplands, all derived from granitics, metasedimentary schists, and undifferentiated rocks. The predominant mapped bedrock types are Wallace Formation schist, gneiss, and amphibolite. In addition, there is a small area of St. Regis Formation schist.</p>			
<p>BURP crews evaluated sites at the lower end of Hem twice once in 1997 and again in 1998 with very similar results. The 1997 reach is at 4,040 feet elevation, about 60 feet above the confluence of Joy Creek with Hem Creek, while the 1998 site is about 0.25 mile upstream from the confluence with Sylvan Creek at 5,020 feet. The 1997 site has a four percent slope which is on the low end of a Rosgen type A channel, and the 1998 site has an eight percent slope (Rosgen type A). Most of Hem Creek is a Rosgen type B channel, with an average slope of five percent. The measured discharge on August 7, 1997, was 10 cubic feet per second, while the measured discharge on August 5, 1998, was 6.7 cubic feet per second. Human activities affecting the reach include forestry and roads. DEQ 1996 WBAG results indicate that Hem Creek is fully supporting its beneficial uses because its 1997 MBI score is 5.34 (1998 MBI score is 5.55), its 1997 HI score is 105 (1998 HI score is 111), and it is supporting salmonid spawning as evidenced by three age classes of westslope cutthroat trout, including juveniles.</p>			
<p>Hem Creek is not listed by either federal regulations or the state's bull trout problem assessment as a stream to be protected for bull trout. Therefore, the stream temperature was assessed using the cutthroat temperature standards shown in Table 5, where mean daily temperatures shall be less than or equal to 9 oC (48.2 oF) from April through July. As shown by the temperature data for Hem Creek in Appendix 3, mean daily temperatures at the mouth of Hem Creek begin to exceed 9 oC (48.2 oF) by early to mid-July and continue throughout Upper North Fork Clearwater River Subbasin Assessment and TMDLs October 2003 Final, Revised October 2003 the month.</p>			
<p>Therefore, Hem Creek water temperatures exceed the state's numeric standard. However, there is a large degree of variability from year to year. Some particular conditions apply to Hem Creek. First, the time period and degree of temperature exceedance for Hem Creek is the least of any streams evaluated in the UNFCRS. Second, the Hem Creek watershed has only had a small amount of logging, and no trees were removed from the streamside zone (i.e., no shade has been removed from the SPZ), and it is in a nearly natural condition. The CWE model being used in this subbasin to determine the adequacy of stream shading to protect stream temperatures shows that Hem Creek has adequate canopy closure and shading (See Loading Allocation Map for Orogrande Creek, Appendix 4). Therefore, we conclude that the temperature exceedance in Hem Creek is a natural condition and no TMDL is necessary.</p>			

Idaho's de-listing rationale concludes that the documented temperature criteria violations are a natural condition, and no TMDL is necessary. Although not explicitly stated, IDEQ implies that Hem Creek temperature conditions are consistent with provisions of IDAPA 58.01.02.200.09, aka. "natural conditions" provisions.

EPA provided comments on the de-listing rationale for Hem Creek on February 20, 2008 (EPA, 2008a). EPA commented that review of aerial photographs from 1998 and 2004 provided evidence that timber harvest and road construction in the watershed may influence temperature, and these conditions would need to be evaluated in more detail to determine whether anthropogenic activities had influenced stream temperature. EPA also commented on IDEQ's suggestion to use the CWE model to evaluate natural conditions, as EPA had previously reviewed this model (USEPA, 2001), and determined that it was only acceptable to use in a very limited manner for TMDL purposes. EPA had never condoned its use in evaluating "natural conditions". Since 2001 DEQ has discarded the use of CWE model for TMDL purposes, so it seemed inappropriate that it would be used for purposes of evaluating natural stream temperature conditions for Hem Creek. IDEQ's reliance on CWE as part of their de-listing rationale was subsequently dropped, as described below.

### Enclosure 3: EPA Review of Idaho's Delisting Rationale for Hem Creek

IDEQ provided the following response to EPA comments in their final 2008 list submission:

1997 and 1998 Beneficial Use Reconnaissance data applied in the Waterbody Assessment Guidance (WBAGII, Grafe, 2002), show the highest condition rating scores for the stream macroinvertebrate index, stream fish index, and stream habitat index (3.0). The condition category is above the 25th percentile of reference condition for this assessment unit. Additionally, macroinvertebrate samples were comprised of 22.7% obligate cold water bugs, and the Stream Fish Index contained 100% cold water fish (salmonids). Samples also included >150 Tailed Frog tadpoles, and Pacific Giant Salamanders. The Clearwater National Forest staff recommended Hem Creek as a reference stream for DEQ's Beneficial Use Reconnaissance Program monitoring.

Observation of human activities does not equate to a WQS violation.

Hem Creek is within the Clearwater National Forest and required to be managed by the Federal Inland Native Fish Strategy (INFISH) (USFS, 1995). INFISH is implemented to address excess heat loading regardless of original cause. INFISH could be considered equivalent to or meeting potential natural vegetation desired canopy cover.

DEQ is not citing CWE as a de-listing rationale. DEQ is stating that mandatory INFISH 300' setbacks are observed on the entirety of Hem Creek and those no entry setbacks achieve a far higher canopy closure than any PNV based TMDL could. Further DEQ is not stating that INFISH is a defacto WQS rather that this AU was evaluated *in the TMDL process and due to its extraordinarily high biological scores coupled with the 300' setbacks no action was deemed needed.*

DEQ maintains Hem Creek is fully supporting its beneficial uses and will be appropriately found in Section 2.

#### **Federal requirements to evaluate de-listing from the 303(d) list**

In order for impaired waters to be de-listed from the 303(d) list, the State must demonstrate a good cause to de-list (40 CFR 130.7(b)(6)(iv). Specifically, in order for impaired waters to be de-listed from Category 5 of the 303(d) Integrated Report,

*“each State must demonstrate good cause for not including a water or waters on the list. Good cause includes, but is not limited to, more recent or accurate data; more sophisticated water quality modeling; flaws in the original analysis that led to the water being listed in the categories in 130.7(b)(5); or changes in conditions, e.g., new control equipment, or elimination of discharges (40 CFR 130.7(b)(6)(iv)).”*

### Enclosure 3: EPA Review of Idaho's Delisting Rationale for Hem Creek

In addition, each State must provide

*"A rationale for any decision to not use any existing and readily available data and information for any one of the categories of waters as described in 130.7(b)(5)". (40 CFR 130.7(b)(6)(iii)*

EPA also describes the interpretation of these regulations in the report, "Guidance for 2006 Assessment, Listing, and Reporting Requirements Pursuant to Sections 303(d), 305(b) and 314 of the Clean Water Act (USEPA, 2005a)".

#### **EPA's Evaluation of the Proposed Temperature De-listing of Hem Creek**

To evaluate whether the proposed temperature de-listing is appropriate, EPA assessed the information DEQ provides to support the de-listing (40 CFR 130.7(b)(6)(iv).

#### **IDEQ's Rationale for De-listing**

Idaho used five lines of evidence in its Draft 2008 303(d) Integrated Report, Final 303(d) Integrated Report, and the Final Response to Comments to support its proposal to de-list Hem Creek for temperature.

In 2003, IDEQ completed the Upper North Fork Clearwater River Subbasin Assessment (SBA) and TMDLs (IDEQ, 2003). The SBA concluded that bull trout temperature criteria were not relevant to Hem Creek, but that data collected by the USFS did demonstrate exceedances of the salmonid spawning temperature criteria applicable to cutthroat trout from April through July in this waterbody (IDEQ, 2003; p. 63). IDEQ concluded that although exceedances occurred, temperature in Hem Creek represented natural conditions:

Although not explicitly stated, it is clear that IDEQ believes that temperature in Hem Creek is consistent with natural conditions provisions under IDAPA 58.01.02.200.09. In 2003, Idaho developed a guidance document to assist staff in implementing natural conditions provisions of the Idaho water quality standards (IDEQ, 2003). Sections of this document regarding evaluation of natural temperature conditions are referenced and repeated in IDEQ's 2008 Working Principles and Policies for the 303(d)/305(b) Report (IDEQ, 2008b). While these sections of Idaho's natural conditions guidance and listing policies are not referenced in IDEQ's rationale for de-listing Hem Creek, EPA considered recommendations in this guidance in assessment of IDEQ's de-listing rationale.

