



**Middle Snake River  
Water-Quality Monitoring  
Annual Report—  
Water Year 2013**

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Compliance Report

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# 1. INTRODUCTION

Idaho Power Company (IPC) evaluated 10-minute water temperature and dissolved oxygen (DO) data collected at the Shoshone Falls, Upper Salmon Falls, Lower Salmon Falls, and Bliss hydroelectric projects, collectively referred to as the Middle Snake River hydroelectric projects, as required by item 13(a)(ii) of the Consent Order dated May 22, 1998, between IPC and the Idaho Department of Environmental Quality (IDEQ) as modified on November 3, 2005, (Consent Order) and the Federal Energy Regulatory Commission (FERC) license requirements issued August 4, 2004. Analyses of these data support a conclusion that water temperature and DO levels in the Snake River are not solely unique to hydroelectric project operations but rather are a gage of overall Snake River water quality, including the hydroelectric projects (Hoelscher 2012). Further, continued water temperature and DO data collection as required by the Consent Order and the FERC licenses would provide little additional information, as data were collected across the recorded range of hydrologic conditions.

On January 21, 2013, IPC and the IDEQ agreed to modify the Consent Order, allowing monitoring to assess Snake River water-quality trends. On March 15, 2013, FERC issued an order modifying the licenses and water temperature and DO monitoring plans for the Middle Snake River hydroelectric projects to discontinue 10-minute water temperature and DO monitoring and implement a year-round water-quality trend monitoring program at 3 locations in the Snake River from Milner Dam to King Hill, Idaho, hereafter referred to as the Middle Snake River.

This report details the results of the water-quality trend monitoring for water year (WY) 2013. Quality assurance and quality control (QC) activities ensure water-quality data and information are of the type and quality commensurate for their intended use.

## 2. DATA COLLECTION AND VALIDATION

### 2.1. Data Collection

Data were collected according to methods described in the *Middle Snake River Water-Quality Trend Monitoring Plan* (Hoelscher 2013a) and the associated *Middle Snake River Water-Quality Trend Monitoring Quality Assurance Project Plan* (Hoelscher 2013b). Sampling was initiated on March 28, 2013, and data were collected every other week through September 30, 2013. Field measures and laboratory analytes were collected at 3 locations: from the left bank facing downstream below the Milner hydroelectric project's Main Powerhouse (Milner) at river mile (RM) 637; from the left bank facing downstream at the Clear Lakes Road Bridge near Buhl, Idaho, (Buhl) at RM 594.4; and from the center of the bridge at King Hill, Idaho, (King Hill) at RM 546 (Table 1). Each location is co-located with a stream gage (Figure 1). Table 2 lists the field measures and laboratory analytes sampled.

#### 2.1.1. Field Measures

Field measures were collected with a Hydrolab<sup>®</sup> minisonde, stored on a handheld Hydrolab<sup>®</sup> surveyor, and recorded on field data sheets. The instruments were calibrated according to

manufacturer's specification before each use. Turbidity was measured using a Hach® model 2100Q turbidimeter.

### **2.1.2. Laboratory Analytes**

Water samples for laboratory analysis were collected using a churn sample splitter for direct sample collection at Milner and Buhl and using a Rickly Hydrological® depth-integrated sampler to fill a churn sample splitter at King Hill. Samples were stored in 125-milliliter (ml) bottles for *Escherichia coli* (*E. coli*) bacteria analysis, 1-liter opaque bottles for chlorophyll-a and phaeophytin analysis, and 1-liter cubitainers for other nutrient analyses. The churn sample splitter, cubitainers, and opaque bottles were rinsed 3 times with sample water before a sample was collected. The 125-ml *E. coli* bacteria sample container was not rinsed because a small amount of sodium thiosulfate was placed in the container by the laboratory to ensure an accurate bacteria count. All sample containers were marked with the location, date, and time. The churn sample splitter was gently stirred so as to avoid aeration as the sample bottles were filled. Sample containers were placed in an ice chest with wet ice and delivered to the laboratory within 24 hours of collection. Chain of custody forms were filled out for each set of samples delivered. Laboratory analyses were performed by Analytical Laboratories, Inc. of Boise, Idaho, hereafter referred to as Analytical Laboratories. Table 3 identifies the laboratory-analysis methods and method detection levels.

### **2.1.3. Quality Assurance and QC**

Within 1 month of initiating monitoring, the data operation expert conducted a data quality assessment of the data-collection methods being implemented. No deviations from the standard operating procedures were noted. The data and information are of the type and quality commensurate for their intended use.

Spike and duplicate samples were collected at a frequency of at least 10% of the sampling events at each location. These events were randomly selected. A vial of spike solution containing ammonia, dissolved orthophosphate (OP), and dissolved organic carbon (DOC) provided by Analytical Laboratories was added to a triple-rinsed cubitainer containing 1,000 ml of sample water when collecting a spiked sample. Duplicate samples were collected similarly to the original sample.

## **2.2. Data Validation**

Data were reviewed using guidance curves when available. Guidance curves represent a field measure and laboratory analyte monthly mean and the dispersion of data based on 2 standard deviations, which is analogous to the 95% confidence interval. Data are considered valid if the data fall within the dispersion bands. Data outside the dispersion bands are reported to the data operation expert. Data were generally available at King Hill from 1991 through WY 2012. Other methods may be used to aid data validation.

The July 31, 2013, chlorophyll-a value of 86 micrograms per liter ( $\mu\text{g/L}$ ) recorded at King Hill substantially deviated from the guidance curves (Figure 2). The DO value of 12.73 milligrams per liter ( $\text{mg/L}$ ) recorded on the same date also deviated from the guidance curves (Figure 3).

Elevated DO levels would be expected due to the increased photosynthetic activities of the algal cells. Likewise, a slightly depressed OP value measured 2 weeks later (Figure 4) substantiated the increase in algae, as readily available nutrients are quickly used during algal blooms. It was concluded the high chlorophyll-a level was indicative of large amounts of algae that were using the OP and elevating the DO levels. Therefore, these field measure and laboratory analyte values were considered valid. A chlorophyll-a level of 74 µg/L recorded at Buhl on June 19, 2013, also appeared elevated given the values reported for the WY. IPC has not monitored at Buhl in over a decade; therefore, guidance curves do not exist to aid the interpretation of the data. However, a chlorophyll-a value of 81 µg/L was recorded at King Hill on the same date, which is within 2 standard deviations of the June monthly mean (Figure 2). The data operation owner determined the Buhl chlorophyll-a datum was valid.

Total organic carbon (TOC) levels measured at King Hill in WY 2013 were consistently less than the historic monthly mean and often more than 2 standard deviations from the mean (Figure 5). TOC has only been consistently measured since 2006. A lack of an adequate monthly sample size may have influenced the ability to appropriately establish representative data dispersions. In addition, the percent recovery of spiked water samples indicated a potential laboratory bias toward low values. This is further discussed in Section 3.1.3. Bias. The data operation owner determined these data were valid.

Other field measure and laboratory analyte results slightly deviated from the King Hill guidance curves. The data operation owner determined these deviations were not cause for concern, and these data too were considered valid.

### 3. RESULTS AND DISCUSSION

#### 3.1. Data-Quality Indicators

Data-quality indicators and criteria are outlined in the *Middle Snake River Water-Quality Trend Monitoring Quality Assurance Project Plan* (Hoelscher 2013b). IPC's data-quality objective is to ensure water-quality trend assessments are supported by water-quality data and information of the type and quality commensurate for their intended use. The implementation of and adherence to data-quality indicators and criteria ensures data-quality objectives are met. Data-quality indicators are elements of a quality assurance process and include QC activities to evaluate accuracy, precision, bias, representativeness, comparability, completeness, and sensitivity. The data-quality indicators and criteria apply to field measures and laboratory analytes collected by IPC. Flow is a non-direct measure, and the acceptance criteria are data published as provisional.

##### 3.1.1. Accuracy

###### 3.1.1.1. Instrument Calibration

The accuracy of water-quality field measures was primarily ensured by instrument maintenance and calibration following manufacturer's specifications and the use of calibration standards. Instrument maintenance and calibration procedures are outlined in IPC's *Standard Operating Procedures for Water Quality Data Collection* (IPC 2012). Temperature sensors are calibrated by the manufacturer, but IPC verified sensor accuracy with comparisons to a National Institute of

Standards and Technology (NIST) thermometer in both an ice bath and at room temperature. The sensor used to collect field measures had a variance of 0.05 degrees Celsius (°C) and 0.02°C from the NIST thermometer in an ice bath and at room temperature, respectively. This is well within the manufacturer's stated accuracy of ±0.1°C (Hach 2013). The calibration history was documented in a calibration log.

### 3.1.1.2. Spiked Samples

Spiked samples were used as a measure of the accuracy of the data-collection and laboratory-analysis processes. Bauer (1986) defines percent recovery as the ratio of the spike recovery to the spike true value expressed as a percentage. The percent recovery was calculated using the following equation:

$$\text{Percent Recovery} = (\text{Spike Recovery}/\text{Spike True Value}) \times 100.$$

The spike recovery was calculated by subtracting the non-spiked value from the spiked value reported by the laboratory to eliminate background analyte levels. If the non-spiked sample laboratory-reported value was below the method detection level, that analyte was not used in estimating the percent recovery.

Data to calculate accuracy is provided in tables 4 through 6. Figure 6 illustrates a plot of percent recovery values compared to an ideal value of 100%. Bauer (1986) gives a general narrative description, saying that “problems occur” when percent recovery results vary more than ±20% from the goal of 100% recovery. Analytical Laboratories considers a variation of ±10 to 30% acceptable depending on the analyte and testing method (J. Hibbs, Analytical Laboratories, pers. comm.).

Although the sample size is limited, results show acceptable spike recovery for ammonia, total Kjeldahl nitrogen, TOC, and DOC. Nitrate, total phosphorus (TP), and OP percent recovery were acceptable in most cases. Poor results were obtained for nitrate at King Hill on June 19, 2013, TP at King Hill and Milner on May 9, 2013, and OP at King Hill on June 19, 2013 (Figure 6). Analytical Laboratories conducted laboratory QC. The laboratory percent recovery for TP corresponding with samples collected on May 9, 2013, was 112%. The laboratory percent recovery for nitrate and OP corresponding with samples collected on June 19, 2013, was 112% and 99%, respectively. When Bauer (1986) encountered repeated poor results for fluoride, he stated that an adjustment in data-collection and laboratory-analysis methods be considered. IPC believes only 2 QC activities are insufficient to support a decision to change any sampling or testing methods. The data operation expert will evaluate data-collection methods during the WY 2014 data-quality assessment, and the data operation owner will more timely evaluate QC data. Continued poor QC results may result in further evaluation of sample collection and laboratory analysis. The data operation owner considers all data valid and of the type and quality commensurate for their intended use.

### 3.1.2. Precision

Duplicate samples were used as a measure of precision of the data-collection and laboratory-analysis processes. Bauer (1986) defines the relative range as a measure of dispersion

expressed as a percentage of the mean value. The relative range was calculated using the following equation:

$$\text{Relative Range} = (|\text{Laboratory Analyte Result} - \text{Duplicate Result}| / \text{Mean}) \times 100.$$

Data to calculate the relative range are provided in tables 7 through 9. If the laboratory-reported value for either analyte sample was below the method detection level, that analyte was not used in estimating the relative range. Figure 7 illustrates a plot of relative range values compared to an ideal value of zero. Bauer (1986) gives a general narrative description that categorized results as “good to excellent” if they varied less than 20% of the goal of zero relative range. Analytical Laboratories also considered variation less than 20% as acceptable with caveats depending on how far the reported values are from the method detection level (J. Hibbs, Analytical Laboratories, pers. comm.).

The relative range values were acceptable for most laboratory analytes. Poor results were obtained for nitrate at King Hill on June 19, 2013, ammonia at Milner on May 9, 2013, and *E. coli* bacteria samples. The nitrate value also presented challenges during spike-recovery QC activities (see Section 3.1.1.2. Spiked Samples). The single value of 40% for ammonia can be explained by the very low levels detected. The ammonia method detection level is 0.01 mg/L (Table 3). The reported values for the sample and duplicate were 0.03 mg/L and 0.02 mg/L, respectively (Table 9). Analytical Laboratories considers data valid, regardless of the percent relative range, if the reported values are within 5 times the method detection level (J. Hibbs, Analytical Laboratories, pers. comm.). Therefore, ammonia data are considered valid. Both total suspended solids (TSS) and volatile suspended solids (VSS) showed more variation, with a range of 0 to 20% and 0 to 25%, respectively (Figure 7). Concentrations, however, were within 5 times the method detection level. Bauer (1986) states that a variation in suspended solid levels can be a result of inadequate sample splitting. Although a churn sample splitter was used when collecting samples, discussions with Analytical Laboratories suggested the initial sample volume collected in the churn sample splitter be increased before the samples are split to ensure adequate mixing (J. Hibbs, Analytical Laboratories, pers. comm.). This suggestion will be incorporated in future sampling. Data indicate poor precision of *E. coli* bacteria samples even though the hold time did not exceed 30 hours. This is substantiated by the high variability observed in *E. coli* bacteria concentrations. Idaho’s *Water Quality Standards and Wastewater Treatment Requirements* require additional sampling if a single sample value is exceeded (IDAPA 58.01.02. n.d.). The *Middle Snake River Water-Quality Trend Monitoring Plan* (Hoelscher 2013a) states additional samples would not be collected if the single sample exceeded the maximum set for the protection of recreation use designations. The data operation owner considers all data valid and of the type and quality commensurate for their intended use. *E. coli* bacteria data should be interpreted with caution.

### **3.1.3. Bias**

Bias of field measures was minimized by calibrating instrumentation prior to use and by frequently inspecting instruments for sensor fouling or malfunction. Calibration history was documented in a calibration log.

Spike recovery was used to investigate whether bias of laboratory analytes occurred. All percent recovery results for TOC and, particularly DOC, were less than 100% (tables 4 through 6) while precision was less than 20% (tables 7 through 9). The results indicate the potential for a negative bias. Analytical Laboratories occasionally reported percent recovery values greater than 100%. These QC data are contradictory and any action would be premature at this time. IPC will continue to evaluate TOC QC data and may initiate an evaluation of data-collection or laboratory-analysis processes if warranted.

### **3.1.4. Representativeness**

Representativeness was assured by sampling every 2 weeks throughout the WY at all 3 locations. This sampling method accounted for any effects of seasonal variations by factors such as flow, climate, and water use. More detail on the project design is available in the *Middle Snake River Water-Quality Trend Monitoring Plan* (Hoelscher 2013a).

Some questions arose regarding the QC values at King Hill. IPC strives to ensure representative data by selecting well-mixed sampling locations or by using depth-integrated sampling procedures. IPC used depth-integrated sampling procedures at King Hill. IPC will increase the initial sample volume collected in the churn sample splitter before the samples are split to ensure adequate mixing (see Section 3.1.2. Precision.).

### **3.1.5. Comparability**

Standard methods and locations of data collection enabled IPC to compare WY 2013 data to data from other locations and from past years. Reporting water-quality data in commonly used units enabled comparisons to the State of Idaho standards and Upper Snake–Rock total maximum daily load (TMDL) targets. Additionally, these data are in a format to compliment other water-quality and conservation monitoring efforts in the watershed.

### **3.1.6. Completeness**

Nearly all data were collected during WY 2013. The data operation owner evaluated hydrogen ion (pH) data collected on September 25, 2013, and determined these data invalid. These data were reported to the data operation expert. Testing and maintenance of the pH sensor corrected the problem.

### **3.1.7. Sensitivity**

Instruments used to collect field measures had manufacturer-stated accuracy levels similar to laboratory-analysis methods. Laboratory analyte method detection levels are shown in Table 3. Laboratory results below method detection levels were recorded as one-half the method detection level. These values were used to calculate daily loads but were not used in calculations of accuracy or precision in spiked or duplicate sample analysis.

## 3.2. Comparison to Criteria, TMDL Targets, and Reporting Levels

Water-quality field measure and laboratory analyte results (appendices 1 through 6) were compared to applicable cold-water aquatic life water-quality criteria and Upper Snake–Rock TMDL targets or the most current reporting level (Table 10). Idaho’s *Water Quality Standards and Wastewater Treatment Requirements* states ammonia criteria based on pH values determined using the criterion maximum concentration calculation (IDAPA 58.01.02. n.d.). Calculated ammonia criteria ranged from 0.80 to 3.67 mg/L using the highest and lowest pH values measured at all 3 locations.

### 3.2.1. Field-Measure Exceedences

Measures of DO at all 3 locations were never less than the instantaneous minimum criterion of 6 mg/L (Figure 8). Idaho’s *Water Quality Standards and Wastewater Treatment Requirements* state turbidity may not exceed background by more than 50 nephelometric turbidity units (NTU). While a measure of background was unavailable, no turbidity measure at any of the 3 locations exceeded 50 NTU (Figure 9); therefore, turbidity did not exceed criterion. A single exceedence of the upper pH criterion of 9 standard units was recorded at Milner when 9.06 was measured on April 25, 2013 (Figure 10). Water temperature was above the daily maximum criterion of 22°C at Milner on 5 sampling dates (Figure 11).

The IDEQ has a policy to evaluate numeric criteria that establishes a threshold up to and including 10% exceedence in which there is discretion in determining water-quality impairment and, therefore, biological effects (Grafe et al. 2002). The single minor exceedence of the pH criteria at Milner is less than 10% and, therefore, does not warrant further consideration. Essig (2002) further clarified procedures for calculating the frequency of measures greater than temperature criteria and identified June 21 through September 21 as the period of interest to evaluate cold-water aquatic life criteria. Nearly all (83%) of the temperature measures at Milner during this period exceeded the instantaneous maximum criterion. The Milner sampling location is immediately downstream of Milner Reservoir, which is designated for the protection of warm-water aquatic life (IDAPA 58.01.02. n.d.). The applicable instantaneous maximum temperature criterion for this beneficial use is 33°C.

The State of Idaho established a minimum flow of 0 cubic feet per second (cfs) at Milner Dam. There was no flow at Milner on 4 of the 5 sampling dates when temperature exceeded the criterion (Figure 12). The lack of flow may have affected field measures. Article 404 of the Milner hydroelectric project license requires IPC to use its right to 45,000 acre-feet of water storage upstream of the project to pass about 1,500 cfs of water through the project for about 14 days after the United States Bureau of Reclamation stops providing flow augmentation but before August 31 each year. The specific dates of water releases were July 22, 2013, through August 9, 2013. Water temperature decreased on July 31, 2013, during IPC’s release (Figure 11). Hoelscher (2012) evaluated water temperatures collected at the Middle Snake River hydroelectric projects from 1997 through 2011. He reported that the large volume of cooler water discharging from the Thousand Springs, an area of dispersed springs entering the Snake River downstream of the Shoshone Falls hydroelectric project, likely moderated water

temperatures. This is evident at Buhl and King Hill, as summer temperatures are lower and winter temperatures are warmer than at Milner (Figure 11).