The following are the main points in IDEQ's rationale as to why temperature conditions are natural, and EPA's review comments:

- 1. Hem Creek has the least temperature criteria exceedances of any stream in the Upper North Fork Clearwater River (UNFCR) subbasin.***

### Enclosure 3: EPA Review of Idaho's Delisting Rationale for Hem Creek

EPA agrees that Hem Creek may have fewer temperature criteria exceedances than other streams in the UNFCR subbasin. However, it is unclear how this comparison relates to IDEQ policy or applicable water quality standards regarding natural conditions. A key provision of Idaho's listing policy is that in order for a water to be eligible for evaluation of natural conditions, "... there must be a continuous record showing < 10% exceedance of IDEQ's temperature criteria ..." (IDEQ, 2008b; p. 27). Data presented in the UNFCR SBA demonstrate > 10% exceedance of the cutthroat spawning criteria in years when sufficient data are available (1997, 1998). In addition, this pattern of >10% exceedances is repeated in data readily available from the USFS (USFS, 2008a) for the years 1994, and 2000 – 2007 (See Attachment A). The pattern of criteria exceedances appears to preclude further evaluation of the waterbody for natural conditions provisions, according to IDEQ's listing policy. Although Idaho's listing policy suggests it is not appropriate to evaluate Hem Creek for natural conditions provisions, EPA considered other information presented by IDEQ regarding natural conditions.

Idaho's comparison of Hem Creek to other UNFCR watersheds, many of which are heavily managed, does not provide any direct evidence that temperatures in Hem Creek are natural. Timber harvest activity (logging, road construction) has been extensive throughout most of the other waterbodies evaluated in the subbasin, with 20% – 60% of timber harvested in many watersheds (IDEQ, 2003). Because these other watersheds have significant anthropogenic impacts, it is unclear whether the less frequent temperature exceedances in Hem Creek are because temperature conditions are natural, or simply because temperature has been increased in the other comparison watersheds due to timber harvest related activities. A more informative evaluation might be to compare Hem Creek to a similar watershed with no management history, or to directly evaluate the effects of timber harvest and road construction activities which have occurred in Hem Creek.

#### ***2. Only a small amount of logging has occurred in the watershed, and no shade was removed from the Stream Protection Zone***

EPA agrees with the first part of this statement, that only a small amount of logging has occurred in the watershed. Data readily available from the USFS indicate that only 7.3% of the watershed has been logged (USFS, 2008b). In general, this falls below Idaho's recommended screening threshold of 20% (IDEQ, 2003); a point at which hydrologic changes resulting from timber harvest may begin to affect stream temperature. However, the location where this harvest occurred is important, and warrants further evaluation.

Idaho's statement that no shade was removed from the SPZ (stream protection zone) is somewhat ambiguous since they do not define the SPZ width. EPA compiled aerial photos of Hem Creek, and evaluated timber harvest proximity to Hem Creek in Attachment B. As can be seen from Figures 3 and 4, timber harvest was evident in the 1998 and 2004 photos in the lower watershed, and appears to be near the stream channel in some locations.

### Enclosure 3: EPA Review of Idaho's Delisting Rationale for Hem Creek

In evaluating whether a waterbody is in a natural condition, Idaho's natural conditions guidance provides the following recommendations, including a recommendation regarding proximity of harvest to stream channels, as follows:

1. No forest harvest impinges riparian areas<sup>1</sup>;
2. No riparian roads are present and few road crossings exist; and
3. No evidence of sources of sediment delivery that are associated with road fills or timber cuts, and
4. No water withdrawals are present;

*then*, stream temperature may be presumed to be natural.

IDEQ provides further clarification regarding the first criteria in Footnote 1, essentially establishing 300' as the minimum riparian zone width. A 300' setback distance line has been overlaid in red on Figures 3 and 4 in Attachment B to help evaluate this guideline. It is apparent that timber harvest occurred some time in the past well within the 300' setback distance both on the mainstem of Hem Creek, and on a small tributary to the south. This finding is further supported by data readily available from the USFS (USFS, 2008b), which states that harvest occurred within the 300' buffer along 1.4 miles of Class 1 (fish bearing) streams in the Hem Creek watershed. This represents 39% of all fish bearing stream miles in the watershed<sup>2</sup>.

In summary, EPA believes that only a small amount of logging has occurred in the watershed. However, some of the logging is located within the riparian zone as defined in IDEQ's guidance as a 300' setback distance, and at times has been very close to Hem Creek and tributaries based on air photo analysis. Idaho's natural condition guideline for evaluating harvest impacts specifies no harvest within a 300' setback distance. According to the USFS, harvest has occurred within this buffer zone in 39% of fish bearing stream miles, which is evidence that this guideline is not met. A more detailed evaluation of shade loss due to harvest activities is described below.

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<sup>1</sup> For this purpose, for fish-bearing streams riparian areas are recommended as consisting of the Stream and the area on either side of the stream to the top of the inner gorge, or to the outer edges of the 100-year floodplain, or to the outer edges of riparian vegetation, or to a distance equal to the height of the two site-potential trees, or to a 300 feet slope distance extending to both sides of the stream channel, whichever is greatest. Tributaries are recommended to have similar definitions except that widths would be less, depending if they were permanent, non-fish bearing streams or intermittent streams. Recommended widths were taken from USFS (1995). Because in this context, intact riparian widths are recommended as one factor in a rebuttable presumption of natural stream conditions, these riparian width recommendations are broad. While narrower riparian widths may in some cases be sufficient for natural stream conditions, that should not be presumed and would need to be demonstrated on a case specific basis.

<sup>2</sup> Calculated as the product of (1) 1.4 miles of "Impacted" stream miles (amount of miles within the impacted buffer zones) (2) divided by 3.63 miles of Class 1 streams in the basin.

## Enclosure 3: EPA Review of Idaho's Delisting Rationale for Hem Creek

### Additional shade-impact analysis conducted by EPA

To further evaluate the potential impact of clearcut and thinning harvest areas, EPA analyzed air photos and conducted a modeling analysis, as described in Attachment B. Riparian disturbance in forested conditions can lead to water quality changes, including (but not limited to) sediment delivery changes, sediment transport changes through changing hydrography, and temperature load changes through reduction of shade conditions. Previous research has shown that reduced riparian shade often results in increases in river/stream temperature conditions.

The impacts of harvest were evaluated using shade modeling and GIS sampling tools developed by Washington and Oregon, respectively. Assumptions used in the analysis are presented in Table 2, Attachment B. The results of the analysis, shown in Figure 7, illustrate that several areas within the lower reach of Hem Creek may have reduced shading resulting from harvest activities. While some areas appear un-impacted, other areas may have reductions in shade of up to or greater than 20%. In addition to not meeting IDEQ's riparian harvest guideline, impacts to stream temperature due to the loss of shade from harvest are probable based on stream heating dynamics described in the paragraph above, and therefore Hem Creek temperature conditions cannot be considered to be "natural".

### ***3. Biological scores were very high in sampling conducted in Hem Creek.***

EPA agrees that macroinvertebrate, fish and habitat scores in samples from Hem Creek were high as evaluated via Idaho's Waterbody Assessment Guidance (WBAG) process (IDEQ, 2002). Idaho uses this information to evaluate the beneficial use portion of Idaho's water quality standards. Idaho's temperature criteria and natural conditions provisions of the water quality standards apply independently of the beneficial use provisions of the standards. Both beneficial use and criteria portions of the standards must be met. Idaho's WBAG recognizes this independent applicability, and considers criteria violations as a first step in determining the support status of a waterbody. If numeric criteria (including temperature) are exceeded (with consideration of the 10% exceedance policy), a water body is considered to be not fully supporting and subject to 303(d) listing, regardless of the outcome of biological, physicochemical and habitat data (See Figure 6.2, IDEQ 2002). While it is encouraging that biological scores are high, they do not over-ride temperature criteria exceedances, nor provide direct evidence that stream temperature conditions are natural.

### ***4. The Clearwater National Forest Recommended Hem Creek as a reference stream for BURP monitoring.***

EPA agrees that management does not appear to have occurred in the upper portions of Hem Creek, and upper Hem Creek could be considered as a reference stream. However, anthropogenic activity in the lower portion of the watershed which could affect stream shade is evident. While EPA acknowledges that the USFS may have recommended Hem Creek as a BURP monitoring reference site, this recommendation

### Enclosure 3: EPA Review of Idaho's Delisting Rationale for Hem Creek

does not provide any specific information about whether existing timber harvest and road construction have affected stream temperature.

**5. *INFISH applies and is equivalent to meeting a natural vegetation canopy cover, since it results in "no entry" 300' stream setbacks.***

INFISH (Inland Native Fish Strategy) are a set of interim guidelines established in 1995 for management of federal lands within the Columbia basin for protection of resident native non-anadromous aquatic fish (USFS, 1995). These guidelines provide specific protections for riparian habitat conservation areas (RHCAs) intended to protect aquatic species. In particular, the provision IDEQ refers to establishes setback distances within which activities such as timber harvest, road construction, etc. are very limited<sup>3</sup>. For fish bearing streams, the setback distance is 300', and the setback is 150' for permanently flowing non-fish bearing streams.

EPA agrees that the Clearwater National Forest is currently managing these lands utilizing INFISH riparian standards and guidelines, and we fully support these prescriptions. EPA agrees that over time this management strategy could result in relatively natural vegetation levels along Hem Creek as trees and other vegetation re-grow, although it would likely take many decades to restore a mature vegetative state where harvest and road construction has occurred. However, these guidelines do not change the impact of harvest which has already occurred, some of which is within the INFISH setbacks, as is evident in photos and USFS documentation described above. While we fully agree that use of INFISH and other similar riparian protections are very beneficial approaches to help the watershed recover from past harvest, they do not have any bearing on whether the current condition of stream temperature is natural.

#### **EPA evaluation of good cause for de-listing**

EPA also considered IDEQ's basis for proposed de-listing in the context of federal regulations pertaining to good cause for listing (40 CFR 130.7(b)(6)(iv)), which read as follows:

*"...each State must demonstrate good cause for not including a water or waters on the list. Good cause includes, but is not limited to, more recent or accurate data; more sophisticated water quality modeling; flaws in the original analysis that led to the water being listed in the categories in 130.7(b)(5); or changes in conditions, e.g., new control equipment, or elimination of discharges..."*

1. *More recent or accurate information.* Hem Creek was originally listed for temperature in Idaho's 2002 list, which was approved by EPA in 2005. Idaho does not present any

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<sup>3</sup> For example, with limited exceptions, timber harvest is prohibited within 300' of fish bearing streams, 150' of permanently flowing non-fish bearing streams, etc. Other restrictions regarding roads, recreation minerals management and other activities also apply.

### Enclosure 3: EPA Review of Idaho's Delisting Rationale for Hem Creek

new or more accurate data than was available at that time in their de-listing rationale. However, it appears that information discussed in their rationale (lines of evidence 1- 5 above) may not have been thoroughly reviewed or considered at the time Hem Creek was included on the list in 2002 (no such review can be found in the record for the 2002 list). EPA has reviewed IDEQ's five lines of evidence above, and has concluded that they do not constitute good cause for de-listing, either individually, or as a whole.

Additional readily available temperature data, management history information, and air photo documentation of management history was compiled by EPA. The temperature data confirms that temperature exceeds salmonid spawning criteria in Hem Creek, as explained above. In addition, air photos indicate that timber harvest and road construction has occurred in lower Hem Creek which has likely reduced shade, which can result in stream temperatures which are not natural. This additional information does not support the conclusion that Hem Creek meets Idaho's temperature criteria or natural conditions provisions, and therefore does not constitute good cause for de-listing.

2. *More sophisticated water quality modeling.* Idaho did not rely on modeling in its original listing of Hem Creek, or propose new modeling to justify de-listing. To support review of Idaho's proposed de-listing, EPA conducted additional modeling of the impact of timber harvest on stream shade, as described in Attachment B. These results indicate that stream shade in the lower reaches of Hem Creek has likely been reduced as a result of timber harvest, and may have resulted in temperature conditions which are not natural. This additional modeling does not support the conclusion that stream temperatures in Hem Creek are natural, and does not constitute good cause for de-listing.

3. *Flaws in the original analysis that led to the water being listed in the categories in 130.7(b)(5).* Hem creek was initially listed for temperature in Idaho's 2002 303(d) list, which was submitted to EPA on July 23, 2004. Idaho's publicly accessible assessment database documenting assessment and listing information for 2002 identifies the coldwater biota beneficial use as being fully supported and the salmonid spawning beneficial use as not being fully supported, with thermal modifications (i.e. temperature) as the pollutant (see Attachment C). The Upper North Fork Clearwater SBA is identified as a reference document. Under Assessment Comments, the following information is provided:

*Assessment is based on 97, 98 burp data. AU within a roadless area, and is a federally protected bull trout watershed. USFS temp data indicate this AU does not meet the federal bull trout water temperature standard. E. coli results = 8/100 ml.*

It appears that there were flaws in the assessment statements noted above. First, Hem Creek is not identified in EPA's list of waters for which federal bull trout criteria apply<sup>4</sup>, and therefore the federal bull trout water temperature standard is not applicable. Second, the assessment statement fails to mention that Hem Creek did not meet the Idaho salmonid spawning criteria for cutthroat trout, as was documented in the Upper North

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<sup>4</sup> See 40 CFR 131.33(a)(2)(xxxv), waters within the Upper North Fork Clearwater Basin protected for bull trout spawning and rearing.

### Enclosure 3: EPA Review of Idaho's Delisting Rationale for Hem Creek

Fork Clearwater SBA, referenced in the assessment. While it appears that it was a mistake to reference non-compliance with the federal bull trout criteria as a basis for 303(d) listing in 2002 for temperature, it was also an error to overlook salmonid spawning temperature criteria violations, available at the time, which would have been a basis for 303(d) listing. Consequently, these flaws cannot be considered a good cause basis for de-listing Hem Creek for temperature in 2008.

4. *Changes in conditions, e.g., new control equipment, or elimination of discharges.* Idaho did not present any information that conditions have changed or that sources of heat loading had been eliminated. Temperature data collected by the USFS during 2000 - 2007 indicates that the temperature conditions, i.e. salmonid spawning criteria exceedances, have not changed since 1999, the most recent data cited in the UNFCR SBA and de-listing rationale. Consequently, there is no evidence that conditions have changed or that heat loading sources have been reduced such that Hem Creek complies with temperature criteria or natural conditions provisions of Idaho water quality standards.

#### **EPA evaluation of “existing and readily available information” requirements**

In its de-listing rationale provided with the final 2008 303(d) list, Idaho referred to temperature data in the UNFCR Subbasin assessment and TMDL for the years 1996 - 1999. However, Idaho did not consider additional temperature data for the years 1994, and 2000 – 2007, which are readily available from the USFS. These data demonstrate that temperature criteria were exceeded in each of these years in Hem Creek, considering the State's 10% exceedance and minimum data records policies. While the bulk of IDEQ's rationale focuses on whether temperature conditions in Hem Creek are natural, it appears Idaho did not fully consider readily available data regarding more recent temperature measurements.

#### **Conclusion**

EPA reviewed IDEQ's de-listing rationale in the context of “good cause” provisions for de-listing established under 40 CFR 130.7(b)(6)(iv). Our review has concluded that none of the four good cause provisions are supported by rationale provided by IDEQ, by data available from the USFS, or by additional analysis conducted by EPA.

EPA also considered federal requirements under 40 CFR 130.7(b)(5) which indicates that States must consider all existing and readily available data and information in making listing decisions. EPA's review found that Idaho did not fully consider existing information available from the USFS which consistently documents exceedances of temperature criteria.

Finally, EPA reviewed Idaho's rationale that stream temperatures and criteria exceedances are natural, and therefore consistent with Idaho water quality standards. Our finding is that the rationale does not support the conclusion that stream temperatures are natural, nor is it consistent with IDEQ listing policies regarding natural conditions, as

Enclosure 3: EPA Review of Idaho's Delisting Rationale for Hem Creek

provided in the Final Department of Environmental Quality Working Principles and Policies for the 303(d)/305(b) (IDEQ, 2008b), and therefore de-listing of temperature for Hem Creek is not consistent with Idaho water quality standards.

**Recommendation**

It is recommended that EPA not approve IDEQ's proposal to de-list Hem Creek for temperature, and that Hem Creek should remain in Category 5 of the Idaho 2008 Integrated Report for temperature.

Enclosure 3: EPA Review of Idaho's Delisting Rationale for Hemi Creek

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Enclosure 3: EPA Review of Idaho's Delisting Rationale for Hem Creek

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USFS, 2008a. Hem Creek temperature data provided in an Excel file as an email attachment by Patrick Murphy, Forest Fisheries Biologist, Clearwater National Forest. November 24, 2008.

USFS, 2008b. Hem Creek Watershed – 17060307070203. Harvesting and road impact statistics. Provided as an email attachment by Patrick Murphy, Forest Fisheries Biologist, Clearwater National Forest. December 2, 2008.