### 3.2.2. Laboratory Analyte Exceedences

All ammonia levels were below the calculated criterion maximum concentration range. Additionally, there was no exceedence of the Upper Snake–Rock TMDL target level of 52 mg/L for TSS (Figure 13). A single *E. coli* bacteria value of 2,000 organisms per 100 ml was recorded at King Hill on September 25, 2013 (Figure 14). All other values were less than the instantaneous maximum of 406 organisms per 100 ml. The frequency of this single exceedence was less than 10% and does not warrant further consideration. Hoelscher (2013a) stated additional samples would not be collected if the single sample exceeded the maximum set for the protection of recreation use designations.

The Upper Snake–Rock TMDL established an annual mean TP target of 0.075 mg/L. Instantaneous TP levels exceeded the Upper Snake–Rock TMDL target at times at all locations (Figure 15), but the mean TP levels for the sampling period (March 28–September 25) were below the 0.075 mg/L target at all 3 locations: 0.064 mg/L at King Hill, 0.074 mg/L near Buhl, and 0.067 mg/L at Milner. Monitoring in WY 2013 indicated TP levels in the Middle Snake River may be approaching the target established by the Upper Snake–Rock TMDL. However, data and information collected as part of the Middle Snake River trend monitoring program do not allow a conclusion as to whether the reduced levels of TP resulted in reduced nuisance aquatic macrophytes, which is the anticipated response. IPC removes aquatic macrophytes that collect on the trash rakes at hydroelectric projects in the Middle Snake River as required by FERC license articles. A Mann–Kendall trend test with a 5% significance level indicated the number of truckloads collected at the Upper Salmon Falls “B” hydroelectric project, which is an index of aquatic macrophyte biomass, has been increasing annually (Figure 16).

The dissolved fraction of TP is an operational classification based on filtering the water sample through a 0.45-micrometer filter. Particulate phosphorus can be estimated by subtracting the OP concentration from the TP concentration and is analogous to phosphorus adsorbed to solids and in algae cells. Most of the TP is particulate (Figure 17). However, a higher percentage of OP is generally observed at Buhl, with OP comprising nearly the entire sample (94%) on May 23, 2013. Similarly, inorganic suspended solids can be estimated by subtracting VSS concentrations from TSS concentrations. About one-half of the TSS is inorganic solids (Figure 18). A majority of the phosphorus is likely adsorbed to inorganic suspended solids (e.g., silt). This is further supported by a review of the TOC data. Particulate organic carbon can be estimated by subtracting DOC concentrations from TOC concentrations. Most of the TOC is dissolved (Figure 19).

### 3.3. Loads

Daily mean flow and calculated daily loads are reported in appendices 7 through 9. All flow data are considered provisional. Daily loads in kilograms per day were calculated for laboratory analytes (except phaeophytin and *E. coli* bacteria) based on linear interpolation of the reported

values. One-half the method detection level was used for values reported less than the method detection level. Multiply kilograms per day by 2.2046 to get daily loads in pounds per day.

## 4. ACKNOWLEDGMENTS

We would like to thank Andy Knight for his help collecting data and for his review.

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## 6. CONSULTATION

Article 404 of the Shoshone Falls and Upper Salmon Falls hydroelectric project licenses and Article 405 of the Lower Salmon Falls and Bliss hydroelectric project licenses require IPC submit to the IDEQ, the Idaho Department of Fish and Game, the U.S. Fish and Wildlife Service,

and the National Oceanic and Atmospheric Administration Fisheries Service monitoring results by January 15 for the preceding water year. IPC will consult with the designated resource agencies for a minimum of 30 days. A draft annual water-quality monitoring report was e-filed with the designated resource agencies on January 15, 2013 (Appendix 10). IPC received comments for 30 days ending February 14, 2013. IPC received responses from both Idaho Department of Fish and game (Appendix 11) and IDEQ (Appendix 12). Neither had comments.

**Table 1**

Snake River water-quality trend monitoring locations and U.S. Geological Survey (USGS) flow gages at King Hill, near Buhl, and at Milner, Idaho. Monitoring locations are given in Universal Transverse Mercator East (UTMx) and North (UTMy) coordinates.

Location	River Mile	Sampling Method	UTMx	UTMy	USGS Flow Gage Number
Snake River at King Hill	546.0	depth integrated from center of bridge	1718285.1430	693053.1227	13154500
Snake River near Buhl	594.4	left bank surface grab	1839264.3560	573310.8981	13094000
Snake River at Milner <sup>1</sup>	637.0	left bank surface grab	2034334.6439	523639.0940	13087995

<sup>1</sup> Idaho Power adds the Milner hydroelectric project's Main Powerhouse hydraulic capacity to the USGS gage at Milner to estimate combined flow in the Snake River at Milner, Idaho.

**Table 2**

List of field measures and laboratory analytes measured every other week in the Snake River at King Hill, near Buhl, and at Milner, Idaho

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**Measures and Analytes**


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water temperature  
dissolved oxygen  
specific conductance  
hydrogen ion concentration  
turbidity  
nitrate  
ammonia  
total Kjeldahl nitrogen  
total phosphorus  
dissolved orthophosphate  
suspended solids  
volatile suspended solids  
total organic carbon  
dissolved total organic carbon  
chlorophyll-a  
phaeophytin  
*Escherichia coli* bacteria

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**Table 3**

List of laboratory analytes, analytical method, and method detection level in milligrams per liter or parts per million; the chlorophyll-a and phaeophytin method detection level is reported as micrograms per liter or parts per billion, and the bacteria method detection level is reported as organisms per 100 milliliters

Laboratory Analyte	Analytical Method	Method Detection Level
ammonia	EPA 350.1	0.01
nitrate	EPA 300.0	0.10
total Kjeldahl nitrogen	EPA 351.2	0.10
total phosphorus	ASTM D515-82A	0.005
dissolved orthophosphate	ASTM D515-88A	0.005
total suspended solids	EPA 160.2	1.0
volatile suspended solids	SM 2540G	1.0
total organic carbon	EPA 415.1	1.0
dissolved total organic carbon	EPA 415.1	1.0
chlorophyll-a	SM 10200H	0.1
phaeophytin	SM 10200H	0.1
<i>Escherichia coli</i> bacteria	SM 9223	1

**Table 4**

Ammonia, nitrate, total Kjeldahl nitrogen (TKN), total phosphorus (TP), dissolved orthophosphate (OP), total organic carbon (TOC), and dissolved organic carbon (DOC) laboratory-analysis results in milligrams per liter and the percent recovery for spiked water samples for water year 2013 at King Hill, Idaho

Analyte	Date	Spiked Value	Non-Spiked Value <sup>1</sup>	True Spike Value	Percent Recovery
Ammonia	5/9/2013	1.01	0.02	1	99
Ammonia	6/19/2013	1.01	<b>0.005</b>	1	
Nitrate	5/9/2013	1.8	1.1	1	70
Nitrate	6/19/2013	2.6	0.8	1	180
TKN	5/9/2013	1.45	0.43	1	102
TKN	6/19/2013	1.64	0.59	1	105
TP	5/9/2013	0.168	0.109	0.1	59
TP	6/19/2013	0.177	0.059	0.1	118
OP	5/9/2013	0.111	0.015	0.1	96
OP	6/19/2013	0.020	0.006	0.1	14
TOC	5/9/2013	11	1.47	10	95
TOC	6/19/2013	10.7	1.31	10	94
DOC	5/9/2013	8.45	1.16	10	73
DOC	6/19/2013	8.73	1.50	10	72

<sup>1</sup> Bold values indicate results below the method detection level, and one-half the method detection level of the test is reported. Less than method detection level results were not used to calculate the percent recovery.

**Table 5**

Ammonia, nitrate, total Kjeldahl nitrogen (TKN), total phosphorus (TP), dissolved orthophosphate (OP), total organic carbon (TOC), and dissolved organic carbon (DOC) laboratory-analysis results in milligrams per liter and the percent recovery for spiked water samples for water year 2013 near Buhl, Idaho

Analyte	Date	Spiked Value	Non-Spiked Value <sup>1</sup>	True Spike Value	Percent Recovery
Ammonia	6/6/2013	0.93	<b>0.005</b>	1	
Ammonia	7/31/2013	0.90	0.01	1	89
Nitrate	6/6/2013	2.7	1.6	1	110
Nitrate	7/31/2013	2.1	1.2	1	90
TKN	6/6/2013	1.46	0.49	1	97
TKN	7/31/2013	1.51	0.50	1	101
TP	6/6/2013	0.191	0.080	0.1	111
TP	7/31/2013	0.162	0.054	0.1	108
OP	6/6/2013	0.137	0.033	0.1	104
OP	7/31/2013	0.108	0.013	0.1	95
TOC	6/6/2013	10.7	1.88	10	88
TOC	7/31/2013	11.54	2.24	10	93
DOC	6/6/2013	10.8	1.83	10	90
DOC	7/31/2013	9.28	1.86	10	74

<sup>1</sup> Bold values indicate results below the method detection level, and one-half the method detection level of the test is reported. Less than method detection level results were not used to calculate the percent recovery.

**Table 6**

Ammonia, nitrate, total Kjeldahl nitrogen (TKN), total phosphorus (TP), dissolved orthophosphate (OP), total organic carbon (TOC), and dissolved organic carbon (DOC) laboratory-analysis results in milligrams per liter and the percent recovery for spiked water samples for water year 2013 near Milner, Idaho

Analyte	Date	Spiked Value	Non-Spiked Value <sup>1</sup>	True Spike Value	Percent Recovery
Ammonia	5/9/2013	1.00	0.03	1	97
Ammonia	8/28/2013	0.88	<b>0.005</b>	1	
Nitrate	5/9/2013	1.2	<b>0.1</b>	1	
Nitrate	8/28/2013	1.0	<b>0.1</b>	1	
TKN	5/9/2013	1.75	0.63	1	112
TKN	8/28/2013	1.66	0.75	1	91
TP	5/9/2013	0.144	0.093	0.1	51
TP	8/28/2013	0.191	0.099	0.1	92
OP	5/9/2013	0.054	<b>0.0025</b>	0.1	
OP	8/28/2013	0.112	0.014	0.1	98
TOC	5/9/2013	11.57	2.14	10	94
TOC	8/28/2013	11.93	2.89	10	90
DOC	5/9/2013	9.45	1.85	10	76
DOC	8/28/2013	10.22	2.24	10	80

<sup>1</sup> Bold values indicate results below the method detection level, and one-half the method detection level of the test is reported. Less than method detection level results were not used to calculate the percent recovery.

**Table 7**

Ammonia, nitrate, total Kjeldahl nitrogen (TKN), total phosphorus (TP), dissolved orthophosphate (OP), total organic carbon (TOC), dissolved organic carbon (DOC), total suspended solids (TSS), and volatile suspended solids (VSS) concentrations in milligrams per liter; chlorophyll-a concentrations in micrograms per liter; and *Escherichia coli* (*E. coli*) bacteria in organisms per 100 milliliters laboratory-analysis results; and the percent relative range for water year 2013 at King Hill, Idaho

Analyte	Date	First Value <sup>1</sup>	Duplicate Value <sup>1</sup>	Mean	Relative Range
Ammonia	5/9/2013	0.02	0.02	0.02	0
Ammonia	6/19/2013	<b>0.005</b>	<b>0.005</b>		
Nitrate	5/9/2013	1.1	1.2	1.15	9
Nitrate	6/19/2013	0.8	1.3	1.05	48
TKN	5/9/2013	0.43	0.41	0.42	5
TKN	6/19/2013	0.59	0.57	0.58	3
TP	5/9/2013	0.109	0.098	0.1035	11
TP	6/19/2013	0.059	0.066	0.0625	11
OP	5/9/2013	0.015	0.015	0.015	0
OP	6/19/2013	0.006	0.005	0.0055	18
TOC	5/9/2013	1.47	1.42	1.445	3
TOC	6/19/2013	1.31	1.36	1.335	4
DOC	5/9/2013	1.16	1.26	1.21	8
DOC	6/19/2013	1.50	1.41	1.455	6
TSS	5/9/2013	11	9	10	20
TSS	6/19/2013	17	18	17.5	6
VSS	5/9/2013	7	6	6.5	15
VSS	6/19/2013	10	9	9.5	11
Chlorophyll-a	5/9/2013	19	20	19.5	5
Chlorophyll-a	6/19/2013	81	79	80	3
<i>E. coli</i>	5/9/2013	1	<b>NA</b>		
<i>E. coli</i>	6/19/2013	4	<b>NA</b>		

<sup>1</sup> Bold values indicate results below the method detection level, and one-half the method detection level of the test is reported. Less than method detection level results were not used to calculate the percent recovery.

**Table 8**

Ammonia, nitrate, total Kjeldahl nitrogen (TKN), total phosphorus (TP), dissolved orthophosphate (OP), total organic carbon (TOC), dissolved organic carbon (DOC), total suspended solids (TSS), and volatile suspended solids (VSS) concentrations in milligrams per liter; chlorophyll-a concentrations in micrograms per liter; and *Escherichia coli* (*E. coli*) bacteria in organisms per 100 milliliters laboratory-analysis results; and the percent relative range for water year 2013 near Buhl, Idaho

Analyte	Date	First Value <sup>1</sup>	Duplicate Value <sup>1</sup>	Mean	Relative Range
Ammonia	6/6/2013	<b>0.005</b>	<b>0.005</b>		
Ammonia	7/31/2013	0.01	0.01	0.01	0
Nitrate	6/6/2013	1.6	1.5	1.55	6
Nitrate	7/31/2013	1.2	1.2	1.2	0
TKN	6/6/2013	0.49	0.45	0.47	9
TKN	7/31/2013	0.50	0.47	0.485	6
TP	6/6/2013	0.080	0.080	0.08	0
TP	7/31/2013	0.054	0.058	0.056	7
OP	6/6/2013	0.033	0.032	0.033	3
OP	7/31/2013	0.013	0.012	0.013	8
TOC	6/6/2013	1.88	1.88	1.88	0
TOC	7/31/2013	2.24	2.25	2.245	0
DOC	6/6/2013	1.83	1.84	1.835	1
DOC	7/31/2013	1.86	1.95	1.905	5
TSS	6/6/2013	11	13	12	17
TSS	7/31/2013	26	26	26	0
VSS	6/6/2013	7	9	8	25
VSS	7/31/2013	9	11	10	20
Chlorophyll-a	6/6/2013	17	15	16	13
Chlorophyll-a	7/31/2013	40	37	38.5	8
<i>E. coli</i>	6/6/2013	12	<b>NA</b>		
<i>E. coli</i>	7/31/2013	42	33	37.5	24

<sup>1</sup> Bold values indicate results below the method detection level, and one-half the method detection level of the test is reported. Less than method detection level results were not used to calculate the percent recovery.

**Table 9**

Ammonia, nitrate, total Kjeldahl nitrogen (TKN), total phosphorus (TP), dissolved orthophosphate (OP), total organic carbon (TOC), dissolved organic carbon (DOC), total suspended solids (TSS), and volatile suspended solids (VSS) concentrations in milligrams per liter; chlorophyll-a concentrations in micrograms per liter; and *Escherichia coli* (*E. coli*) bacteria in organisms per 100 milliliters laboratory-analysis results; and the percent relative range for water year 2013 at Milner, Idaho

Analyte	Date	First Value <sup>1</sup>	Duplicate Value <sup>1</sup>	Mean	Relative Range
Ammonia	5/9/2013	0.03	0.02	0.025	40
Ammonia	8/28/2013	<b>0.005</b>	<b>0.005</b>	<b>0.005</b>	
Nitrate	5/9/2013	<b>0.1</b>	<b>0.1</b>	<b>0.1</b>	
Nitrate	8/28/2013	<b>0.1</b>	<b>0.1</b>	<b>0.1</b>	
TKN	5/9/2013	0.63	0.65	0.64	3
TKN	8/28/2013	0.75	0.70	0.725	7
TP	5/9/2013	0.093	0.074	0.0835	23
TP	8/28/2013	0.099	0.083	0.091	18
OP	5/9/2013	<b>0.0025</b>	0.007		
OP	8/28/2013	0.014	0.015	0.0145	7
TOC	5/9/2013	2.14	2.08	2.11	3
TOC	8/28/2013	2.89	2.99	2.94	3
DOC	5/9/2013	1.85	1.87	1.86	1
DOC	8/28/2013	2.24	2.23	2.235	0
TSS	5/9/2013	22	26	24	17
TSS	8/28/2013	12	12	12	0
VSS	5/9/2013	14	15	14.5	7
VSS	8/28/2013	6	6	6	0
Chlorophyll-a	5/9/2013	43	38	40.5	12
Chlorophyll-a	8/28/2013	36	35	35.5	3
<i>E. coli</i>	5/9/2013	1	<b>NA</b>		
<i>E. coli</i>	8/28/2013	8	11	9.5	32

<sup>1</sup> Bold values indicate results below the method detection level, and one-half the method detection level of the test is reported. Less than method detection level results were not used to calculate the percent recovery.

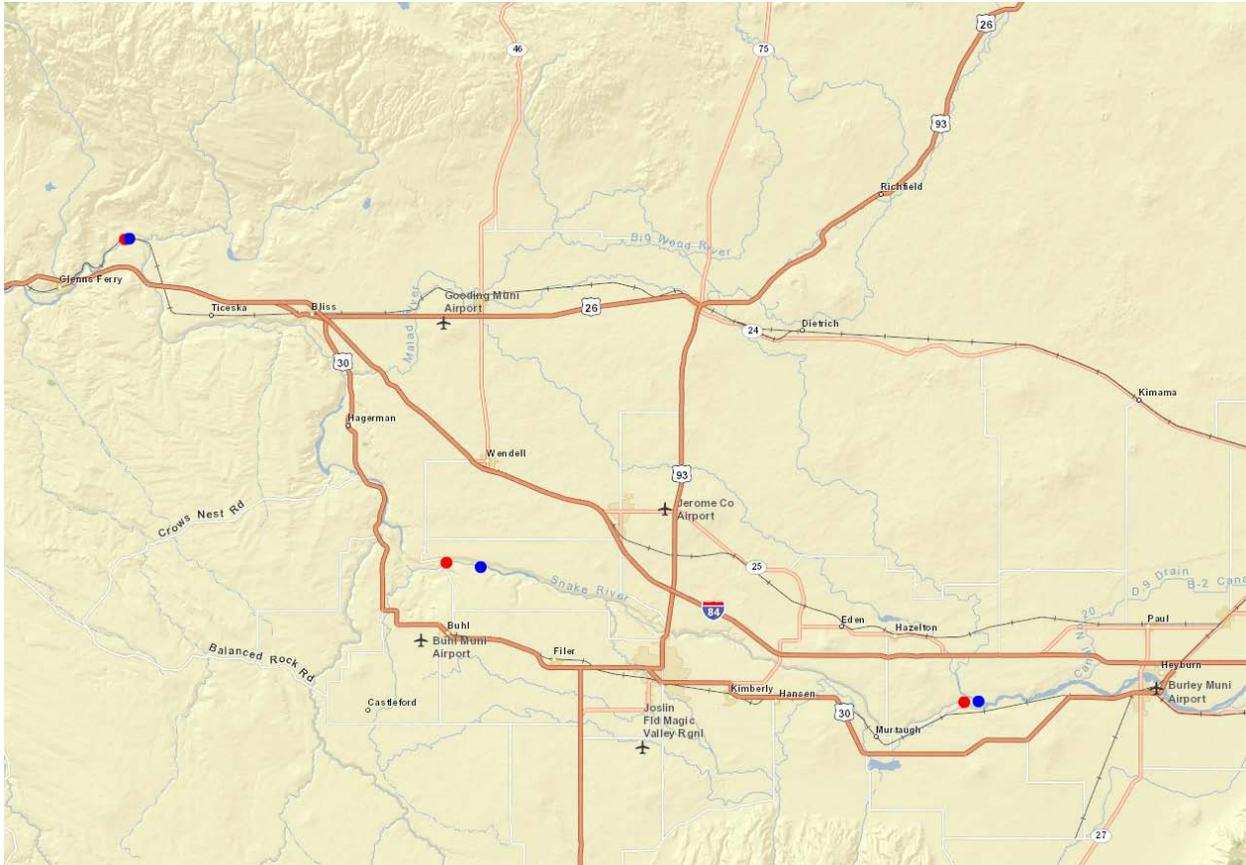
**Table 10**

Field-measure and laboratory analyte instantaneous reporting levels for the protection of cold-water aquatic life and primary contact recreation

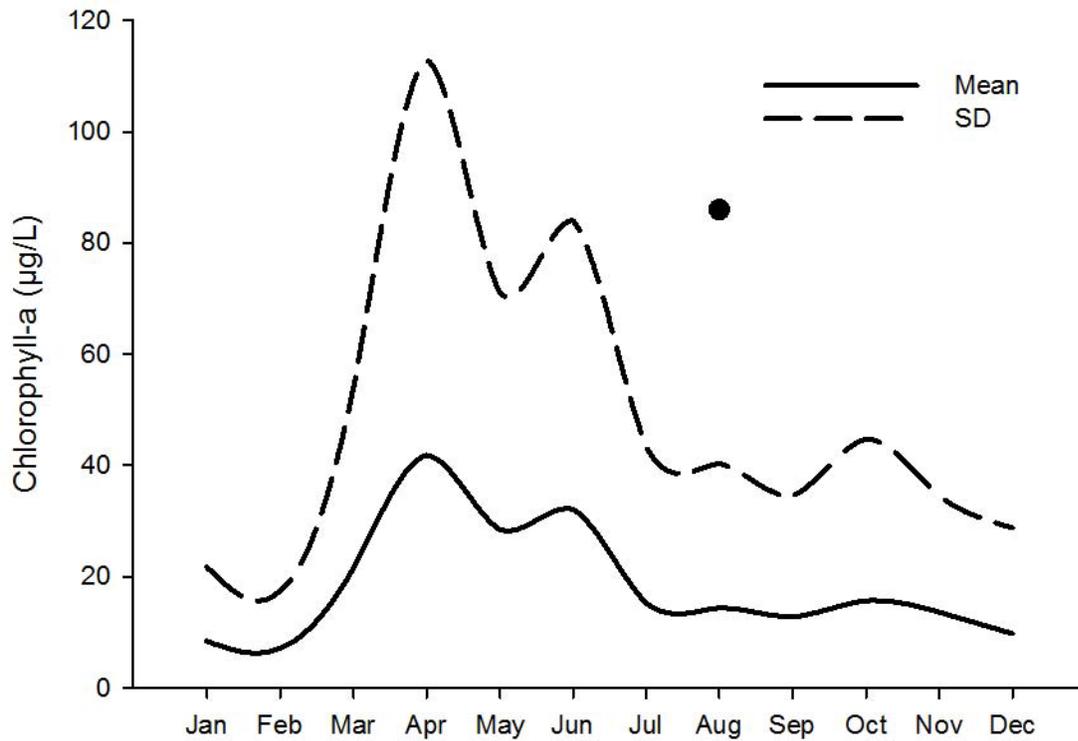
Measure or Analyte	Reporting Level
water temperature	22°Celsius <sup>1</sup>
dissolved oxygen	6 milligram per liter <sup>1</sup>
specific conductance	NA
hydrogen ion concentration (pH)	6.5–9.0 units <sup>1</sup>
turbidity	50 NTU from background <sup>1</sup>
ammonia	criteria are temperature and pH dependent <sup>1</sup>
nitrate	NA
total Kjeldahl nitrogen	NA
total phosphorus	0.075 milligram per liter <sup>2</sup>
dissolved orthophosphate	NA
total suspended solids	52 milligram per liter <sup>2</sup>
volatile suspended solids	NA
total organic carbon	NA
dissolved total organic carbon	NA
chlorophyll-a	NA
phaeophytin	NA
<i>Escherichia coli</i>	406 organisms per 100 milliliter <sup>1</sup>

<sup>1</sup> Idaho Water Quality Standards and Wastewater Treatment Requirements

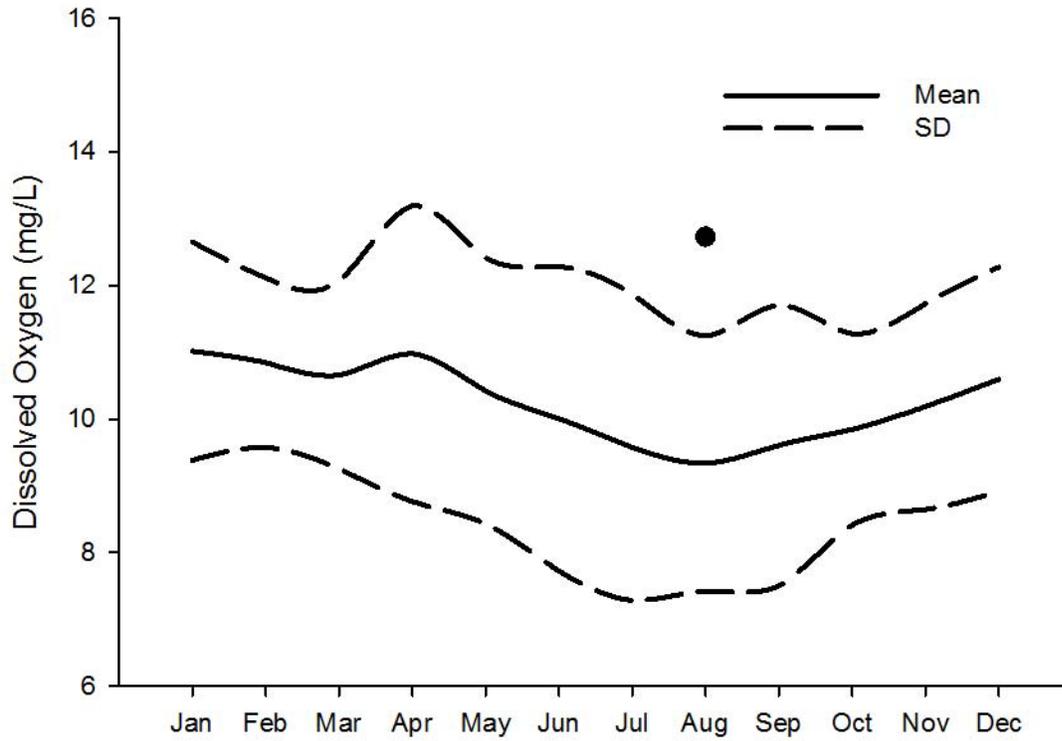
<sup>2</sup> Upper Snake–Rock Total Maximum Daily Load targets



**Figure 1**  
Water-quality trend monitoring locations (red dots) and stream gages (blue dots) in the Snake River from Milner Dam to King Hill, Idaho

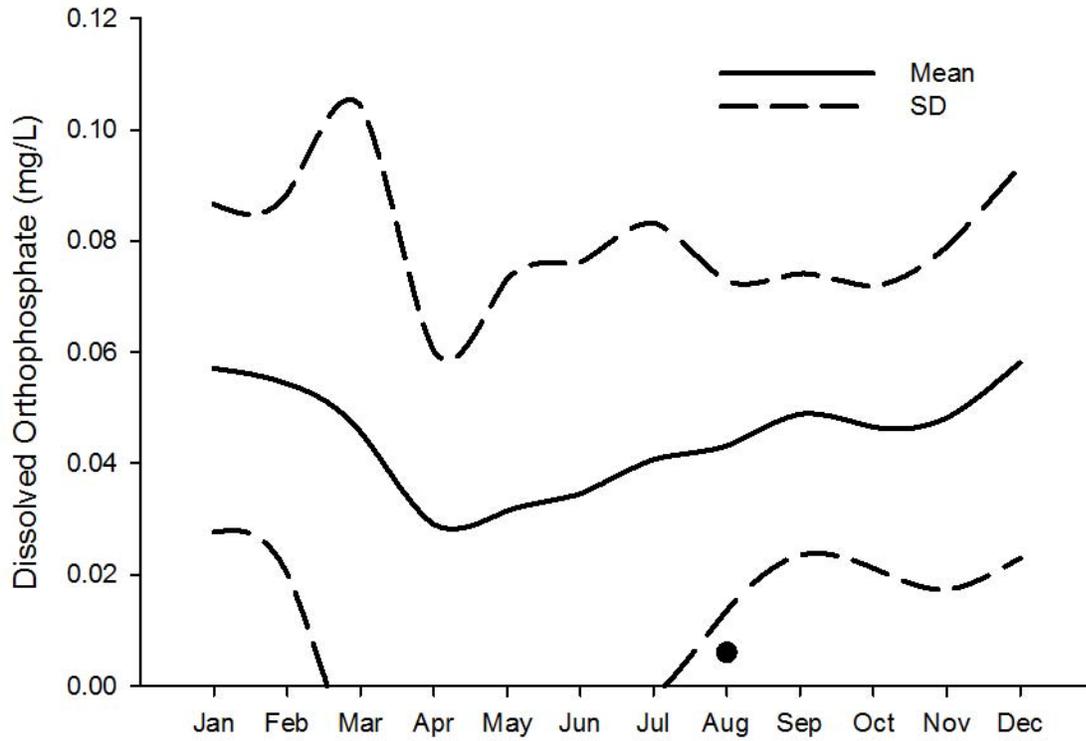


**Figure 2**  
 Monthly mean chlorophyll-a concentrations in the Snake River at King Hill, Idaho, since the early 1990s in micrograms per liter ( $\mu\text{g/L}$ ) and 2 standard deviation (SD) guidance curves compared to the chlorophyll-a value of 86  $\mu\text{g/L}$  (black dot) measured on July 31, 2013



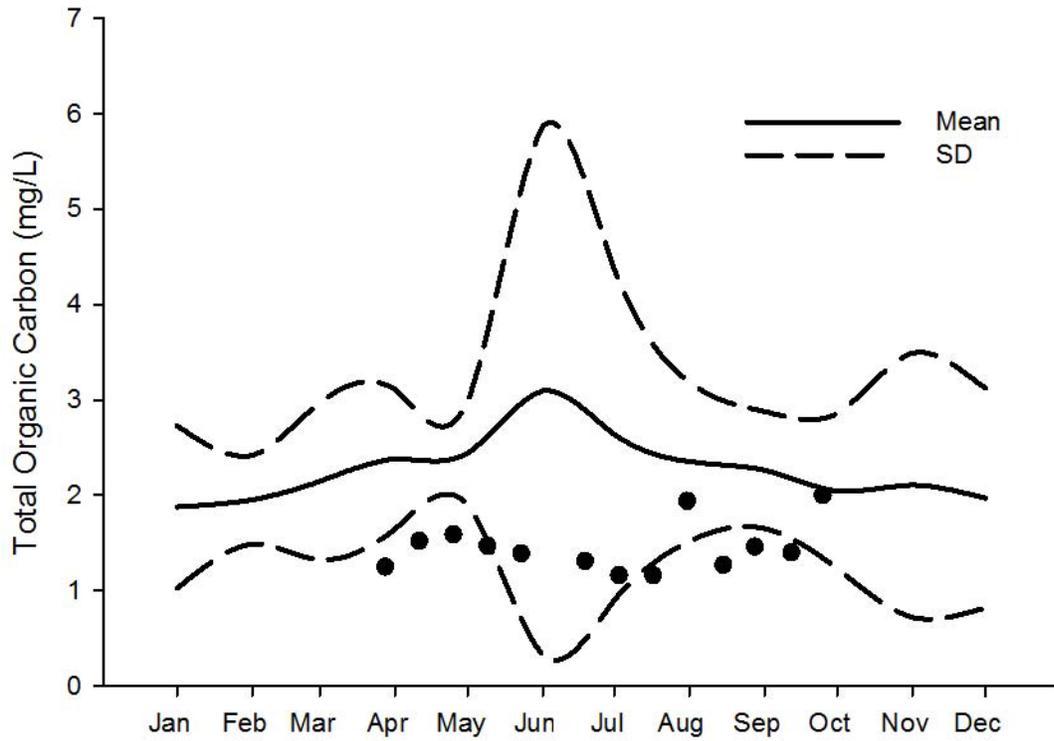
**Figure 3**

Monthly mean dissolved oxygen (DO) concentrations in the Snake River at King Hill, Idaho, since the early 1990s in milligrams per liter (mg/L) and 2 standard deviation (SD) guidance curves compared to the DO value of 12.73 mg/L (black dot) measured on July 31, 2013



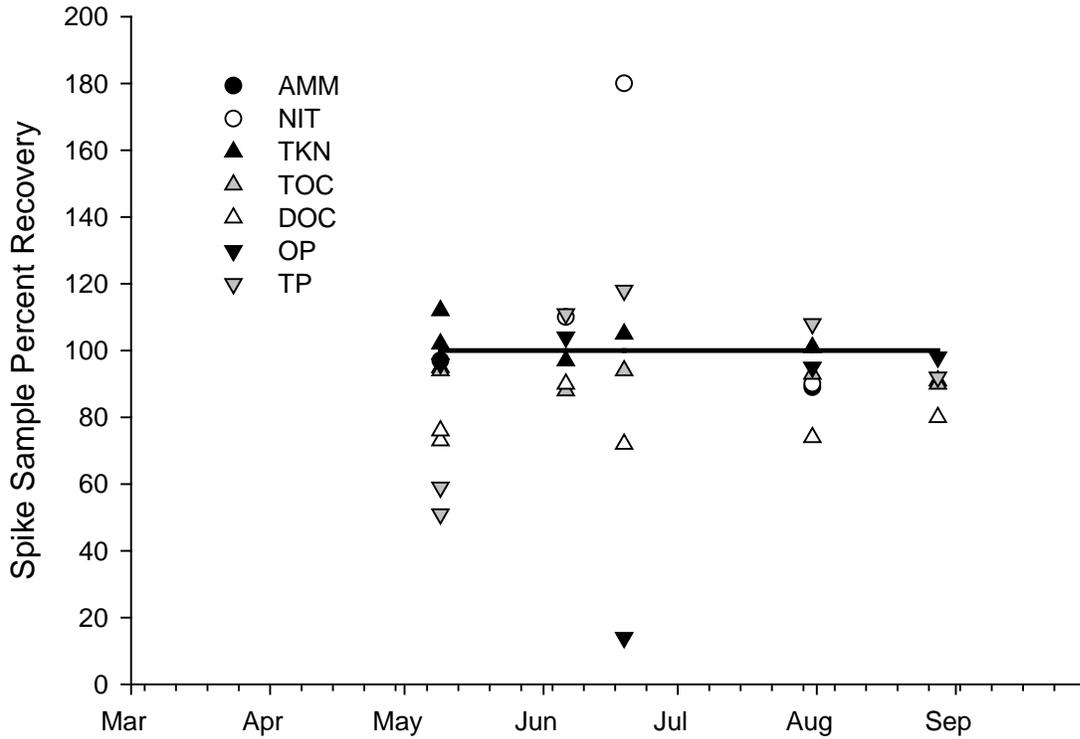
**Figure 4**

Monthly mean dissolved orthophosphate (OP) concentrations in the Snake River at King Hill, Idaho, since the early 1990s in milligrams per liter (mg/L) and 2 standard deviation (SD) guidance curves compared to the OP value of 0.05 mg/L (black dot) measured on August 15, 2013



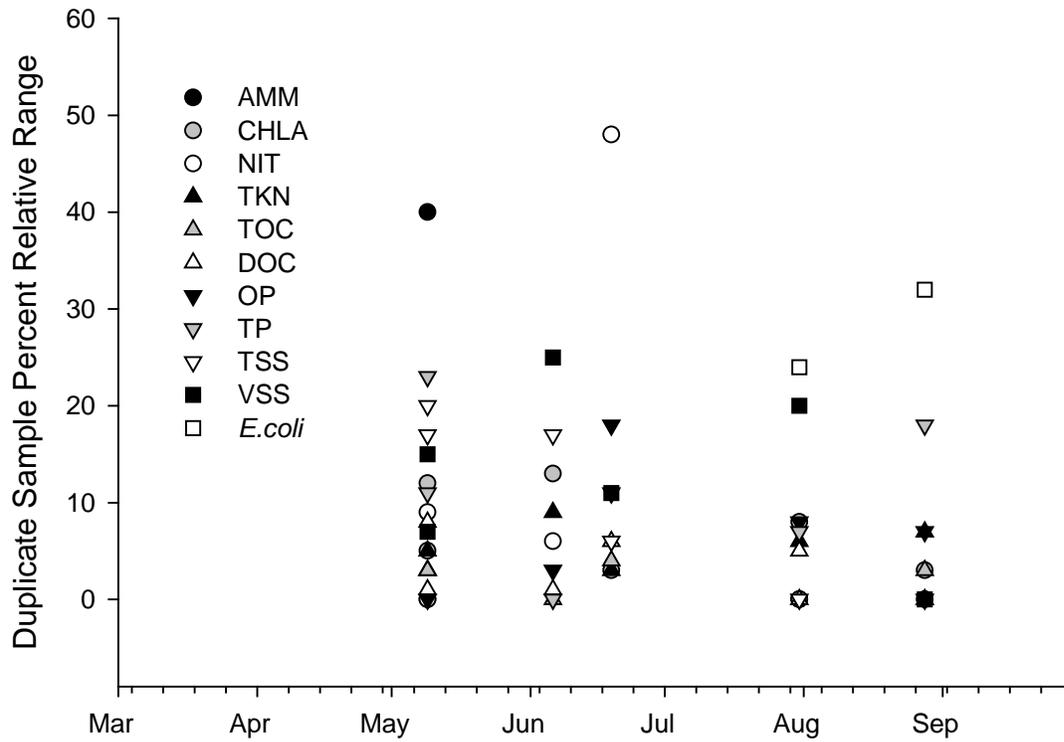
**Figure 5**

Monthly mean total organic carbon (TOC) concentrations in the Snake River at King Hill, Idaho, since the early 1990s in milligrams per liter (mg/L) and 2 standard deviation (SD) guidance curves compared to the TOC levels measured in water year 2013