**ATTACHMENT A**

**Hem Creek - USFS Temperature Data**

**1994 to 2007**

	# days T recorded during cutthroat spawning window (April 1 - July 31)	% measurements exceeding daily average of 9° C	% measurements exceeding daily max. of 13° C
1994	51	71	67
1996	14	79	57
1997	37	19	0
1998	31	100	84
1999	12	75	25
2000	41	63	46
2001	41	80	54
2002	54	41	35
2003	63	49	41
2004	73	49	32
2005	75	48	39
2006	73	51	44
2007	61	64	77

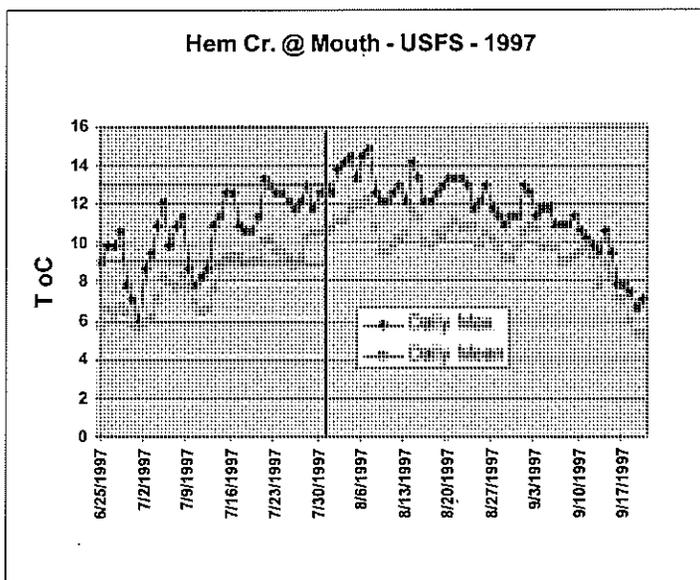
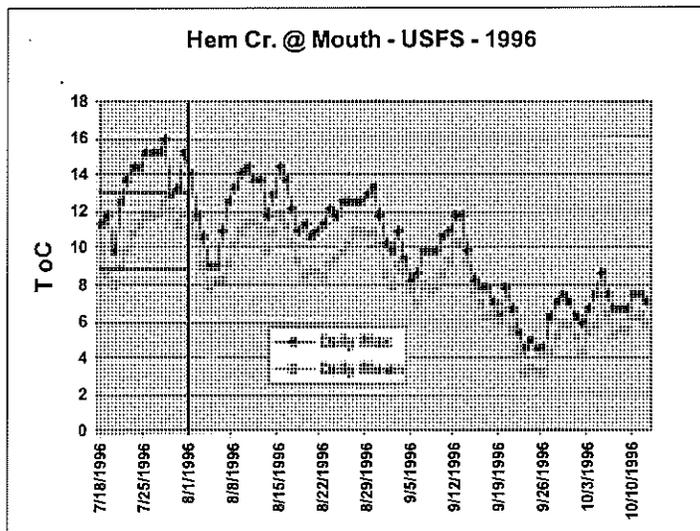
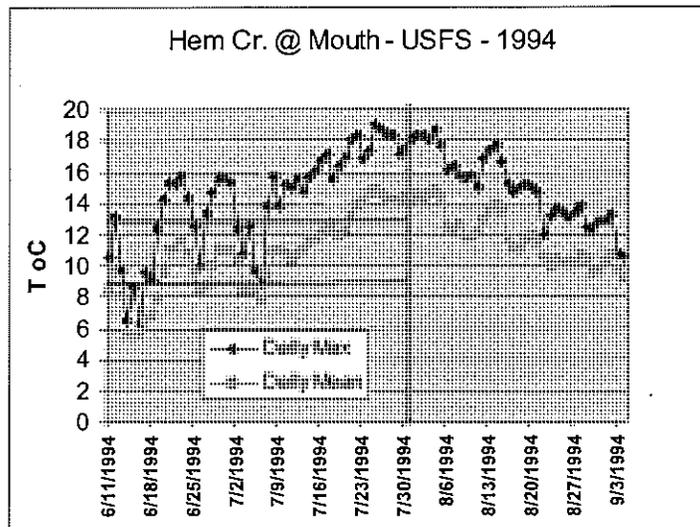
Data provided electronically by Patrick Murphy, USFS Fisheries Biologist, Clearwater National Forest. November 24, 2008.

Footnotes:

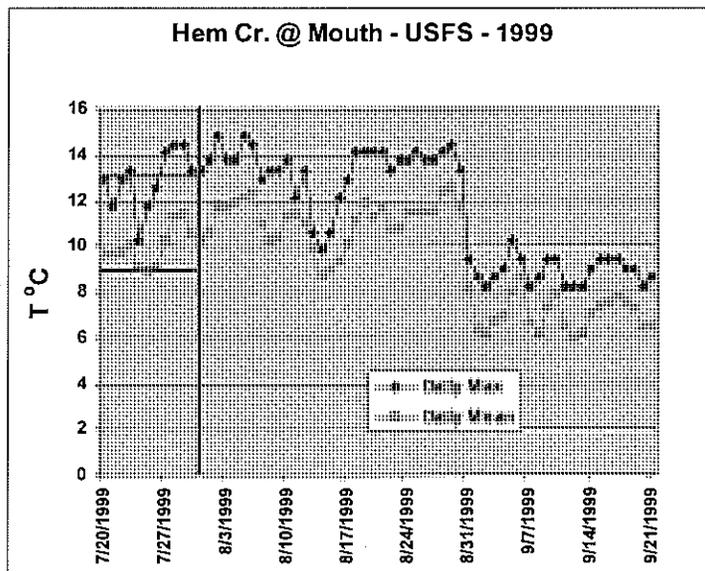
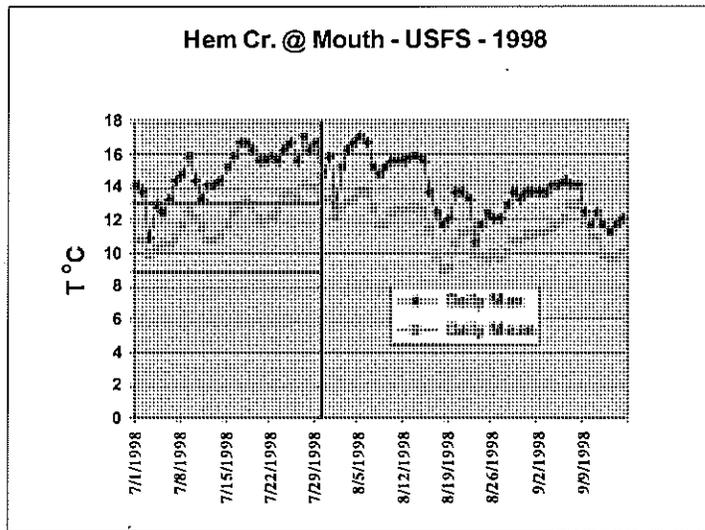
Daily average and daily maximum measurements were compared to Idaho criteria of 9°C and 13°C respectively to determine if >10% of measurements exceed criteria, per IDEQ policy.

Two years (1996, 1999) have <22 days of data within the warmest portions of the cutthroat spawning period, therefore there is insufficient data to evaluate criteria exceedances in these years, according to IDEQ policy.

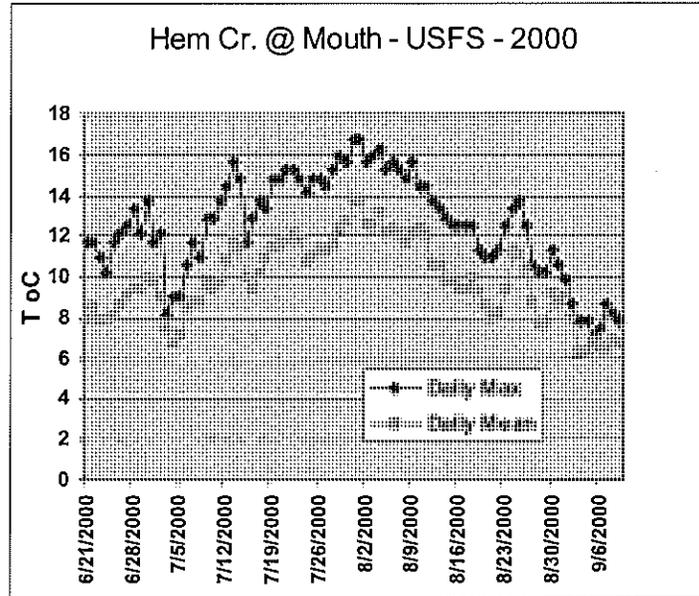
Enclosure 3: EPA Review of Idaho's Delisting Rationale for Hem Creek