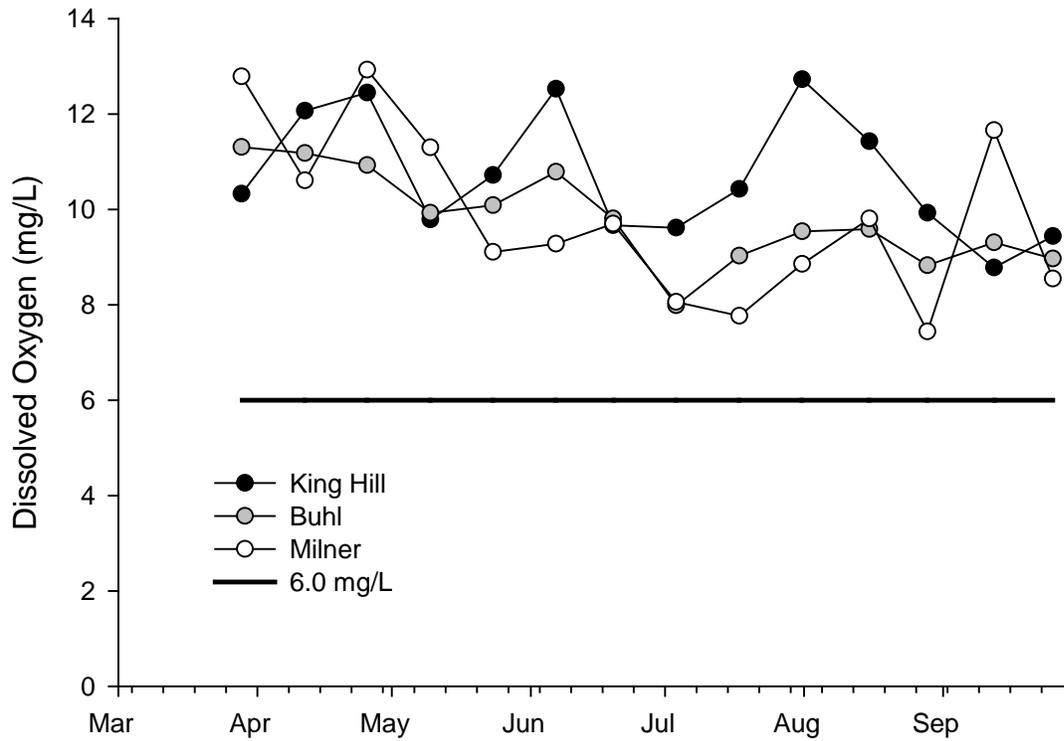
**Figure 6**

Ammonia (AMM), nitrate (NIT), total Kjeldahl nitrogen (TKN), total organic carbon (TOC), dissolved organic carbon (DOC), dissolved orthophosphate (OP), and total phosphorus (TP) spiked sample percent recovery from the Snake River at Milner, near Buhl, and at King Hill, Idaho, during water year 2013. The goal of 100% recovery is indicated by the solid line.

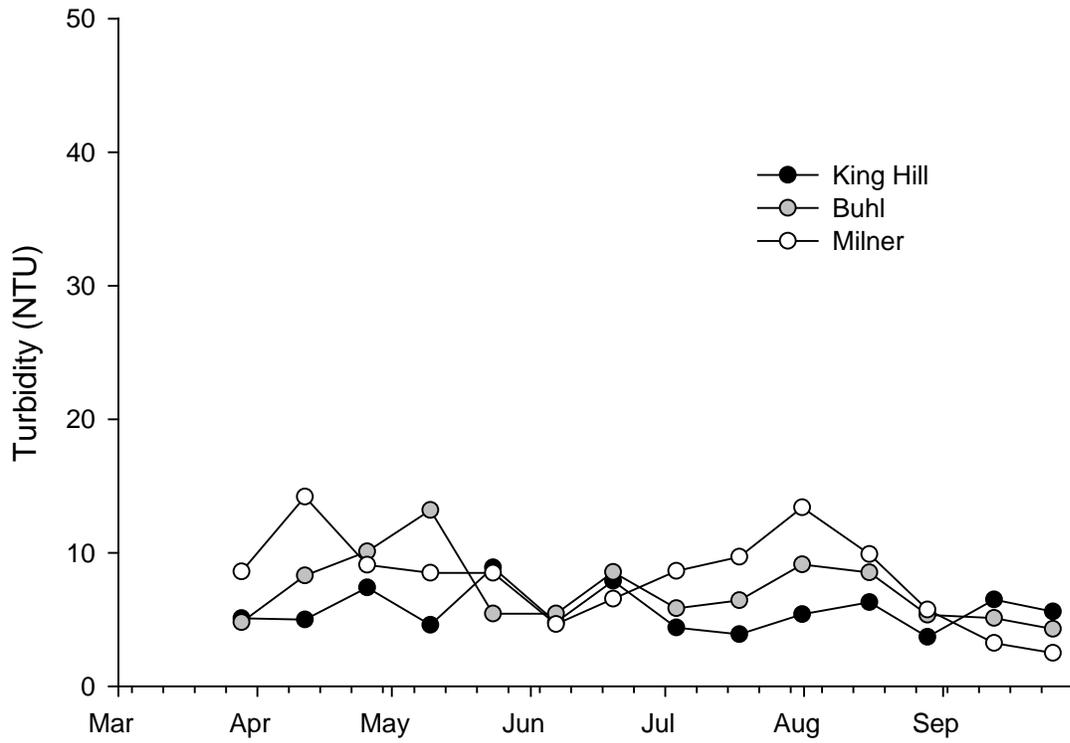


**Figure 7**

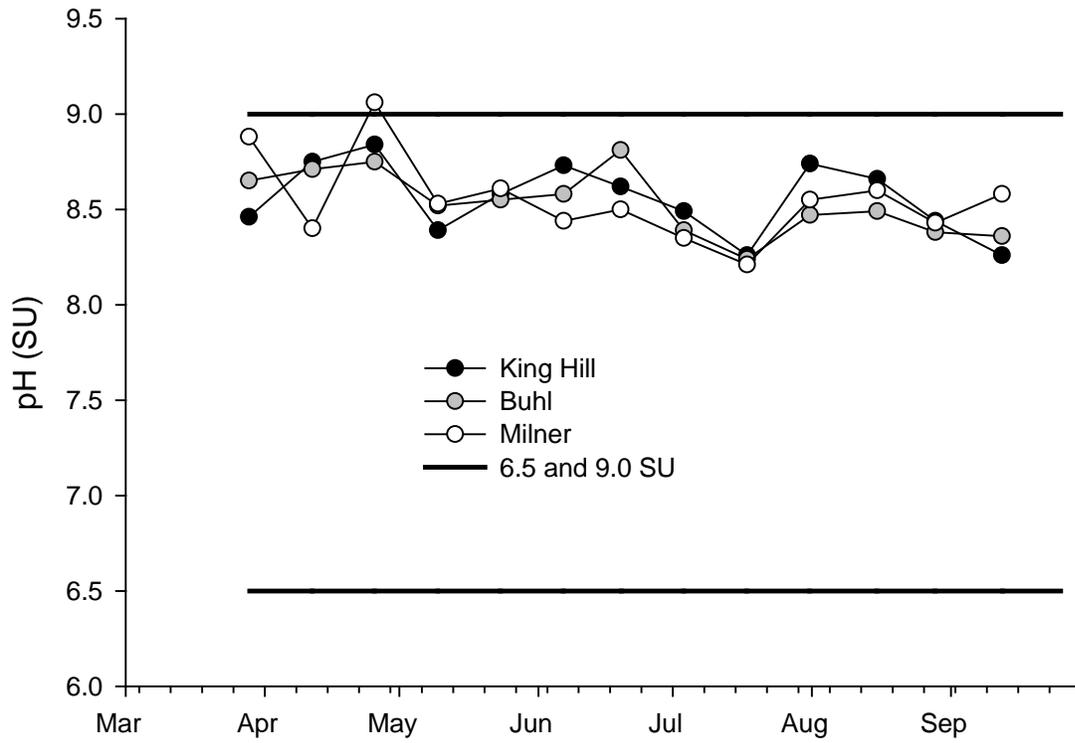
Ammonia (AMM), chlorophyll-a (CHLA), nitrate (NIT), total Kjeldahl nitrogen (TKN), total organic carbon (TOC), dissolved organic carbon (DOC), dissolved orthophosphate (OP), total phosphorus (TP), total suspended solids (TSS), volatile suspended solids (VSS), and *Escherichia coli* (*E. coli*) bacteria duplicate sample percent relative range from the Snake River at Milner, near Buhl, and at King Hill, Idaho, during water year 2013



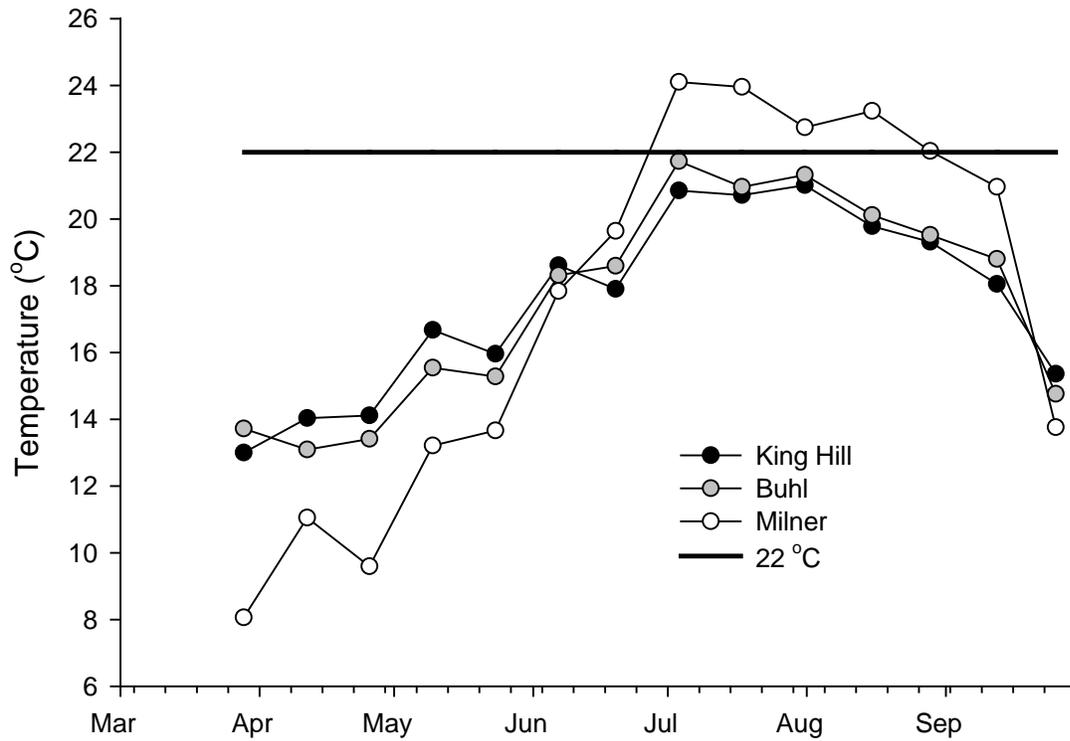
**Figure 8**  
 Dissolved oxygen concentrations in milligrams per liter (mg/L) in the Snake River, Idaho, during water year 2013. The horizontal line represents the state criterion of a 6.0 mg/L instantaneous minimum.



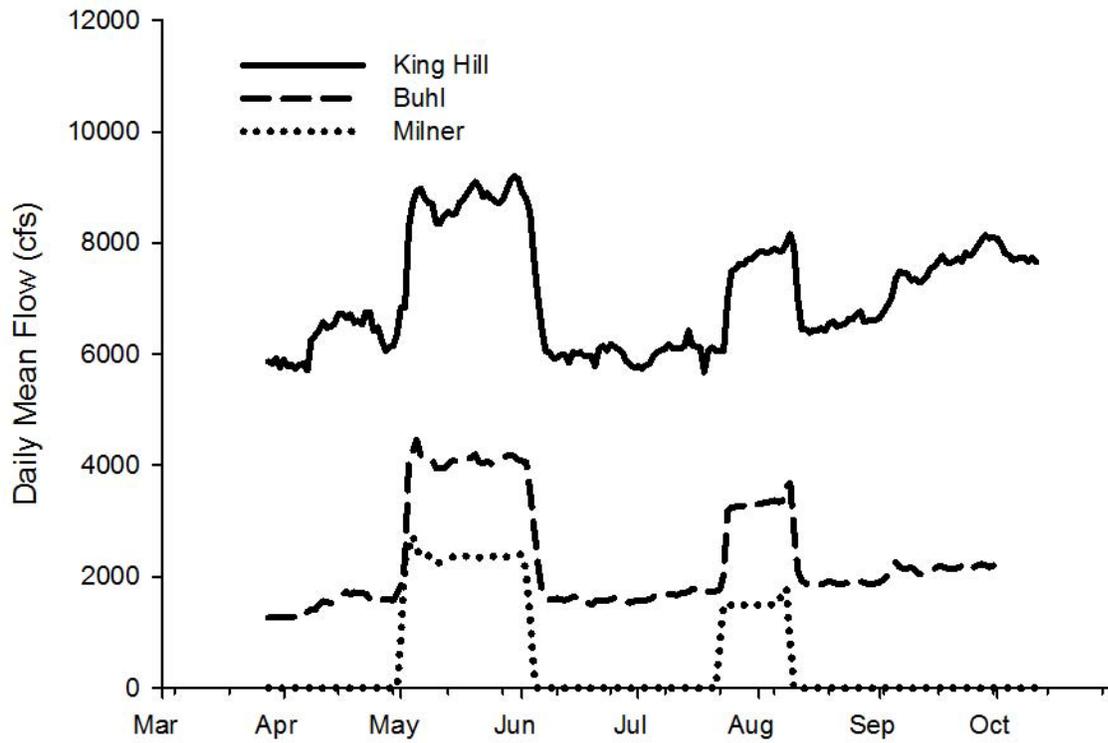
**Figure 9**  
Turbidity concentrations in nephelometric turbidity units (NTU) in the Snake River, Idaho, during water year 2013



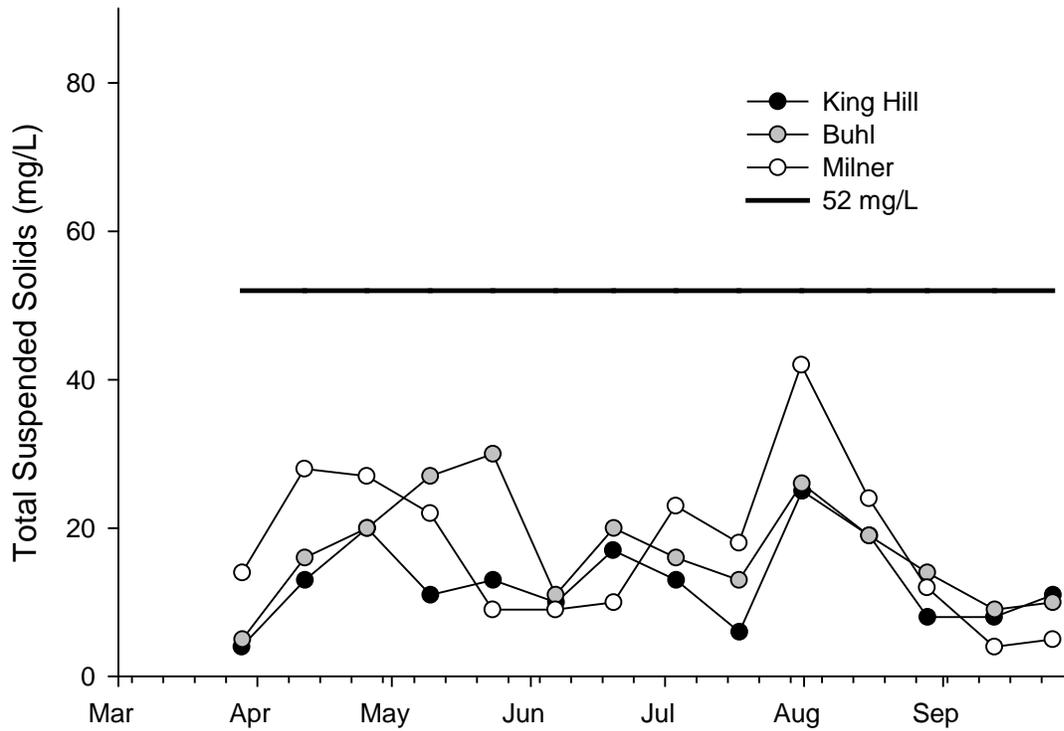
**Figure 10**  
Hydrogen ion (pH) concentrations in standard units (SU) in the Snake River, Idaho, during water year 2013. The horizontal lines represent the state criteria of 6.5 and 9.0 SU.



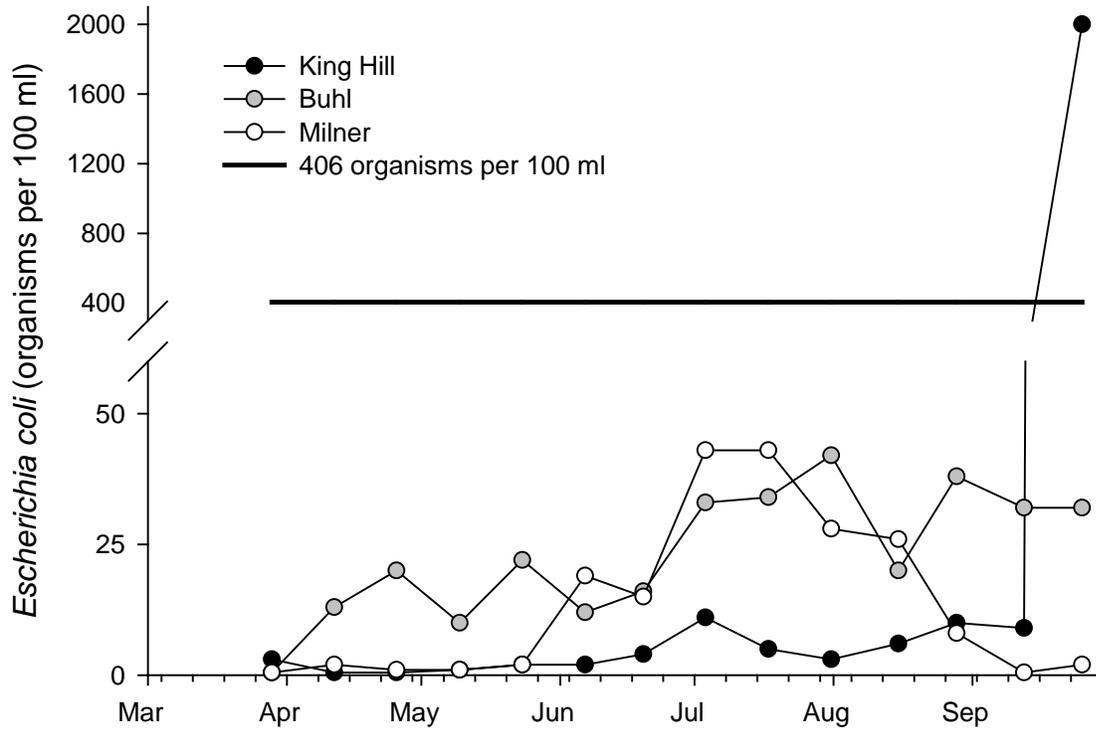
**Figure 11**  
 Temperature in degree Celsius (°C) in the Snake River, Idaho, during water year 2013. The horizontal line represents the state criterion of a 22°C instantaneous maximum.



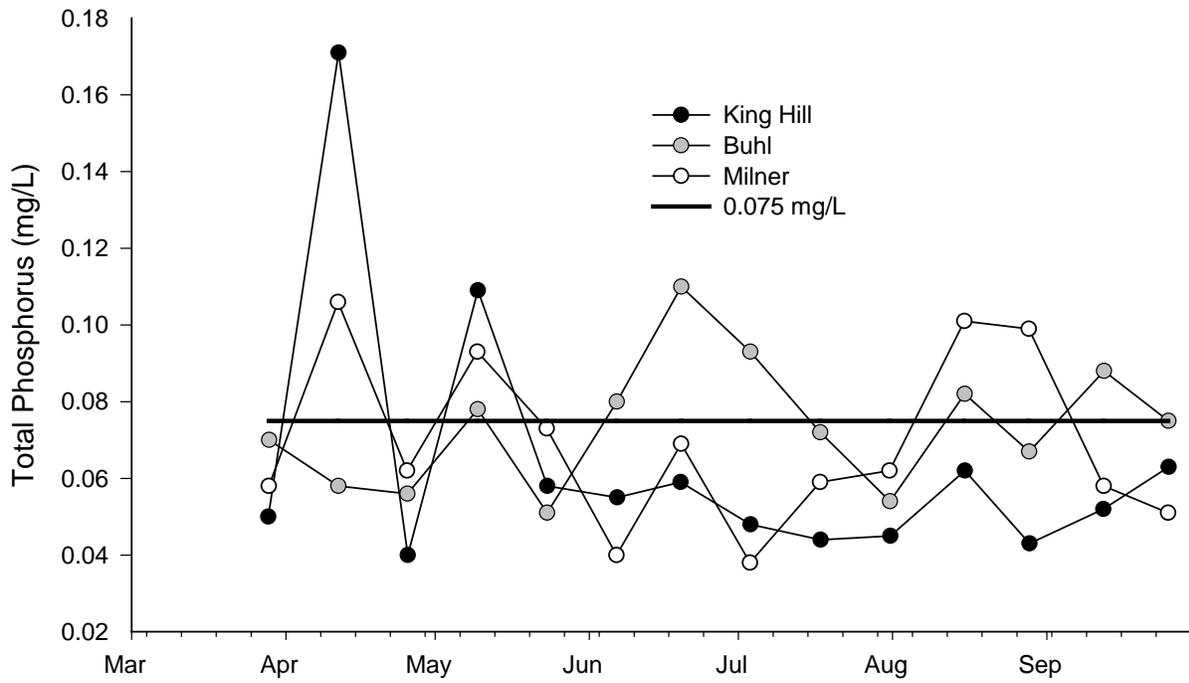
**Figure 12**  
Daily mean flow in cubic feet per second (cfs) in the Snake River at King Hill, near Buhl, and at Milner, Idaho, during water year 2013



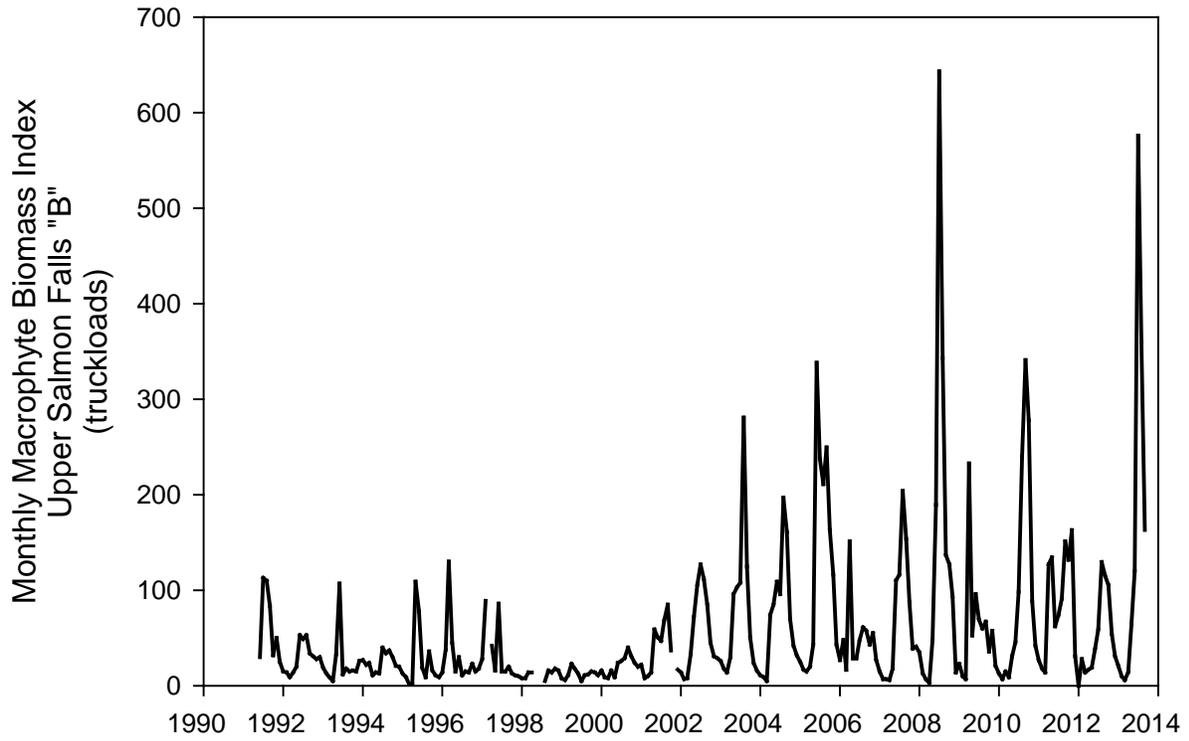
**Figure 13**  
 Total suspended solids (TSS) concentrations in milligrams per liter (mg/L) in the Snake River, Idaho, during water year 2013. The horizontal line represents the Upper Snake–Rock Total Maximum Daily Load target of 52 mg/L.



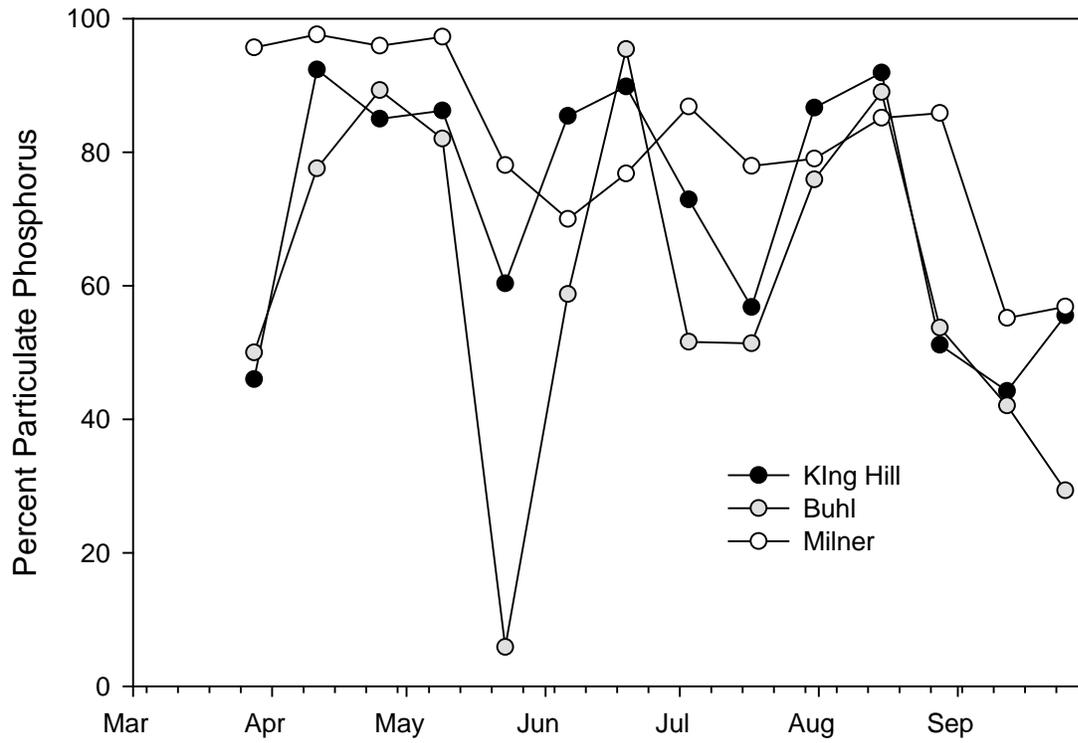
**Figure 14**  
*Escherichia coli* bacteria counts in organisms per 100 milliliters (ml) in the Snake River, Idaho, during water year 2013. The horizontal line represents the state criterion of 406 organisms per 100 ml.



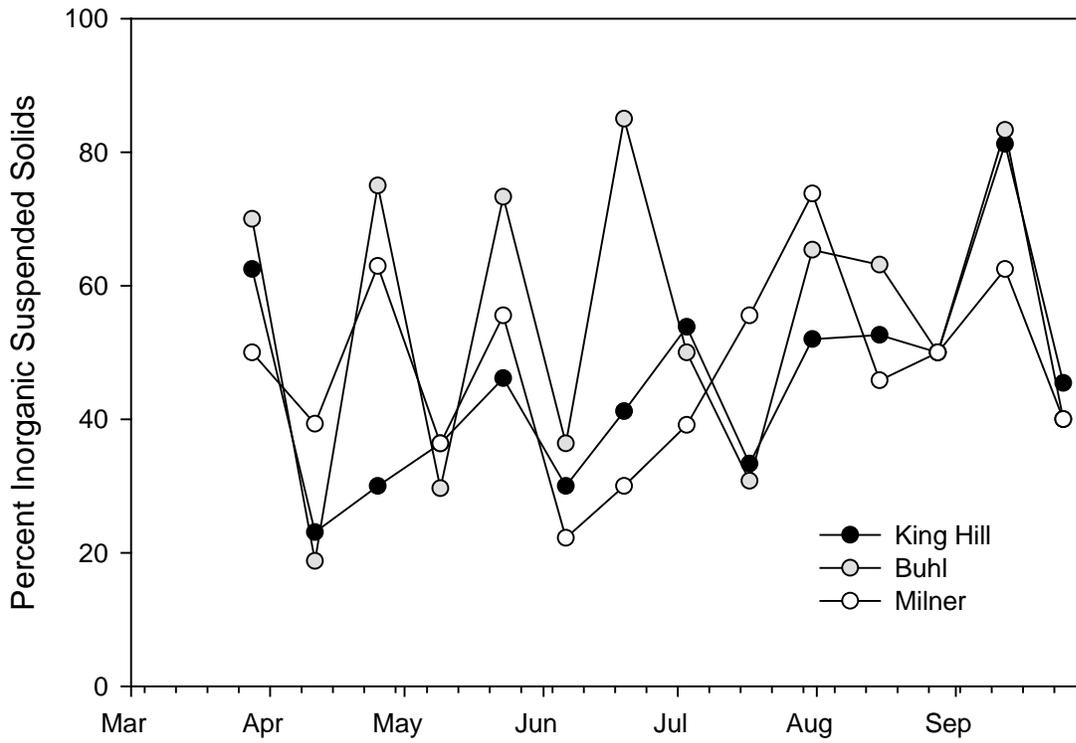
**Figure 15**  
 Total phosphorus concentrations in milligrams per liter (mg/L) in the Snake River, Idaho, during water year 2013. The horizontal line represents the Upper Snake-Rock Total Maximum Daily Load target of 0.075 mg/L.



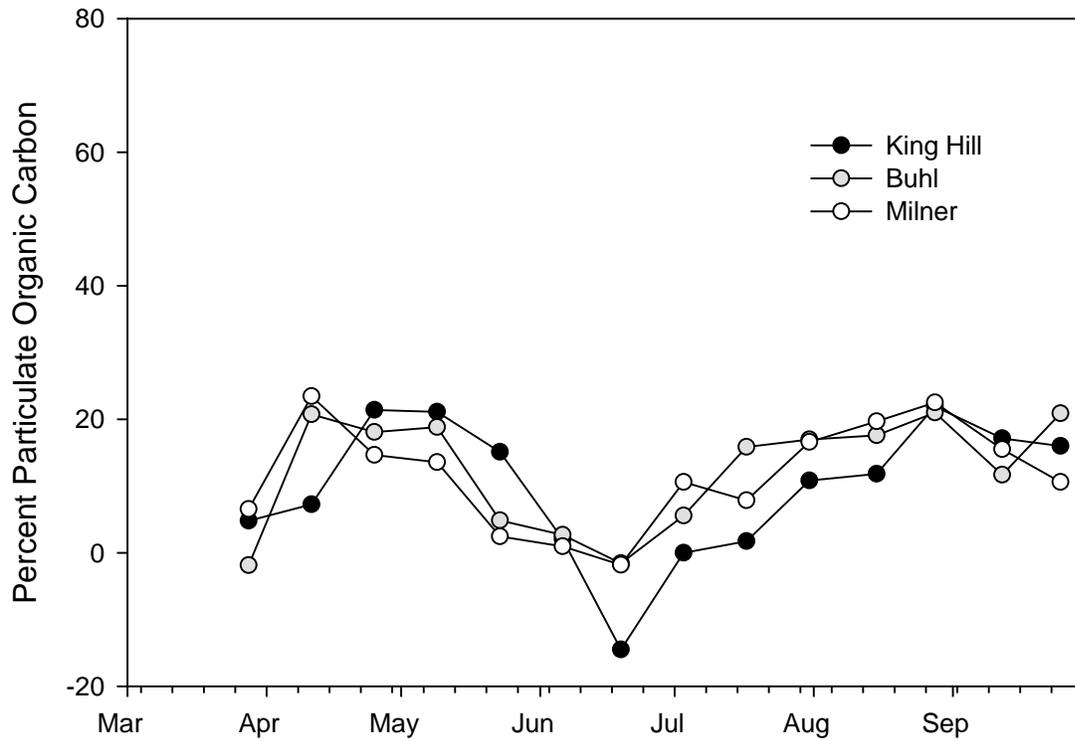
**Figure 16**  
Monthly total macrophyte truckloads collected at the Upper Salmon Falls "B" hydroelectric project from 1991 through 2013



**Figure 17**  
Percent particulate phosphorus (total phosphorus minus dissolved orthophosphate) in the Snake River at King Hill, near Buhl, and at Milner, Idaho, during water year 2013



**Figure 18**  
Percent inorganic suspended solids (total suspended solids minus volatile suspended solids) in the Snake River at King Hill, near Buhl, and at Milner, Idaho, during water year 2013



**Figure 19**  
 Percent particulate organic carbon (total organic carbon minus dissolved organic carbon) in the Snake River at King Hill, near Buhl, and at Milner, Idaho, during water year 2013

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**Appendix 1**

Water-quality data collected from the Snake River at King Hill, Idaho, during water year 2013. Ammonia (AMM), nitrate (NIT), total Kjeldahl nitrogen (TKN), total organic carbon (TOC), dissolved organic carbon (DOC), total phosphorus (TP), and orthophosphate (OP) concentrations are reported in milligrams per liter and chlorophyll-a concentrations are reported in micrograms per liter. Bold values indicate a laboratory result below the method detection level and represent one-half the detection level.

DATE	AMM	CHLA	NIT	TKN	TOC	DOC	TP	OP
3/28/13	0.04	3.8	1.9	0.25	1.25	1.19	0.050	0.027
4/11/13	<b>0.005</b>	30.0	1.7	0.47	1.52	1.41	0.171	0.013
4/25/13	<b>0.005</b>	61.0	1.3	0.62	1.59	1.25	0.040	0.006
5/9/13	0.02	19.0	1.1	0.43	1.47	1.16	0.109	0.015
5/23/13	0.01	20.0	1.3	0.30	1.39	1.18	0.058	0.023
6/6/13	<b>0.005</b>	42.0	1.0	0.42	1.47	1.44	0.055	0.008
6/19/13	<b>0.005</b>	81.0	0.8	0.59	1.31	1.50	0.059	0.006
7/3/13	0.01	32.0	1.3	0.37	1.16	1.16	0.048	0.013
7/17/13	<b>0.005</b>	17.0	1.5	0.34	1.16	1.14	0.044	0.019
7/31/13	<b>0.005</b>	86.0	0.9	0.67	1.94	1.73	0.045	0.006
8/15/13	<b>0.005</b>	45.0	1.2	0.50	1.27	1.12	0.062	0.005
8/28/13	<b>0.005</b>	15.0	1.6	0.34	1.46	1.14	0.043	0.021
9/12/13	<b>0.005</b>	8.8	1.8	0.26	1.40	1.16	0.052	0.029
9/25/13	<b>0.005</b>	4.5	1.8	0.42	2.00	1.68	0.063	0.028

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**Appendix 2**

Water-quality data collected from the Snake River at King Hill, Idaho, during water year 2013. Volatile suspended solids (VSS), total suspended solids (TSS), and dissolved oxygen (DO) concentrations are reported in milligrams per liter; *Escherichia coli* (*E. coli*) bacteria concentrations in organisms per 100 milliliters; specific conductivity (SPC) concentrations in micro siemens per centimeter; hydrogen ion (pH) concentrations in standard units; turbidity (TURB) in nephelometric turbidity units; and temperature (Temp) in degree Celsius. Bold values indicate a laboratory result below the method detection level and represent one-half the detection level.