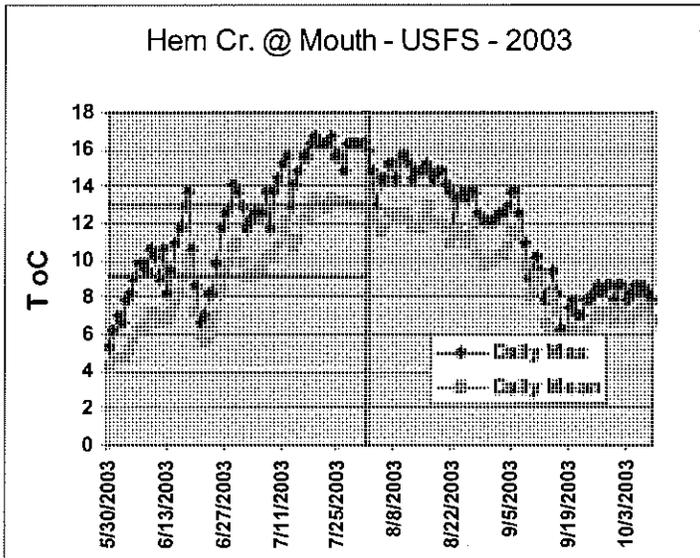
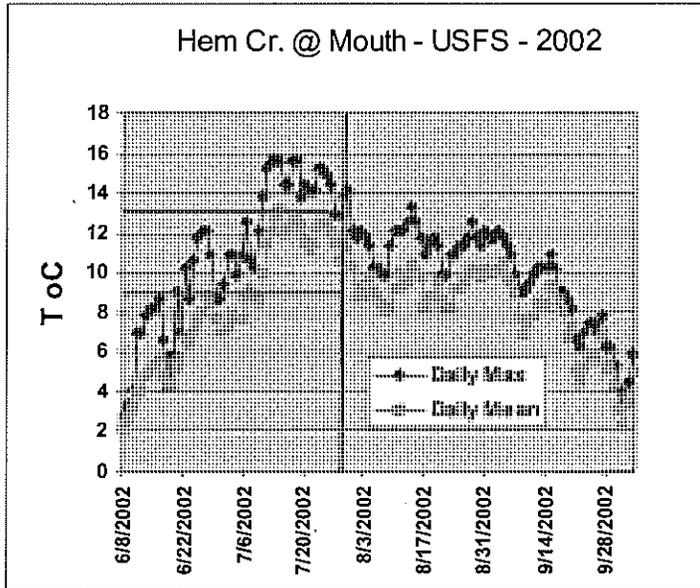
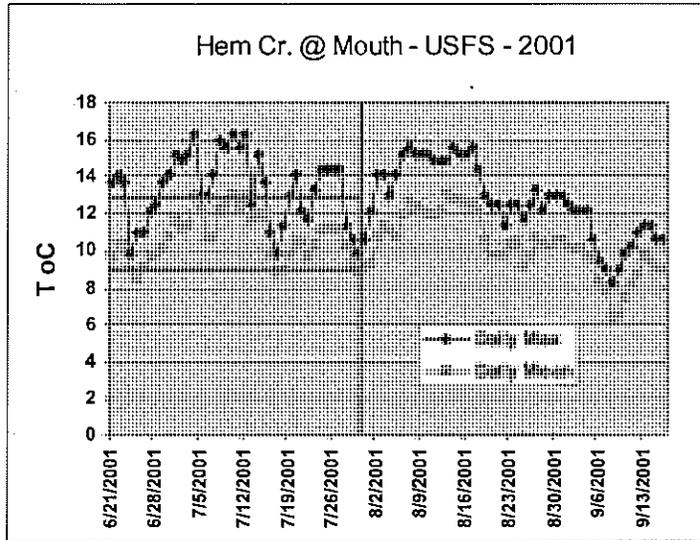
Enclosure 3: EPA Review of Idaho's Delisting Rationale for Hem Creek



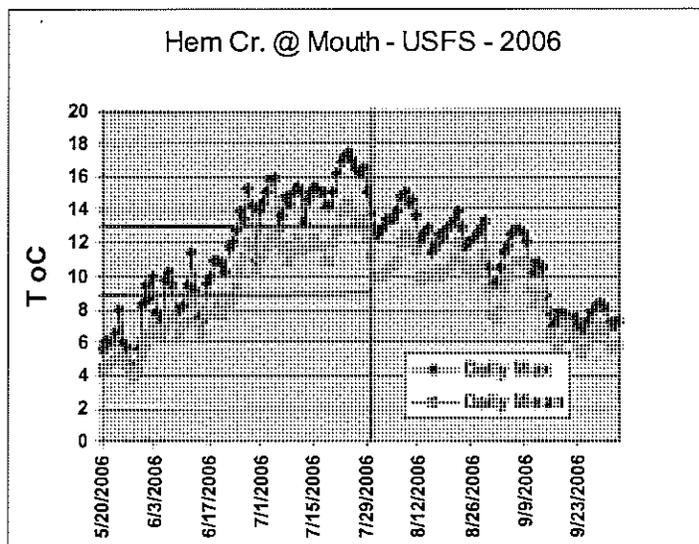
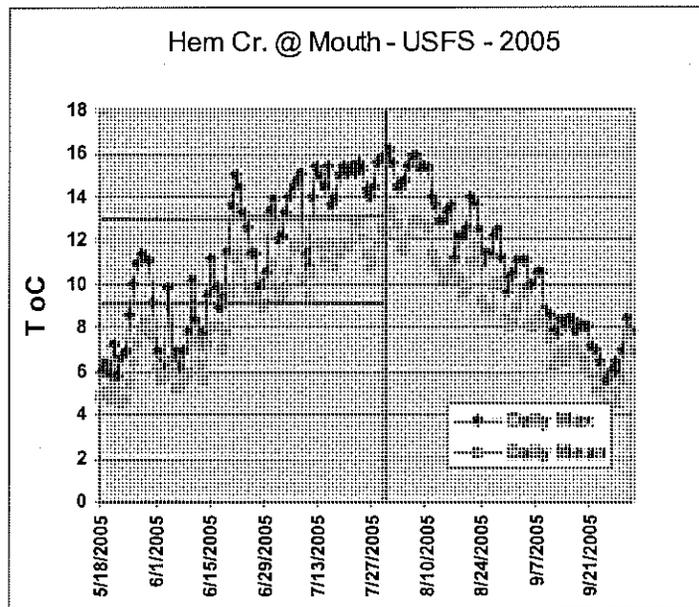
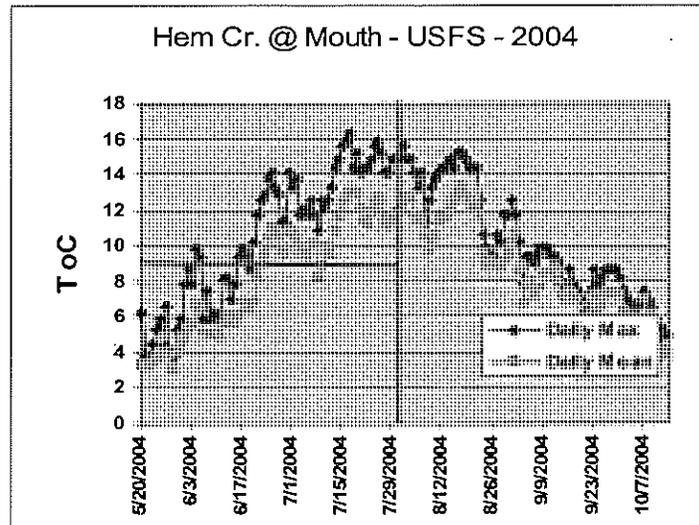
Enclosure 3: EPA Review of Idaho's Delisting Rationale for Hem Creek



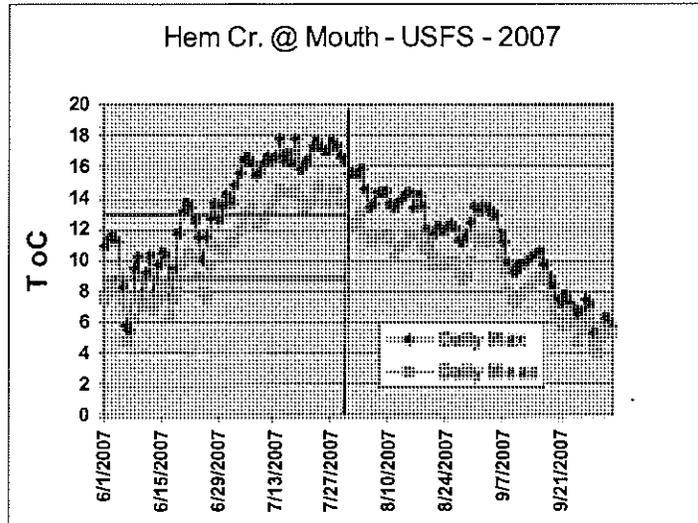
Enclosure 3: EPA Review of Idaho's Delisting Rationale for Hem Creek