DATE	VSS	TSS	<i>E. coli</i>	SPC	pH	TURB	Temp	DO
3/28/13	<b>1.5</b>	4	3	0.4638	8.46	5.1	13.00	10.33
4/11/13	10	13	<b>0.5</b>	0.4665	8.75	5.0	14.03	12.07
4/25/13	14	20	<b>0.5</b>	0.4642	8.84	7.4	14.11	12.45
5/9/13	7	11	1	0.4627	8.39	4.6	16.67	9.79
5/23/13	7	13	2	0.4607	8.58	8.9	15.96	10.72
6/6/13	7	10	2	0.4513	8.73	4.8	18.61	12.53
6/19/13	10	17	4	0.4412	8.62	7.9	17.90	9.67
7/3/13	6	13	11	0.4697	8.49	4.4	20.85	9.62
7/17/13	4	6	5	0.4763	8.26	3.9	20.71	10.43
7/31/13	12	25	3	0.4636	8.74	5.4	21.01	12.73
8/15/13	9	19	6	0.4587	8.66	6.3	19.78	11.43
8/28/13	4	8	10	0.4868	8.44	3.7	19.31	9.93
9/12/13	<b>1.5</b>	8	9	0.4987	8.26	6.5	18.05	8.78
9/25/13	6	11	2,000	0.4993	–	5.6	15.36	9.44

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**Appendix 3**

Water-quality data collected from the Snake River near Buhl, Idaho, during water year 2013. Ammonia (AMM), nitrate (NIT), total Kjeldahl nitrogen (TKN), total organic carbon (TOC), dissolved organic carbon (DOC), total phosphorus (TP), and orthophosphate (OP) concentrations are reported in milligrams per liter and chlorophyll-a concentrations are reported in micrograms per liter. Bold values indicate a laboratory result below the method detection level and represent one-half the detection level.

DATE	AMM	CHLA	NIT	TKN	TOC	DOC	TP	OP
3/28/13	0.03	15.0	3.0	0.36	1.60	1.63	0.070	0.035
4/11/13	<b>0.005</b>	40.0	2.5	0.58	1.93	1.53	0.058	0.013
4/25/13	<b>0.005</b>	56.0	2.1	0.65	1.88	1.54	0.056	0.006
5/9/13	0.04	26.0	1.1	0.57	1.86	1.51	0.078	0.014
5/23/13	0.05	8.3	1.3	0.34	1.86	1.77	0.051	0.048
6/6/13	<b>0.005</b>	17.0	1.6	0.49	1.88	1.83	0.080	0.033
6/19/13	0.01	74.0	2.3	0.76	1.88	1.91	0.110	0.005
7/3/13	0.02	31.0	2.3	0.44	1.62	1.53	0.093	0.045
7/17/13	0.04	9.6	2.1	0.38	1.83	1.54	0.072	0.035
7/31/13	0.01	40.0	1.2	0.50	2.24	1.86	0.054	0.013
8/15/13	<b>0.005</b>	35.0	1.9	0.63	1.82	1.50	0.082	0.009
8/28/13	0.03	14.0	2.4	0.43	2.05	1.62	0.067	0.031
9/12/13	<b>0.005</b>	9.3	2.5	0.41	1.80	1.59	0.088	0.051
9/25/13	0.01	4.0	2.5	0.40	1.82	1.44	0.075	0.053

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**Appendix 4**

Water-quality data collected from the Snake River near Buhl, Idaho, during water year 2013. Volatile suspended solids (VSS), total suspended solids (TSS), and dissolved oxygen (DO) concentrations are reported in milligrams per liter; *Escherichia coli* (*E. coli*) bacteria concentrations in organisms per 100 milliliters; specific conductivity (SPC) concentrations in micro siemens per centimeter; hydrogen ion (pH) concentrations in standard units; turbidity (TURB) in nephelometric turbidity units; and temperature (Temp) in degrees Celsius. Bold values indicate a laboratory result below the method detection level and represent one-half the detection level.

DATE	VSS	TSS	<i>E. coli</i>	SPC	pH	TURB	Temp	DO
3/28/13	<b>1.5</b>	5	<b>0.5</b>	0.6406	8.65	4.8	13.72	11.31
4/11/13	13	16	13	0.6149	8.71	8.3	13.09	11.18
4/25/13	5	20	20	0.6056	8.75	10.1	13.41	10.93
5/9/13	19	27	10	0.5162	8.52	13.2	15.54	9.93
5/23/13	8	30	22	0.5230	8.55	5.5	15.28	10.09
6/6/13	7	11	12	0.5639	8.58	5.5	18.31	10.79
6/19/13	3	20	16	0.6094	8.81	8.6	18.59	9.81
7/3/13	8	16	33	0.6437	8.39	5.9	21.73	7.99
7/17/13	9	13	34	0.6378	8.24	6.5	20.96	9.03
7/31/13	9	26	42	0.5505	8.47	9.1	21.32	9.54
8/15/13	7	19	20	0.6026	8.49	8.5	20.11	9.59
8/28/13	7	14	38	0.6469	8.38	5.4	19.52	8.83
9/12/13	<b>1.5</b>	9	32	0.6497	8.36	5.1	18.80	9.31
9/25/13	6	10	32	0.6499	–	4.3	14.76	8.97

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**Appendix 5**

Water-quality data collected from the Snake River at Milner, Idaho, during water year 2013. Ammonia (AMM), nitrate (NIT), total Kjeldahl nitrogen (TKN), total organic carbon (TOC), dissolved organic carbon (DOC), total phosphorus (TP), and orthophosphate (OP) concentrations are reported in milligrams per liter and chlorophyll-a concentrations are reported in micrograms per liter. Bold values indicate a laboratory result below the method detection level and represent one-half the detection level.

DATE	AMM	CHLA	NIT	TKN	TOC	DOC	TP	OP
3/28/13	0.05	59.0	0.4	0.95	3.07	2.87	0.058	<b>0.0025</b>
4/11/13	0.06	89.0	0.4	1.08	2.77	2.12	0.106	<b>0.0025</b>
4/25/13	<b>0.005</b>	34.0	<b>0.1</b>	0.63	1.98	1.69	0.062	<b>0.0025</b>
5/9/13	0.03	43.0	<b>0.1</b>	0.63	2.14	1.85	0.093	<b>0.0025</b>
5/23/13	0.06	7.7	0.3	0.38	2.05	2.00	0.073	0.0160
6/6/13	0.07	13.0	<b>0.1</b>	0.37	2.09	2.07	0.040	0.0120
6/19/13	0.05	15.0	<b>0.1</b>	0.49	2.22	2.26	0.069	0.0160
7/3/13	0.03	23.0	<b>0.1</b>	0.34	2.17	1.94	0.038	0.0050
7/17/13	0.05	18.0	<b>0.1</b>	0.54	2.17	2.00	0.059	0.0130
7/31/13	<b>0.005</b>	41.0	<b>0.1</b>	0.52	2.47	2.06	0.062	0.0130
8/15/13	<b>0.005</b>	42.0	<b>0.1</b>	0.65	2.34	1.88	0.101	0.0150
8/28/13	<b>0.005</b>	36.0	<b>0.1</b>	0.75	2.89	2.24	0.099	0.0140
9/12/13	<b>0.005</b>	2.4	<b>0.1</b>	0.41	2.71	2.29	0.058	0.0260
9/25/13	0.01	1.6	<b>0.1</b>	0.43	2.55	2.28	0.051	0.0220

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**Appendix 6**

Water-quality data collected from the Snake River at Milner, Idaho, during water year 2013. Volatile suspended solids (VSS), total suspended solids (TSS), and dissolved oxygen (DO) concentrations are reported in milligrams per liter; *Escherichia coli* (*E. coli*) bacteria concentrations in organisms per 100 milliliters; specific conductivity (SPC) concentrations in micro siemens per centimeter; hydrogen ion (pH) concentrations in standard units; turbidity (TURB) in nephelometric turbidity units; and temperature (Temp) in degrees Celsius. Bold values indicate a laboratory result below the method detection level and represent one-half the detection level.

DATE	VSS	TSS	<i>E. coli</i>	SPC	pH	TURB	Temp	DO
3/28/13	7	14	<b>0.5</b>	0.4822	8.88	8.6	8.06	12.79
4/11/13	17	28	2	0.4895	8.40	14.2	11.05	10.61
4/25/13	10	27	1	0.4779	9.06	9.1	9.59	12.93
5/9/13	14	22	1	0.4314	8.53	8.5	13.21	11.30
5/23/13	4	9	2	0.4514	8.61	8.5	13.66	9.11
6/6/13	7	9	19	0.4489	8.44	4.7	17.84	9.28
6/19/13	7	10	15	0.4425	8.50	6.6	19.64	9.70
7/3/13	14	23	43	0.4422	8.35	8.7	24.10	8.06
7/17/13	8	18	43	0.4474	8.21	9.7	23.95	7.77
7/31/13	11	42	28	0.4425	8.55	13.4	22.74	8.86
8/15/13	13	24	26	0.4225	8.60	9.9	23.23	9.81
8/28/13	6	12	8	0.4168	8.43	5.8	22.03	7.44
9/12/13	<b>1.5</b>	4	<b>0.5</b>	0.3920	8.58	3.3	20.96	11.66
9/25/13	3	5	2	0.3951	–	2.5	13.76	8.55

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**Appendix 7**

Daily average flow in cubic feet per second and ammonia (AMM), chlorophyll-a (CHLA), nitrate (NIT), total Kjeldahl nitrogen (TKN), total organic carbon (TOC), dissolved organic carbon (DOC), dissolved orthophosphate (OP), total phosphorus (TP), total suspended solids (TSS), and volatile suspended solids (VSS) daily loads in kilograms for the Snake River at King Hill, Idaho

DATE	FLOW	AMM	CHLA	NIT	TKN	TOC	DOC	OP	TP	TSS	VSS
3/28/13	5,870	575	55	27,290	3,591	17,954	17,092	388	718	57,452	21,544
3/29/13	5,830	535	81	26,900	3,790	18,107	17,200	371	837	66,231	30,059
3/30/13	5,930	508	109	27,154	4,083	18,697	17,723	363	976	76,695	39,384
3/31/13	5,760	458	133	26,174	4,188	18,433	17,436	338	1,070	83,556	46,812
4/1/13	5,910	434	163	26,649	4,524	19,192	18,117	333	1,223	95,029	56,811
4/2/13	5,780	389	186	25,861	4,647	19,042	17,941	311	1,318	102,030	64,148
4/3/13	5,810	355	214	25,792	4,894	19,415	18,258	299	1,448	111,699	73,112
4/4/13	5,740	316	237	25,281	5,056	19,452	18,258	281	1,552	119,382	80,758
4/5/13	5,810	284	267	25,386	5,341	19,964	18,704	270	1,694	129,977	90,374
4/6/13	5,840	250	295	25,313	5,593	20,342	19,026	257	1,826	139,834	99,517
4/7/13	5,710	210	315	24,550	5,688	20,159	18,822	238	1,906	145,703	105,784
4/8/13	6,270	192	374	26,738	6,487	22,432	20,909	245	2,226	169,855	125,473
4/9/13	6,340	155	407	26,815	6,804	22,981	21,386	233	2,385	181,724	136,293
4/10/13	6,430	118	443	26,971	7,147	23,611	21,937	220	2,554	194,418	147,780
4/11/13	6,580	81	483	27,370	7,567	24,472	22,701	209	2,753	209,303	161,003
4/12/13	6,480	79	511	26,501	7,622	24,180	22,175	198	2,563	214,050	163,086
4/13/13	6,500	80	548	26,129	7,816	24,334	22,062	191	2,422	222,663	168,133
4/14/13	6,550	80	587	25,872	8,048	24,601	22,048	184	2,291	232,389	174,006
4/15/13	6,740	82	641	26,151	8,458	25,397	22,499	181	2,203	247,376	183,765
4/16/13	6,740	82	677	25,680	8,635	25,480	22,311	173	2,049	255,622	188,477
4/17/13	6,650	81	704	24,872	8,694	25,221	21,827	163	1,869	260,345	190,609
4/18/13	6,720	82	748	24,664	8,961	25,569	21,869	156	1,735	271,307	197,314
4/19/13	6,570	80	767	23,654	8,934	25,078	21,197	145	1,546	273,288	197,503
4/20/13	6,600	81	806	23,301	9,147	25,273	21,109	137	1,402	282,611	203,018
4/21/13	6,540	80	834	22,632	9,236	25,124	20,735	128	1,239	288,043	205,745
4/22/13	6,760	83	899	22,921	9,724	26,052	21,243	124	1,126	306,003	217,392
4/23/13	6,760	83	936	22,448	9,901	26,134	21,054	116	971	314,273	222,118
4/24/13	6,420	79	923	20,870	9,571	24,898	19,815	102	775	306,321	215,434
4/25/13	6,490	79	969	20,644	9,846	25,249	19,850	95	635	317,601	222,321
4/26/13	6,270	93	890	19,725	9,304	24,262	19,079	102	689	296,972	207,113
4/27/13	6,060	106	816	18,853	8,791	23,322	18,344	108	739	277,494	192,763
4/28/13	6,130	123	780	18,856	8,689	23,463	18,460	119	822	271,057	187,490
4/29/13	6,160	140	739	18,733	8,527	23,449	18,453	129	900	262,694	180,871
4/30/13	6,380	162	718	19,179	8,619	24,152	19,012	144	1,009	262,040	179,525
5/1/13	6,850	192	721	20,353	9,027	25,788	20,305	165	1,166	270,569	184,370
5/2/13	6,840	209	669	20,084	8,787	25,607	20,167	176	1,247	259,415	175,733
5/3/13	8,300	276	751	24,080	10,387	30,898	24,342	226	1,613	301,731	203,088
5/4/13	8,730	313	726	25,023	10,635	32,316	25,465	252	1,802	303,631	202,929
5/5/13	8,940	344	678	25,312	10,594	32,906	25,937	272	1,953	296,873	196,873
5/6/13	8,980	369	615	25,112	10,343	32,865	25,912	287	2,070	284,076	186,768
5/7/13	8,820	385	540	24,356	9,866	32,094	25,312	296	2,140	265,140	172,650
5/8/13	8,720	404	469	23,775	9,464	31,548	24,888	306	2,221	248,418	160,024
5/9/13	8,710	426	405	23,443	9,164	31,329	24,722	320	2,323	234,433	149,184

DATE	FLOW	AMM	CHLA	NIT	TKN	TOC	DOC	OP	TP	TSS	VSS
5/10/13	8,360	395	390	22,793	8,606	29,953	23,758	319	2,155	227,934	143,190
5/11/13	8,350	379	391	23,058	8,406	29,800	23,759	330	2,078	230,580	143,018
5/12/13	8,490	371	399	23,741	8,354	30,181	24,187	347	2,037	237,414	145,416
5/13/13	8,560	359	404	24,236	8,228	30,310	24,416	362	1,978	242,364	146,615
5/14/13	8,520	342	404	24,421	7,996	30,050	24,332	372	1,893	244,209	145,930
5/15/13	8,530	328	406	24,748	7,812	29,966	24,390	385	1,819	247,478	146,101
5/16/13	8,730	320	417	25,633	7,797	30,546	24,992	406	1,784	256,332	149,527
5/17/13	8,800	308	421	26,146	7,659	30,668	25,224	421	1,720	261,463	150,726
5/18/13	8,900	296	428	26,755	7,544	30,892	25,541	439	1,660	267,545	152,439
5/19/13	9,000	283	434	27,370	7,424	31,113	25,860	456	1,598	273,697	154,151
5/20/13	9,100	270	441	27,992	7,300	31,332	26,179	474	1,535	279,919	155,864
5/21/13	9,020	252	438	28,061	7,031	30,930	25,980	482	1,441	280,612	154,494
5/22/13	8,830	231	431	27,779	6,682	30,155	25,464	485	1,332	277,787	151,240
5/23/13	8,900	218	436	28,310	6,533	30,270	25,697	501	1,263	283,100	152,439
5/24/13	8,810	208	465	27,562	6,652	30,087	25,837	473	1,246	275,618	150,897
5/25/13	8,750	199	495	26,915	6,790	30,004	26,059	447	1,233	269,153	149,869
5/26/13	8,720	191	527	26,366	6,950	30,024	26,366	422	1,224	263,658	149,356
5/27/13	8,780	184	565	26,087	7,182	30,353	26,946	402	1,228	260,869	150,383
5/28/13	8,940	180	609	26,094	7,500	31,031	27,844	386	1,245	260,935	153,124
5/29/13	9,130	176	657	26,169	7,851	31,818	28,850	370	1,267	261,694	156,378
5/30/13	9,200	169	698	25,888	8,104	32,191	29,489	349	1,272	258,877	157,577
5/31/13	9,160	160	730	25,295	8,261	32,179	29,777	323	1,262	252,948	156,892
6/1/13	8,910	148	744	24,137	8,222	31,425	29,370	291	1,222	241,373	152,610
6/2/13	8,810	139	770	23,404	8,315	31,196	29,440	265	1,204	234,045	150,897
6/3/13	8,570	127	782	22,318	8,268	30,466	29,028	235	1,167	223,175	146,786
6/4/13	7,740	108	736	19,750	7,630	27,623	26,568	192	1,050	197,503	132,570
6/5/13	7,050	92	697	17,620	7,097	25,259	24,520	156	952	176,199	120,752
6/6/13	6,500	80	668	15,905	6,680	23,380	22,902	127	875	159,045	111,332
6/7/13	6,060	74	667	14,600	6,422	21,615	21,421	116	820	156,263	107,217
6/8/13	6,040	74	709	14,324	6,594	21,361	21,418	114	822	163,705	110,274
6/9/13	5,930	73	740	13,840	6,663	20,794	21,095	109	811	168,537	111,614
6/10/13	5,940	73	785	13,640	6,865	20,650	21,198	107	817	176,647	115,156
6/11/13	5,990	73	835	13,529	7,114	20,643	21,444	106	829	186,026	119,508
6/12/13	5,990	73	879	13,304	7,306	20,463	21,511	104	833	193,918	122,890
6/13/13	5,850	72	902	12,773	7,322	19,808	21,075	99	818	197,094	123,321
6/14/13	6,040	74	975	12,960	7,753	20,270	21,827	100	849	211,453	130,737
6/15/13	6,010	74	1,015	12,669	7,907	19,988	21,787	97	850	218,321	133,481
6/16/13	6,040	74	1,064	12,505	8,140	19,906	21,964	95	858	227,369	137,558
6/17/13	5,960	73	1,094	12,115	8,223	19,463	21,740	92	851	232,210	139,101
6/18/13	5,960	73	1,137	11,891	8,413	19,283	21,808	90	856	240,062	142,467
6/19/13	5,970	73	1,183	11,686	8,619	19,136	21,912	88	862	248,331	146,077
6/20/13	5,790	76	1,098	11,840	8,136	18,407	20,907	92	825	236,795	137,625
6/21/13	6,100	85	1,105	13,007	8,337	19,233	21,664	104	857	245,209	140,729
6/22/13	6,150	91	1,061	13,651	8,169	19,229	21,476	113	852	242,920	137,583
6/23/13	6,070	95	995	14,004	7,829	18,820	20,836	119	830	235,516	131,550
6/24/13	6,180	103	960	14,797	7,734	18,999	20,846	129	833	235,464	129,613
6/25/13	6,140	107	901	15,238	7,447	18,715	20,346	135	816	229,647	124,482
6/26/13	6,090	112	842	15,646	7,153	18,403	19,819	142	797	223,520	119,210
6/27/13	6,030	116	782	16,019	6,850	18,064	19,265	148	778	217,102	113,820

DATE	FLOW	AMM	CHLA	NIT	TKN	TOC	DOC	OP	TP	TSS	VSS
6/28/13	5,870	118	711	16,107	6,443	17,431	18,405	151	746	207,238	106,697
6/29/13	5,820	122	655	16,478	6,164	17,129	17,903	157	728	201,404	101,719
6/30/13	5,760	126	599	16,812	5,879	16,802	17,376	162	710	195,300	96,644
7/1/13	5,790	132	553	17,405	5,687	16,738	17,122	170	702	192,270	93,099
7/2/13	5,740	135	499	17,757	5,417	16,443	16,633	176	685	186,597	88,282
7/3/13	5,800	142	454	18,449	5,251	16,462	16,462	184	681	184,492	85,150
7/4/13	5,830	138	441	18,748	5,248	16,548	16,527	192	681	178,314	83,553
7/5/13	5,960	135	435	19,375	5,333	16,917	16,875	202	692	174,999	83,333
7/6/13	6,040	132	425	19,846	5,373	17,144	17,080	211	697	169,958	82,340
7/7/13	6,080	128	412	20,190	5,377	17,257	17,172	219	697	163,645	80,760
7/8/13	6,100	123	398	20,470	5,363	17,314	17,207	226	695	156,721	78,893
7/9/13	6,180	119	387	20,954	5,401	17,541	17,411	235	700	151,215	77,768
7/10/13	6,100	112	366	20,896	5,299	17,314	17,165	239	687	141,795	74,629
7/11/13	6,100	107	350	21,109	5,267	17,314	17,143	245	682	134,332	72,497
7/12/13	6,100	101	334	21,323	5,235	17,314	17,122	252	678	126,869	70,364
7/13/13	6,150	97	320	21,712	5,245	17,456	17,241	260	679	120,385	68,791
7/14/13	6,420	95	318	22,890	5,442	18,222	17,975	278	705	117,816	69,567
7/15/13	6,160	86	289	22,178	5,189	17,484	17,226	273	672	105,508	64,597
7/16/13	6,140	80	271	22,321	5,140	17,427	17,148	279	665	97,654	62,241
7/17/13	6,130	75	255	22,499	5,100	17,399	17,099	285	660	89,995	59,997
7/18/13	5,680	69	305	20,252	5,053	16,896	16,430	251	613	102,250	63,534
7/19/13	6,050	74	398	20,936	5,731	18,822	18,124	254	653	129,001	76,132
7/20/13	6,120	75	476	20,537	6,150	19,874	18,964	243	662	150,817	85,570
7/21/13	6,060	74	544	19,700	6,440	20,505	19,403	227	657	169,462	93,204
7/22/13	6,060	74	617	19,064	6,789	21,331	20,028	213	658	189,585	101,677
7/23/13	6,060	74	691	18,429	7,139	22,157	20,653	199	659	209,709	110,150
7/24/13	7,020	86	885	20,612	8,674	26,624	24,649	215	764	266,242	137,415
7/25/13	7,500	92	1,036	21,235	9,700	29,467	27,108	212	818	309,351	157,297
7/26/13	7,540	92	1,132	20,558	10,187	30,652	28,030	196	824	336,040	168,679
7/27/13	7,620	93	1,236	19,977	10,734	32,016	29,113	181	834	364,909	181,123
7/28/13	7,610	93	1,326	19,153	11,159	33,012	29,859	164	834	389,701	191,525
7/29/13	7,700	94	1,435	18,572	11,735	34,452	31,006	148	845	419,879	204,556
7/30/13	7,710	94	1,529	17,787	12,195	35,547	31,842	131	848	446,027	215,602
7/31/13	7,770	95	1,635	17,111	12,738	36,883	32,891	114	856	475,300	228,144
8/1/13	7,840	96	1,597	17,649	12,635	36,359	32,407	114	885	471,909	226,363
8/2/13	7,850	96	1,547	18,055	12,434	35,547	31,667	113	908	464,828	222,810
8/3/13	7,820	96	1,489	18,369	12,169	34,557	30,768	111	926	455,398	218,132
8/4/13	7,850	96	1,442	18,824	11,998	33,831	30,105	110	951	449,462	215,127
8/5/13	7,900	97	1,398	19,330	11,856	33,183	29,511	110	979	444,592	212,631
8/6/13	7,860	96	1,339	19,617	11,578	32,156	28,579	108	996	434,648	207,708
8/7/13	7,860	96	1,286	20,002	11,360	31,297	27,797	106	1,018	426,955	203,862
8/8/13	7,980	98	1,252	20,697	11,312	30,903	27,427	107	1,056	425,663	203,069
8/9/13	8,160	100	1,226	21,564	11,341	30,708	27,234	108	1,102	427,278	203,656
8/10/13	7,920	97	1,137	21,317	10,788	28,939	25,645	103	1,092	406,960	193,790
8/11/13	6,980	85	955	19,128	9,314	24,742	21,907	90	981	351,827	167,374
8/12/13	6,450	79	840	17,992	8,428	22,158	19,601	82	925	318,800	151,509
8/13/13	6,450	79	796	18,307	8,249	21,453	18,960	81	943	312,487	148,352
8/14/13	6,390	78	746	18,450	7,995	20,555	18,147	79	952	303,326	143,845
8/15/13	6,440	79	709	18,909	7,879	20,012	17,649	79	977	299,396	141,819

DATE	FLOW	AMM	CHLA	NIT	TKN	TOC	DOC	OP	TP	TSS	VSS
8/16/13	6,430	79	672	19,364	7,673	20,211	17,645	98	952	285,619	135,548
8/17/13	6,470	79	639	19,972	7,526	20,568	17,780	118	935	274,000	130,302
8/18/13	6,420	79	598	20,301	7,274	20,639	17,666	137	905	258,590	123,253
8/19/13	6,560	80	574	21,237	7,235	21,324	18,076	159	901	250,648	119,768
8/20/13	6,590	81	540	21,830	7,070	21,657	18,184	180	882	238,150	114,113
8/21/13	6,500	80	495	22,022	6,778	21,593	17,960	197	847	221,440	106,438
8/22/13	6,530	80	461	22,615	6,612	21,927	18,067	218	827	208,942	100,784
8/23/13	6,540	80	425	23,142	6,426	22,194	18,120	238	805	195,721	94,783
8/24/13	6,640	81	394	23,996	6,324	22,771	18,422	261	794	184,967	89,984
8/25/13	6,630	81	356	24,459	6,115	22,974	18,419	281	769	170,961	83,609
8/26/13	6,720	82	323	25,297	5,995	23,526	18,694	305	755	159,369	78,420
8/27/13	6,770	83	287	25,995	5,836	23,943	18,859	327	737	146,538	72,632
8/28/13	6,580	81	242	25,760	5,474	23,506	18,354	338	692	128,802	64,401
8/29/13	6,610	81	236	26,094	5,413	23,549	18,460	348	705	129,389	61,999
8/30/13	6,600	81	229	26,269	5,318	23,449	18,453	356	714	129,194	59,214
8/31/13	6,620	81	223	26,565	5,248	23,455	18,531	366	726	129,585	56,693
9/1/13	6,660	81	217	26,943	5,193	23,531	18,664	377	740	130,368	54,320
9/2/13	6,770	83	214	27,609	5,190	23,854	18,995	392	762	132,521	52,456
9/3/13	6,890	84	211	28,323	5,193	24,209	19,354	408	786	134,870	50,576
9/4/13	7,010	86	208	29,045	5,191	24,562	19,714	424	810	137,219	48,598
9/5/13	7,360	90	211	30,735	5,355	25,717	20,722	455	861	144,070	48,023
9/6/13	7,490	92	207	31,522	5,351	26,097	21,113	473	887	146,615	45,817
9/7/13	7,460	91	198	31,639	5,233	25,920	21,052	481	894	146,028	42,591
9/8/13	7,450	91	191	31,840	5,128	25,812	21,048	490	904	145,832	39,496
9/9/13	7,330	90	180	31,566	4,950	25,325	20,733	491	900	143,483	35,871
9/10/13	7,360	90	173	31,936	4,874	25,356	20,842	503	915	144,070	33,016
9/11/13	7,290	89	164	31,870	4,733	25,044	20,668	508	917	142,700	29,729
9/12/13	7,320	90	158	32,240	4,657	25,075	20,777	519	931	143,287	26,866
9/13/13	7,400	91	153	32,592	4,931	26,185	21,728	524	957	149,032	33,428
9/14/13	7,550	92	150	33,253	5,258	27,568	22,907	533	992	156,316	40,500
9/15/13	7,580	93	145	33,385	5,507	28,534	23,740	534	1,012	161,217	47,081
9/16/13	7,680	94	141	33,825	5,811	29,778	24,805	539	1,041	167,681	54,207
9/17/13	7,770	95	136	34,222	6,113	31,004	25,856	544	1,069	174,033	61,423
9/18/13	7,660	94	128	33,737	6,257	31,430	26,240	535	1,070	175,894	67,042
9/19/13	7,640	93	121	33,649	6,471	32,211	26,919	532	1,083	179,749	73,338
9/20/13	7,670	94	115	33,781	6,727	33,204	27,776	533	1,103	184,786	80,122
9/21/13	7,730	95	110	34,045	7,013	34,336	28,749	535	1,128	190,596	87,296
9/22/13	7,670	94	103	33,781	7,189	34,936	29,277	530	1,135	193,448	93,115
9/23/13	7,830	96	99	34,486	7,575	36,549	30,654	539	1,175	201,904	101,689
9/24/13	7,770	95	92	34,222	7,751	37,147	31,180	534	1,182	204,745	107,491
9/25/13	7,840	96	86	34,530	8,057	38,367	32,228	537	1,209	211,016	115,100
9/26/13	7,950	97	91	35,274	7,963	38,244	32,006	560	1,213	213,328	113,473
9/27/13	8,060	99	95	36,025	7,862	38,102	31,765	584	1,216	215,623	111,756
9/28/13	8,140	100	99	36,648	7,728	37,803	31,390	605	1,215	217,099	109,545
9/29/13	8,090	99	102	36,687	7,469	36,898	30,511	618	1,194	215,106	105,573
9/30/13	8,110	99	105	37,042	7,276	36,314	29,898	635	1,184	214,976	102,527

**Appendix 8**

Daily average flow in cubic feet per second and ammonia (AMM), chlorophyll-a (CHLA), nitrate (NIT), total Kjeldahl nitrogen (TKN), total organic carbon (TOC), dissolved organic carbon (DOC), dissolved orthophosphate (OP), total phosphorus (TP), total suspended solids (TSS), and volatile suspended solids (VSS) daily loads in kilograms for the Snake River at Buhl, Idaho

DATE	FLOW	AMM	CHLA	NIT	TKN	TOC	DOC	ORP	TP	TSS	VSS
3/28/2013	1,260	92	46	9,249	1,110	4,933	5,025	108	216	15,415	4,625
3/29/2013	1,260	87	52	9,139	1,158	5,006	5,003	103	213	17,838	7,157
3/30/2013	1,260	81	57	9,029	1,207	5,078	4,981	98	211	20,260	9,690
3/31/2013	1,260	76	63	8,919	1,255	5,151	4,959	93	208	22,682	12,222
4/1/2013	1,270	71	69	8,879	1,314	5,265	4,976	89	207	25,304	14,872
4/2/2013	1,270	65	74	8,768	1,363	5,338	4,954	84	204	27,746	17,424
4/3/2013	1,280	60	81	8,725	1,423	5,454	4,971	80	203	30,425	20,134
4/4/2013	1,270	54	85	8,546	1,461	5,485	4,910	75	199	32,629	22,529
4/5/2013	1,270	49	91	8,435	1,509	5,558	4,888	70	196	35,070	25,082
4/6/2013	1,270	43	97	8,324	1,558	5,631	4,865	65	194	37,512	27,635
4/7/2013	1,370	41	110	8,859	1,734	6,154	5,225	65	206	43,099	32,564
4/8/2013	1,410	36	120	8,995	1,838	6,415	5,353	61	209	47,069	36,349
4/9/2013	1,400	29	125	8,809	1,879	6,450	5,290	55	205	49,426	38,905
4/10/2013	1,500	25	140	9,307	2,071	6,997	5,642	53	216	55,841	44,699
4/11/2013	1,560	19	153	9,543	2,214	7,367	5,840	50	221	61,073	49,622
4/12/2013	1,540	19	155	9,313	2,204	7,259	5,768	47	218	61,367	46,833
4/13/2013	1,520	19	157	9,085	2,194	7,152	5,696	45	215	61,633	44,099
4/14/2013	1,610	20	171	9,511	2,344	7,561	6,036	45	227	66,407	44,459
4/15/2013	1,660	20	181	9,690	2,437	7,781	6,226	45	233	69,630	43,519
4/16/2013	1,670	20	187	9,632	2,472	7,813	6,267	43	234	71,217	41,446
4/17/2013	1,730	21	198	9,857	2,582	8,079	6,495	42	242	74,985	40,516
4/18/2013	1,680	21	197	9,455	2,528	7,831	6,310	39	234	73,993	36,996
4/19/2013	1,720	21	207	9,559	2,609	8,002	6,463	38	239	76,957	35,472
4/20/2013	1,710	21	210	9,384	2,615	7,941	6,429	36	237	77,705	32,875
4/21/2013	1,700	21	214	9,211	2,621	7,880	6,394	33	235	78,439	30,306
4/22/2013	1,690	21	217	9,038	2,626	7,818	6,359	31	233	79,159	27,765
4/23/2013	1,600	20	210	8,445	2,506	7,388	6,023	27	220	76,062	24,049
4/24/2013	1,660	20	223	8,646	2,620	7,651	6,252	26	228	80,075	22,630
4/25/2013	1,650	20	226	8,478	2,624	7,590	6,217	24	226	80,746	20,186
4/26/2013	1,580	29	208	7,842	2,491	7,263	5,945	25	223	79,253	23,196
4/27/2013	1,600	39	202	7,662	2,500	7,349	6,012	28	232	82,214	27,405
4/28/2013	1,580	48	192	7,290	2,447	7,252	5,929	30	235	83,119	30,928
4/29/2013	1,580	58	183	7,014	2,425	7,246	5,921	32	241	85,052	34,794
4/30/2013	1,700	73	188	7,250	2,585	7,790	6,361	37	266	93,592	41,596
5/1/2013	1,840	90	194	7,525	2,772	8,426	6,876	42	295	103,551	49,524
5/2/2013	2,290	126	230	8,965	3,418	10,478	8,545	56	375	131,677	67,239
5/3/2013	4,110	251	391	15,372	6,077	18,791	15,315	106	690	241,357	130,735
5/4/2013	4,250	286	382	15,153	6,225	19,417	15,814	116	729	254,778	145,587
5/5/2013	4,460	327	377	15,122	6,470	20,360	16,572	128	783	272,824	163,694
5/6/2013	4,180	332	332	13,442	6,005	19,068	15,510	126	750	260,810	163,645
5/7/2013	4,130	354	306	12,560	5,876	18,825	15,303	130	756	262,743	171,793
5/8/2013	4,150	381	286	11,895	5,846	18,902	15,355	136	776	269,092	182,780
5/9/2013	4,110	402	261	11,062	5,732	18,705	15,185	141	784	271,527	191,074

DATE	FLOW	AMM	CHLA	NIT	TKN	TOC	DOC	ORP	TP	TSS	VSS
5/10/2013	3,940	393	238	10,742	5,337	17,931	14,736	158	733	262,362	175,596
5/11/2013	3,940	399	226	10,880	5,178	17,931	14,915	182	715	264,427	168,022
5/12/2013	3,940	406	214	11,018	5,020	17,931	15,094	205	696	266,493	160,447
5/13/2013	4,010	421	205	11,354	4,948	18,250	15,545	233	690	273,330	155,588
5/14/2013	4,080	435	196	11,695	4,870	18,569	16,002	261	682	280,241	150,460
5/15/2013	4,080	442	184	11,837	4,706	18,569	16,187	285	663	282,380	142,616
5/16/2013	4,070	448	171	11,950	4,531	18,523	16,332	309	642	283,822	134,442
5/17/2013	4,100	459	159	12,182	4,400	18,660	16,639	335	628	288,064	127,551
5/18/2013	4,120	468	147	12,385	4,256	18,751	16,907	361	611	291,629	120,252
5/19/2013	4,130	476	135	12,560	4,100	18,796	17,136	387	593	294,503	112,604
5/20/2013	4,200	492	124	12,919	4,001	19,115	17,617	418	584	301,696	106,438
5/21/2013	4,060	483	108	12,631	3,704	18,478	17,215	429	545	293,769	95,085
5/22/2013	4,030	486	94	12,678	3,515	18,341	17,270	449	522	293,711	86,634
5/23/2013	4,070	498	83	12,946	3,386	18,523	17,627	478	508	298,760	79,669
5/24/2013	4,030	461	88	13,030	3,458	18,355	17,496	463	523	282,441	78,182
5/25/2013	4,010	428	94	13,176	3,546	18,278	17,451	450	541	267,724	77,093
5/26/2013	4,050	400	101	13,520	3,688	18,475	17,668	444	567	256,945	77,154
5/27/2013	4,110	374	108	13,935	3,850	18,763	17,972	440	596	247,104	77,579
5/28/2013	4,170	346	116	14,358	4,016	19,051	18,279	435	626	236,864	77,983
5/29/2013	4,190	315	123	14,646	4,145	19,157	18,410	426	650	224,086	77,625
5/30/2013	4,160	280	129	14,759	4,224	19,035	18,322	412	667	208,667	76,342
5/31/2013	4,100	244	133	14,761	4,271	18,774	18,101	396	678	192,043	74,524
6/1/2013	4,080	210	139	14,903	4,357	18,697	18,055	383	695	177,557	73,447
6/2/2013	4,060	177	144	15,043	4,442	18,620	18,009	370	712	163,205	72,378
6/3/2013	3,560	128	132	13,377	3,988	16,339	15,829	315	643	131,284	62,842
6/4/2013	2,910	81	112	11,087	3,336	13,366	12,969	250	540	97,650	50,859
6/5/2013	2,240	45	90	8,652	2,627	10,296	10,007	187	427	67,729	38,758
6/6/2013	1,770	22	74	6,929	2,122	8,142	7,926	143	346	47,640	30,316
6/7/2013	1,620	21	85	6,556	2,025	7,452	7,278	122	326	46,347	26,528
6/8/2013	1,590	22	100	6,644	2,068	7,314	7,167	112	329	48,182	24,839
6/9/2013	1,590	24	117	6,853	2,149	7,314	7,191	103	338	50,876	23,642
6/10/2013	1,610	26	136	7,152	2,258	7,406	7,306	96	352	54,243	22,727
6/11/2013	1,580	27	150	7,226	2,296	7,268	7,194	86	354	55,909	21,114
6/12/2013	1,580	28	167	7,435	2,376	7,268	7,218	78	363	58,585	19,925
6/13/2013	1,600	30	187	7,740	2,488	7,360	7,333	70	376	62,037	18,972
6/14/2013	1,630	32	208	8,099	2,617	7,498	7,495	63	393	65,961	18,101
6/15/2013	1,630	34	225	8,314	2,700	7,498	7,520	54	402	68,723	16,874
6/16/2013	1,610	35	240	8,424	2,749	7,406	7,452	45	406	70,607	15,455
6/17/2013	1,590	36	254	8,529	2,795	7,314	7,383	36	410	72,423	14,066
6/18/2013	1,530	36	261	8,409	2,767	7,038	7,127	27	403	72,282	12,383
6/19/2013	1,490	36	270	8,385	2,771	6,854	6,963	18	401	72,916	10,937
6/20/2013	1,560	41	271	8,779	2,814	7,105	7,187	30	415	75,251	12,814
6/21/2013	1,560	44	259	8,779	2,726	7,034	7,083	41	411	74,160	14,178
6/22/2013	1,570	47	249	8,836	2,656	7,008	7,025	52	409	73,538	15,641
6/23/2013	1,560	49	236	8,779	2,552	6,893	6,876	63	401	71,979	16,904
6/24/2013	1,600	53	230	9,004	2,528	6,997	6,946	76	407	72,706	18,736
6/25/2013	1,610	56	219	9,061	2,454	6,967	6,883	87	405	72,035	20,260
6/26/2013	1,600	59	206	9,004	2,349	6,851	6,734	98	397	70,469	21,532
6/27/2013	1,560	60	189	8,779	2,203	6,609	6,462	106	383	67,617	22,357