Enclosure 3: EPA Review of Idaho's Delisting Rationale for Hem Creek



Enclosure 3: EPA Review of Idaho's Delisting Rationale for Hem Creek



ATTACHMENT B

Enclosure 3: EPA Review of Idaho's Delisting Rationale for Hem Creek

**Memorandum**

**December 12, 2008**

**To:** File

**From:** Peter Leinenbach, USEPA Region 10

**Subject:** Description of current conditions for Hem Creek Idaho.

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The watershed area for Hem Creek is illustrated in **Figure 1**. In addition, the topographic (i.e., "hill shade") relief for this watershed is illustrated in this image. Several clearcut harvest and thinning harvest areas have occurred in the lower portions of this watershed (**Figure 2**). Road building in support of these harvest activities has also occurred in this lower portion of the watershed.

**Table 1** presents a summary statistics for the Hem Creek watershed developed by the Clearwater National Forest (CWNF) staff. This table shows that road development occurred in 1982, and forest harvest soon followed. Locations of these harvest activities are illustrated in **Figures 3, 4, 5, and 6**. These images show that harvest activities continue in this basin<sup>1</sup>. In addition, these figures show that harvest has occurred within a 300 foot buffer of the stream. Similarly, the CWNF reported that 52.1 acres in this basin have been harvested within the stream buffer (300 foot) (See **Table 1**). In addition, the CWNF indicated that 39%<sup>2</sup> of "Class 1" stream miles in this basin have buffer conditions which are "impacted" by harvest activities.

Riparian disturbance in forested conditions can lead to water quality changes, including (but not limited too) sediment delivery changes, sediment transport changes (through changing hydrography), and temperature load changes (through reduction of shade conditions). Previous research has shown that reduce riparian shade conditions often result in increases river/stream temperature conditions. It is important to note that data collected on this river has shown that temperature conditions are above the water quality criteria (described in another document). Accordingly, a quick analysis was developed in order to determine if harvest activities along Hem Creek mainstem could have a "potential" to reduce stream shade conditions (**Table 2**). Results from this analysis indicated that areas along the mainstem Hem Creek may have lower shade conditions as a result of the historic riparian harvest (**Figure 7**).

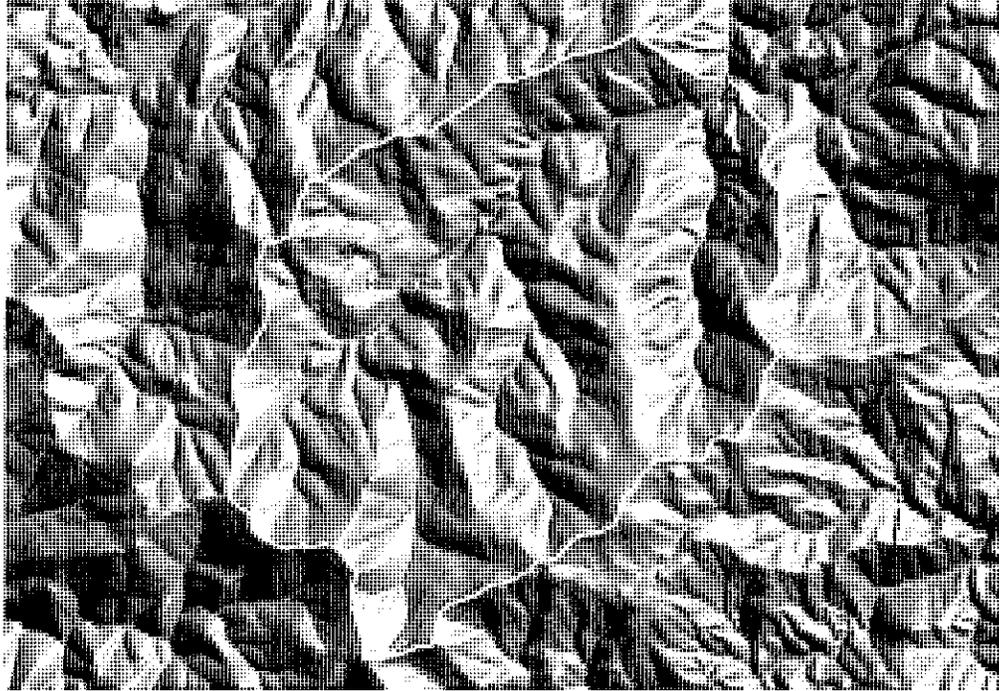
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<sup>1</sup> The CWNF analysis appears to represent approximately 1994 conditions. Harvest has occurred in the basin since this time (see Figure 3 and 4).

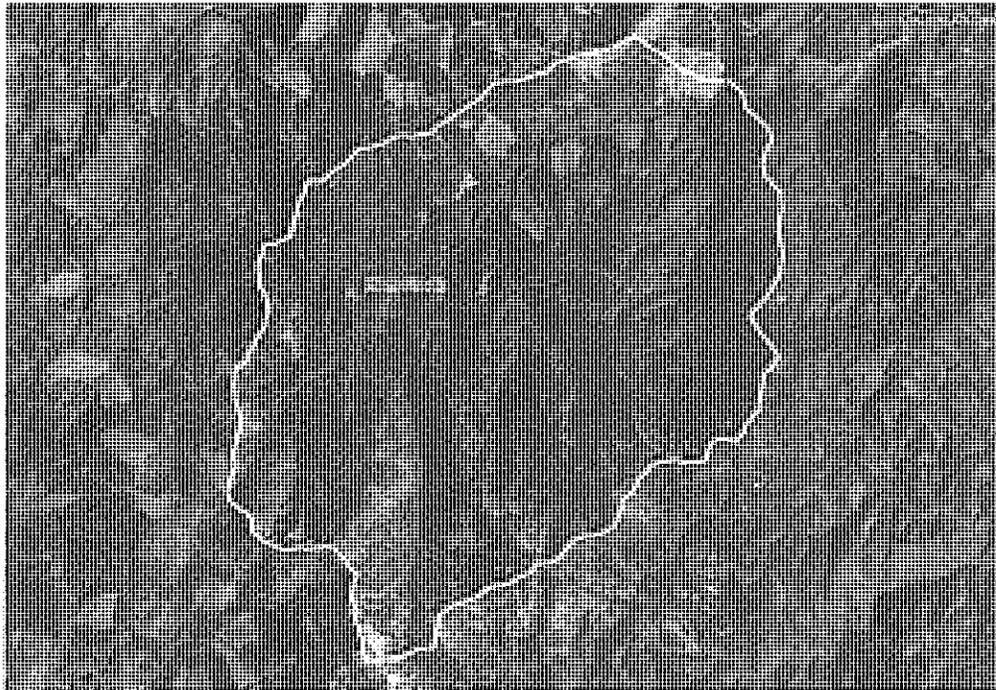
<sup>2</sup> Calculated as product of (1) 1.4 miles of "Impacted" stream miles (amount of miles within the impacted buffer zones) (2) divided by 3.63 miles of Class 1 streams in the basin.

Enclosure 3: EPA Review of Idaho's Delisting Rationale for Hem Creek

**Figure 1.** Watershed boundary and topographic relief for the Hem Creek Watershed.  
[Yellow line represents the watershed boundary and thick blue line is the Hem Creek mainstem.]



**Figure 2.** 2004 Photograph of the Hem Creek Watershed.



Enclosure 3: EPA Review of Idaho's Delisting Rationale for Hem Creek

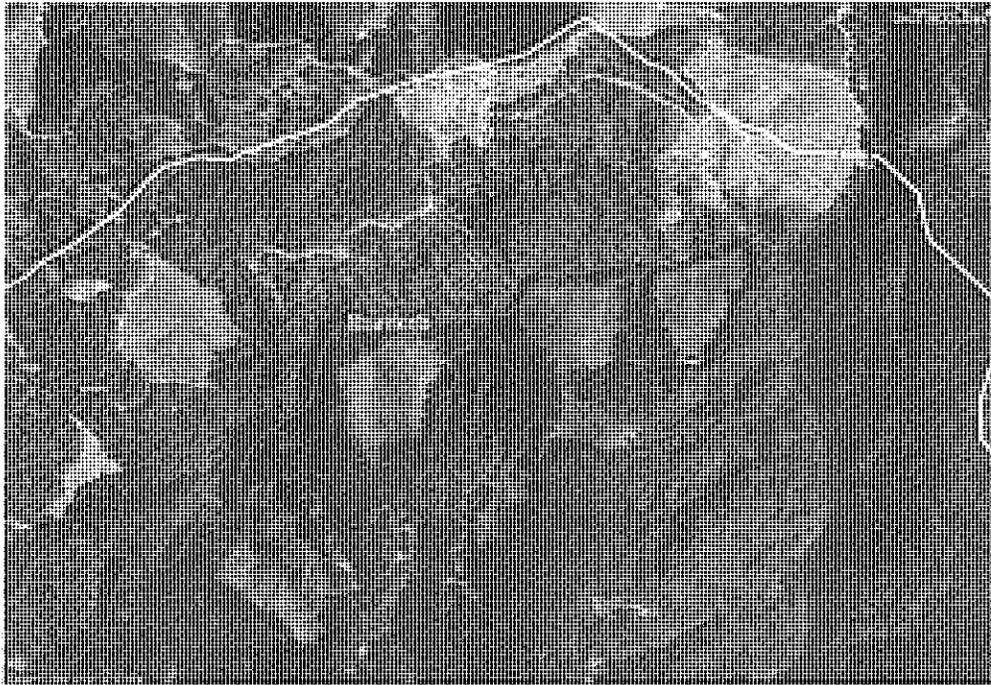
Table 1. Summary statistics calculated by the CWNF for the Hem Creek watershed.

<b>Hem Creek Watershed - 17060307070203</b>	
<b>Harvesting and road impact statistics</b>	
• <b>Watershed Size:</b>	4723 acres
• <b>Stream Habitat:</b>	20.2 miles of streams (GIS layer mileage)
Class 1:	3.63 miles
Class 2:	16.58 miles
• <b>Harvested Acreage:</b>	347.7 acres (7.3%)
Clearcut:	200 ac.
Partial Cut:	147.7 ac. (no more than 24% standing volume harvested)
• <b>Impacted Buffers (amount of acres of harvest within the buffers)<sup>1</sup></b>	
Within Clearcuts:	18.4 acres class 1
	9.1 acres class 2
Within Partial Cuts:	16.8 acres class 1
	7.8 acres class 2
• <b>Impacted stream miles (amount of miles within the impacted buffer zones)</b>	
Class 1:	1.40 miles
Class 2:	0.53 miles
• <b>Miles of Roads: 9.67 miles</b>	
Class 1 crossings:	1 (Hem Creek)
Class 2 crossings:	2
• <b>Harvest Years:</b>	1985-86, 1994
• <b>Road Construction:</b>	1982 (1930 for the 547 road)

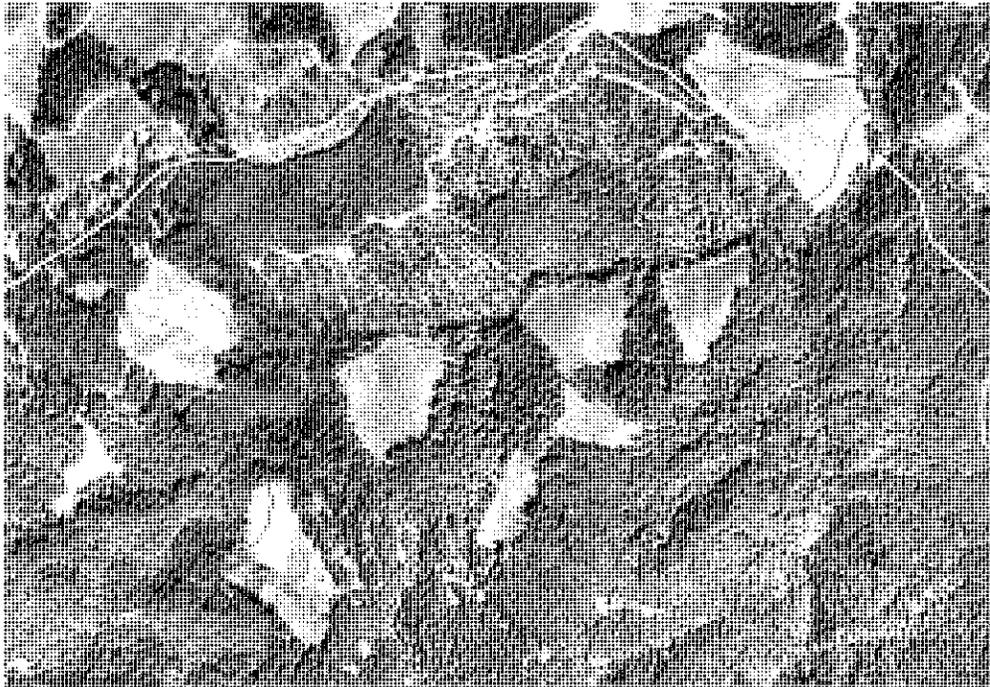
1 – No harvest occurred directly along the class 1 stream channels. Only within the 300 foot buffer

Enclosure 3: EPA Review of Idaho's Delisting Rationale for Hem Creek

**Figure 3.** 2004 Photograph of the Lower Hem Creek Watershed.  
[Red line represents a 300 foot buffer from the Hem Creek mainstem.]

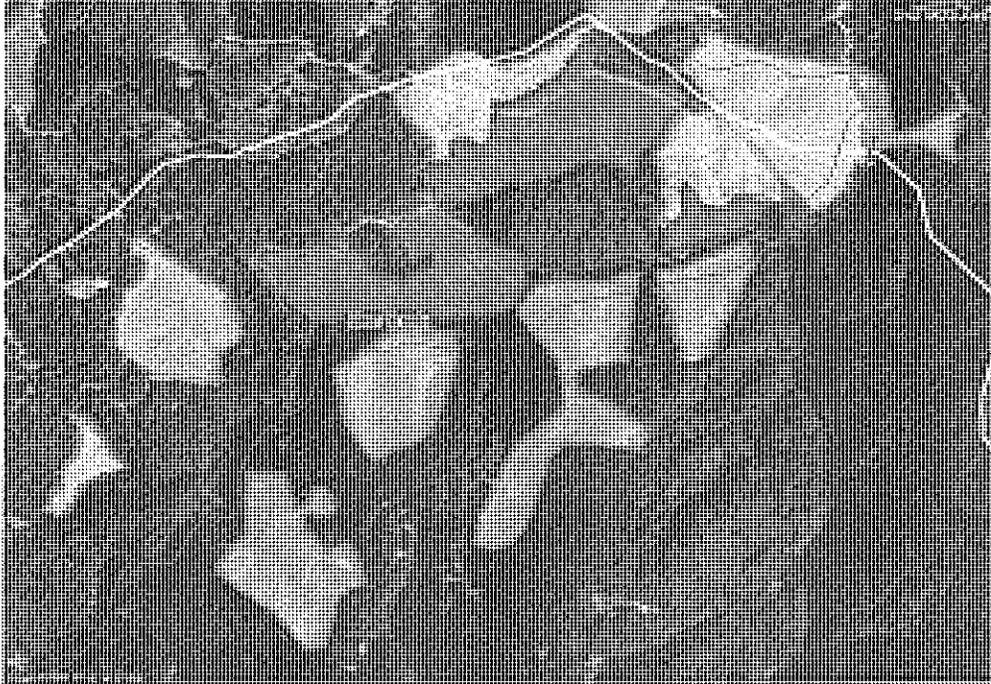


**Figure 4.** 1998 Photograph of the Lower Hem Creek Watershed.  
[Red line represents a 300 foot buffer from the Hem Creek mainstem.]

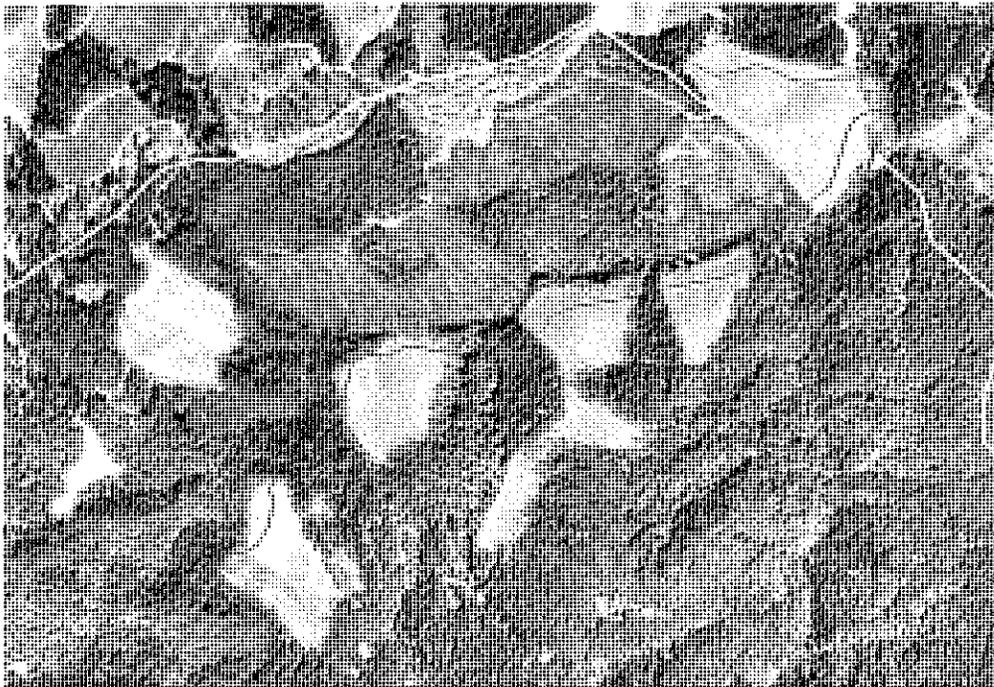


Enclosure 3: EPA Review of Idaho's Delisting Rationale for Hem Creek

**Figure 5.** Harvest areas the Lower Hem Creek Watershed – 2004 Image.  
[Purple polygons are thinning harvest areas and yellow polygons are clearcut harvest areas.]



**Figure 6.** Harvest areas the Lower Hem Creek Watershed – 1998 Image  
[Purple polygons are thinning harvest areas and yellow polygons are clearcut harvest areas.]

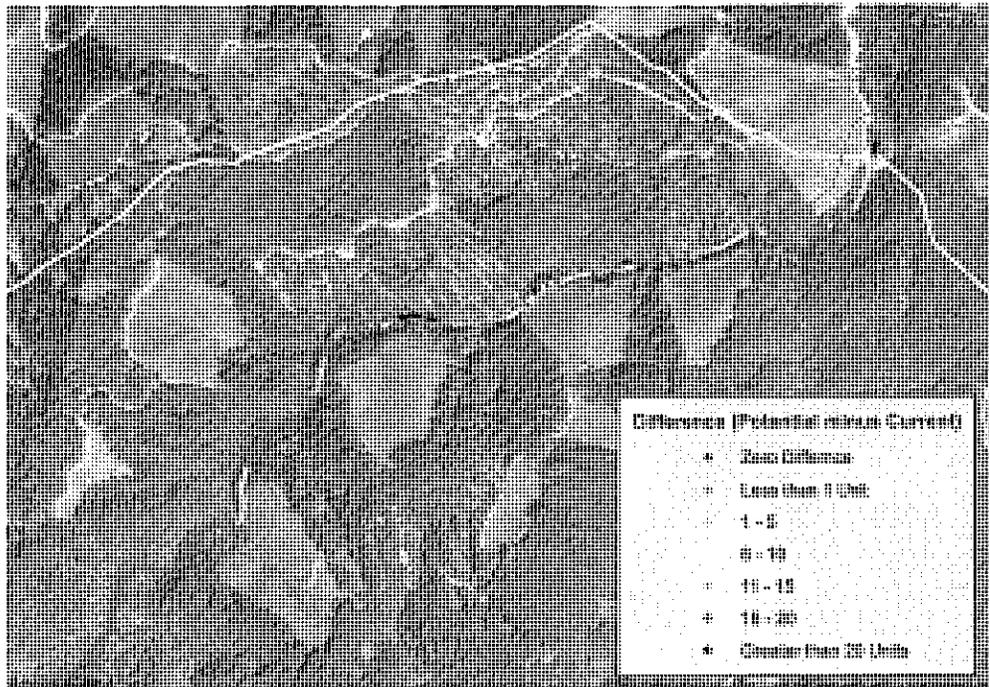


Enclosure 3: EPA Review of Idaho's Delisting Rationale for Hem Creek

Table 2. Model Description

- Models/Sampling Tools – Obtained “shade” model from Washington Department of Ecology webpage - [www.ecy.wa.gov/programs/eap/models.html](http://www.ecy.wa.gov/programs/eap/models.html). Obtained GIS sampling tool from Oregon Department of Environmental Quality webpage - [www.deq.state.or.us/wq/TMDLs/tools.htm](http://www.deq.state.or.us/wq/TMDLs/tools.htm).
- Input Data – High resolution stream layer (NHD), 10 m Digital Elevation Model, Harvest Area dataset (see Figures 5 and 6).
- Sampling and Analysis Methods – Assumptions (1) forest vegetation was 80 feet tall and 60% canopy cover, (2) thinning forest vegetation condition was 80 feet tall and 40% canopy cover, (3) clearcut areas were 5 feet tall and 80% canopy cover, and (4) stream channel was 30 feet wide. Ran the model for current conditions, and then ran the model for a “potential” vegetation conditions (i.e., change all vegetation to the “forest” condition which is presented above). **Figure 7** illustrates the product of potential model run results minus the current model run results. These results should not be viewed as absolute values, but rather as a relative risk of potential change in shade conditions along the mainstem Hem Creek. In other words, although there is uncertainty, these results indicate that several areas may have reduced shade levels.

Figure 7. Estimated Shade Reduction along Lower Hem Creek.  
[Red line represents a 300 foot buffer from the Hem Creek mainstem.]



## ATTACHMENT C

**SUBBASIN**  
**17060307 - Upper North**  
**Fork Clearwater**

### Assessment Unit Status Report 2002

**ASSESSMENT UNIT ID: ID17060307CL007\_02b**

**Segment Name: Hem Creek**

**Segment Type: River**

**Segment Size: 9.96 Miles**

Beneficial Uses	Status
Aquatic Life Use -- Cold	Fully
Aquatic Life Use --SS	Not supporting
Secondary Contact (Recr)	Fully
Agriculture	Not assessed
Industrial Water Supply	Not assessed
Wildlife Habitats	Not assessed
Aesthetics	Not assessed

**Assessment Date: 06/16/2002**

**Pollutants**

Thermal modifications

**Monitoring Methods**

BIOLOGICAL MONITORING

HABITAT ASSESSMENT

PATHOGEN MONITORING

Idaho WBAGII (January 2002) using BURP data

**Document Name**

UpNF SBA es  
 UNF TMDL Executive Summary  
 UNF CL TMDL

**Document File**

UperNFCWTMDLExecSum.doc  
 UNF CL TMDL ExecSum.doc  
 UNF temptmdl.doc

**Monitoring Sites 1993 - 2003**

SITE ID	Stream	Elevation (ft)	Latitude	Longitude
1997SLEWA028	Hem Creek	4042	46 31 26.48	-115 36 12.67
1998SLEWB026	Hem Creek	4075	46 31 24.09	-115 36 25.70

**Monitoring Results for Reporting Years 1997 - 2000**

SITEID	Stream	SMI	SMIScore	SFI	SFI Score
1997SLEWA028	Hem	79.92	3	82.66	3

Enclosure 3: EPA Review of Idaho's Delisting Rationale for Hem Creek

1998SLEWB026	Creek Hem 79.33 Creek	3	99.5	3
<b>SITEID</b>	<b>StreamSHI</b>	<b>SHIScore</b>	<b>SMIBioRegion</b>	
1997SLEWA028	Hem 77 Creek	3	No.Mtns.	
1998SLEWB026	Hem 74 Creek	3	No.Mtns.	
<b>SITEID</b>	<b>StreamSHIBioRegion</b>	<b>SFBioRegion</b>	<b>AVGScore</b>	
1997SLEWA028	Hem No.Mtns Creek	Forested	3	
1998SLEWB026	Hem No.Mtns Creek	Forested	3	

ASSESSMENT UNIT	CONDITION RATING	STATUS
ID17060307CL007_02b	3	PASS

**Assessment Comments**

Assessment is based on 97,98 burp data. AU within a roadless area, and is a federally protected bull trout watershed. USFS temp data indicate this AU does not meet the federal bull trout water temperature standard. E. coli results= 8/100 ml

**Segment Comments**

Hem Creek is on the 303(d) list.

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