DATE	FLOW	AMM	CHLA	NIT	TKN	TOC	DOC	ORP	TP	TSS	VSS
6/28/2013	1,540	62	175	8,667	2,089	6,454	6,277	116	373	65,673	23,416
6/29/2013	1,530	64	162	8,610	1,989	6,343	6,134	126	366	64,177	24,601
6/30/2013	1,560	68	154	8,779	1,941	6,396	6,151	139	369	64,345	26,447
7/1/2013	1,560	71	142	8,779	1,854	6,325	6,047	150	364	63,255	27,810
7/2/2013	1,570	74	131	8,836	1,778	6,295	5,982	162	362	62,562	29,360
7/3/2013	1,580	77	120	8,892	1,701	6,263	5,915	174	360	61,856	30,928
7/4/2013	1,590	83	115	8,893	1,695	6,361	5,955	172	356	61,414	31,402
7/5/2013	1,640	92	112	9,115	1,731	6,621	6,145	175	361	62,486	32,676
7/6/2013	1,660	99	107	9,168	1,735	6,763	6,223	174	359	62,377	33,365
7/7/2013	1,660	104	101	9,110	1,718	6,824	6,226	171	353	61,507	33,655
7/8/2013	1,690	112	97	9,216	1,731	7,009	6,342	171	354	61,732	34,558
7/9/2013	1,690	118	90	9,156	1,713	7,071	6,345	168	347	60,846	34,854
7/10/2013	1,680	123	83	9,044	1,685	7,091	6,310	164	339	59,605	34,941
7/11/2013	1,660	128	76	8,878	1,648	7,067	6,238	160	329	58,025	34,815
7/12/2013	1,700	137	72	9,032	1,670	7,300	6,391	160	331	58,532	35,951
7/13/2013	1,710	143	66	9,026	1,662	7,406	6,432	158	326	57,980	36,462
7/14/2013	1,730	151	60	9,071	1,663	7,556	6,510	157	324	57,751	37,190
7/15/2013	1,780	162	55	9,271	1,692	7,840	6,701	159	327	58,487	38,576
7/16/2013	1,770	167	48	9,157	1,664	7,861	6,667	155	318	57,230	38,669
7/17/2013	1,760	172	41	9,044	1,636	7,881	6,632	151	310	55,984	38,758
7/18/2013	1,730	160	50	8,617	1,645	7,870	6,616	142	299	58,960	38,097
7/19/2013	1,730	151	59	8,345	1,681	7,994	6,712	135	294	62,891	38,097
7/20/2013	1,720	141	68	8,026	1,707	8,071	6,770	127	287	66,435	37,877
7/21/2013	1,740	134	78	7,846	1,764	8,290	6,946	122	285	71,161	38,318
7/22/2013	1,770	127	89	7,703	1,831	8,560	7,165	118	284	76,410	38,978
7/23/2013	2,030	135	112	8,515	2,143	9,963	8,331	127	319	92,246	44,704
7/24/2013	3,180	195	193	12,839	3,424	15,834	13,228	187	490	151,729	70,029
7/25/2013	3,240	181	214	12,571	3,556	16,365	13,658	178	489	161,953	71,350
7/26/2013	3,260	165	232	12,136	3,647	16,700	13,925	166	482	170,360	71,791
7/27/2013	3,260	148	250	11,623	3,715	16,933	14,107	154	472	177,767	71,791
7/28/2013	3,270	131	268	11,145	3,795	17,220	14,334	142	463	185,742	72,011
7/29/2013	3,320	116	290	10,793	3,923	17,721	14,738	131	460	196,125	73,112
7/30/2013	3,310	98	306	10,240	3,980	17,905	14,879	118	448	203,055	72,892
7/31/2013	3,300	81	323	9,690	4,037	18,087	15,019	105	436	209,940	72,671
8/1/2013	3,300	78	320	10,066	4,107	17,861	14,825	103	451	206,171	71,595
8/2/2013	3,320	76	320	10,506	4,203	17,742	14,720	101	469	203,630	70,946
8/3/2013	3,330	73	318	10,918	4,286	17,567	14,569	99	486	200,441	70,073
8/4/2013	3,350	71	317	11,366	4,383	17,443	14,459	98	504	197,820	69,401
8/5/2013	3,370	69	316	11,819	4,480	17,316	14,348	96	522	195,152	68,716
8/6/2013	3,340	65	311	12,095	4,511	16,933	14,024	93	533	189,601	67,014
8/7/2013	3,350	63	309	12,514	4,596	16,755	13,869	91	550	186,344	66,122
8/8/2013	3,620	65	331	13,936	5,043	17,857	14,774	96	611	197,229	70,270
8/9/2013	3,680	63	333	14,587	5,205	17,901	14,803	95	638	196,296	70,234
8/10/2013	2,860	47	257	11,663	4,105	13,716	11,337	72	509	149,290	53,651
8/11/2013	2,110	33	188	8,846	3,074	9,975	8,240	52	385	107,731	38,893
8/12/2013	1,930	28	170	8,311	2,852	8,991	7,424	46	361	96,337	34,946
8/13/2013	1,870	26	163	8,267	2,803	8,584	7,083	44	358	91,207	33,249
8/14/2013	1,870	24	162	8,480	2,843	8,456	6,973	42	367	89,072	32,639
8/15/2013	1,870	23	160	8,694	2,883	8,328	6,863	41	375	86,937	32,029

DATE	FLOW	AMM	CHLA	NIT	TKN	TOC	DOC	ORP	TP	TSS	VSS
8/16/2013	1,870	32	153	8,870	2,812	8,409	6,906	49	370	85,177	32,029
8/17/2013	1,860	40	145	8,997	2,727	8,444	6,911	56	363	82,971	31,858
8/18/2013	1,890	50	139	9,320	2,700	8,662	7,065	65	363	82,530	32,372
8/19/2013	1,910	59	133	9,599	2,657	8,836	7,183	74	362	81,606	32,714
8/20/2013	1,890	68	125	9,676	2,558	8,826	7,150	81	353	78,973	32,372
8/21/2013	1,870	76	116	9,750	2,460	8,813	7,117	88	344	76,377	32,029
8/22/2013	1,870	84	108	9,926	2,390	8,894	7,159	95	338	74,618	32,029
8/23/2013	1,880	94	102	10,156	2,332	9,023	7,240	104	335	73,247	32,201
8/24/2013	1,880	103	94	10,332	2,261	9,105	7,282	111	329	71,478	32,201
8/25/2013	1,900	113	88	10,621	2,214	9,284	7,403	121	328	70,450	32,543
8/26/2013	1,930	124	81	10,971	2,176	9,514	7,563	130	327	69,746	33,057
8/27/2013	1,910	131	73	11,037	2,081	9,498	7,528	137	319	67,226	32,714
8/28/2013	1,880	138	64	11,040	1,978	9,430	7,452	143	308	64,401	32,201
8/29/2013	1,870	130	63	11,012	1,961	9,304	7,403	148	313	62,533	30,352
8/30/2013	1,870	122	61	11,042	1,955	9,227	7,394	154	319	61,008	28,674
8/31/2013	1,880	115	60	11,132	1,960	9,200	7,425	161	328	59,801	27,140
9/1/2013	1,900	108	59	11,282	1,974	9,221	7,494	169	338	58,887	25,725
9/2/2013	1,950	103	59	11,610	2,020	9,384	7,682	180	353	58,847	24,652
9/3/2013	2,020	99	60	12,060	2,086	9,638	7,948	193	373	59,312	23,725
9/4/2013	2,120	95	61	12,692	2,182	10,029	8,331	209	398	60,519	22,997
9/5/2013	2,260	92	64	13,567	2,319	10,599	8,870	230	432	62,672	22,488
9/6/2013	2,180	80	60	13,122	2,230	10,135	8,545	229	425	58,675	19,736
9/7/2013	2,140	70	57	12,916	2,182	9,862	8,378	232	424	55,853	17,454
9/8/2013	2,150	61	56	13,012	2,185	9,820	8,407	240	433	54,361	15,607
9/9/2013	2,160	53	54	13,107	2,188	9,778	8,435	248	443	52,852	13,741
9/10/2013	2,120	43	51	12,899	2,141	9,510	8,269	251	442	50,144	11,585
9/11/2013	2,050	33	48	12,507	2,063	9,112	7,986	249	434	46,816	9,363
9/12/2013	2,050	25	47	12,540	2,057	9,029	7,976	256	441	45,144	7,524
9/13/2013	2,100	28	46	12,846	2,103	9,257	8,111	263	447	46,641	9,486
9/14/2013	2,130	30	44	13,029	2,129	9,397	8,166	267	448	47,708	11,426
9/15/2013	2,140	32	42	13,091	2,135	9,449	8,144	269	445	48,335	13,292
9/16/2013	2,180	35	41	13,335	2,171	9,634	8,235	275	448	49,648	15,387
9/17/2013	2,180	37	39	13,335	2,166	9,642	8,174	276	443	50,059	17,233
9/18/2013	2,150	38	36	13,152	2,133	9,518	8,000	273	431	49,775	18,817
9/19/2013	2,140	40	34	13,091	2,119	9,482	7,903	273	424	49,946	20,542
9/20/2013	2,140	42	32	13,091	2,115	9,490	7,842	273	419	50,349	22,355
9/21/2013	2,160	45	30	13,213	2,130	9,587	7,855	277	418	51,226	24,393
9/22/2013	2,190	47	28	13,396	2,156	9,728	7,902	282	418	52,349	26,587
9/23/2013	2,240	51	26	13,702	2,201	9,958	8,019	289	422	53,966	29,091
9/24/2013	2,150	51	23	13,152	2,108	9,566	7,636	278	400	52,203	29,743
9/25/2013	2,170	53	21	13,274	2,124	9,664	7,646	281	398	53,097	31,858
9/26/2013	2,200	52	22	13,565	2,135	9,736	7,701	291	405	53,113	31,222
9/27/2013	2,230	51	23	13,859	2,146	9,807	7,755	302	412	53,110	30,556
9/28/2013	2,200	48	23	13,781	2,099	9,614	7,601	304	408	51,677	29,069
9/29/2013	2,170	46	23	13,699	2,053	9,423	7,448	305	404	50,265	27,610
9/30/2013	2,200	45	24	13,996	2,064	9,492	7,500	316	411	50,242	26,915

**Appendix 9**

Daily average flow in cubic feet per second and ammonia (AMM), chlorophyll-a (CHLA), nitrate (NIT), total Kjeldahl nitrogen (TKN), total organic carbon (TOC), dissolved organic carbon (DOC), dissolved orthophosphate (OP), total phosphorus (TP), total suspended solids (TSS), and volatile suspended solids (VSS) daily loads in kilograms for the Snake River at Milner, Idaho

DATE	FLOW	AMM	CHLA	NIT	TKN	TOC	DOC	OP	TP	TSS	VSS
03/28/13	0	0	0	0	0	0	0	0	0	0	0
03/29/13	0	0	0	0	0	0	0	0	0	0	0
03/30/13	0	0	0	0	0	0	0	0	0	0	0
03/31/13	0	0	0	0	0	0	0	0	0	0	0
04/01/13	0	0	0	0	0	0	0	0	0	0	0
04/02/13	0	0	0	0	0	0	0	0	0	0	0
04/03/13	0	0	0	0	0	0	0	0	0	0	0
04/04/13	0	0	0	0	0	0	0	0	0	0	0
04/05/13	0	0	0	0	0	0	0	0	0	0	0
04/06/13	0	0	0	0	0	0	0	0	0	0	0
04/07/13	0	0	0	0	0	0	0	0	0	0	0
04/08/13	0	0	0	0	0	0	0	0	0	0	0
04/09/13	0	0	0	0	0	0	0	0	0	0	0
04/10/13	0	0	0	0	0	0	0	0	0	0	0
04/11/13	0	0	0	0	0	0	0	0	0	0	0
04/12/13	0	0	0	0	0	0	0	0	0	0	0
04/13/13	0	0	0	0	0	0	0	0	0	0	0
04/14/13	0	0	0	0	0	0	0	0	0	0	0
04/15/13	0	0	0	0	0	0	0	0	0	0	0
04/16/13	0	0	0	0	0	0	0	0	0	0	0
04/17/13	0	0	0	0	0	0	0	0	0	0	0
04/18/13	0	0	0	0	0	0	0	0	0	0	0
04/19/13	0	0	0	0	0	0	0	0	0	0	0
04/20/13	0	0	0	0	0	0	0	0	0	0	0
04/21/13	0	0	0	0	0	0	0	0	0	0	0
04/22/13	0	0	0	0	0	0	0	0	0	0	0
04/23/13	0	0	0	0	0	0	0	0	0	0	0
04/24/13	0	0	0	0	0	0	0	0	0	0	0
04/25/13	0	0	0	0	0	0	0	0	0	0	0
04/26/13	0	0	0	0	0	0	0	0	0	0	0
04/27/13	0	0	0	0	0	0	0	0	0	0	0
04/28/13	0	0	0	0	0	0	0	0	0	0	0
04/29/13	0	0	0	0	0	0	0	0	0	0	0
04/30/13	0	0	0	0	0	0	0	0	0	0	0
05/01/13	979	38	91	240	1,509	4,907	4,213	6	180	59,544	28,061
05/02/13	2,300	98	217	563	3,545	11,593	9,961	14	436	137,880	67,533
05/03/13	2,500	118	239	612	3,854	12,671	10,897	15	488	147,685	75,153
05/04/13	2,740	141	267	670	4,224	13,964	12,020	17	549	159,468	84,283
05/05/13	2,490	139	246	609	3,838	12,760	10,993	15	513	142,742	78,334
05/06/13	2,350	142	236	575	3,623	12,108	10,441	14	497	132,663	75,573
05/07/13	2,390	155	244	585	3,684	12,381	10,685	15	518	132,832	78,530
05/08/13	2,380	164	247	582	3,669	12,396	10,707	15	529	130,197	79,865

DATE	FLOW	AMM	CHLA	NIT	TKN	TOC	DOC	OP	TP	TSS	VSS
05/09/13	2,250	165	237	551	3,468	11,782	10,185	14	512	121,119	77,076
05/10/13	2,240	176	222	626	3,355	11,694	10,198	19	502	115,491	72,818
05/11/13	2,250	189	209	708	3,272	11,711	10,303	24	496	110,895	69,211
05/12/13	2,250	201	195	786	3,173	11,675	10,362	30	488	105,782	65,278
05/13/13	2,320	219	187	892	3,171	12,002	10,745	36	495	103,802	63,255
05/14/13	2,350	234	175	986	3,109	12,120	10,946	42	494	99,805	59,965
05/15/13	2,360	247	161	1,072	3,019	12,135	11,054	48	488	94,868	56,096
05/16/13	2,370	261	147	1,160	2,929	12,149	11,163	54	481	89,885	52,191
05/17/13	2,370	273	132	1,243	2,825	12,112	11,225	59	473	84,500	48,049
05/18/13	2,370	286	118	1,325	2,721	12,074	11,287	65	465	79,115	43,907
05/19/13	2,370	298	103	1,408	2,618	12,037	11,350	70	456	73,731	39,765
05/20/13	2,380	312	89	1,497	2,525	12,050	11,460	76	450	68,634	35,773
05/21/13	2,340	319	73	1,554	2,380	11,811	11,329	81	434	62,164	31,082
05/22/13	2,370	336	59	1,657	2,307	11,925	11,536	87	432	57,576	27,338
05/23/13	2,360	346	44	1,732	2,194	11,838	11,549	92	422	51,971	23,098
05/24/13	2,360	351	47	1,650	2,190	11,854	11,578	91	408	51,971	24,336
05/25/13	2,370	356	49	1,574	2,195	11,921	11,656	89	396	52,191	25,681
05/26/13	2,370	360	51	1,491	2,191	11,938	11,685	88	382	52,191	26,924
05/27/13	2,360	363	53	1,402	2,178	11,904	11,665	86	367	51,971	28,048
05/28/13	2,350	366	55	1,314	2,164	11,870	11,644	84	352	51,751	29,161
05/29/13	2,380	374	58	1,248	2,188	12,038	11,822	83	343	52,411	30,781
05/30/13	2,370	377	60	1,160	2,175	12,004	11,801	81	328	52,191	31,895
05/31/13	2,400	386	63	1,091	2,198	12,173	11,980	81	318	52,852	33,557
06/01/13	2,400	390	65	1,007	2,194	12,189	12,009	79	304	52,852	34,815
06/02/13	2,080	342	58	800	1,898	10,579	10,433	67	252	45,805	31,264
06/03/13	1,280	213	37	447	1,166	6,519	6,436	40	147	28,188	19,910
06/04/13	289	48	9	91	263	1,474	1,457	9	32	6,364	4,647
06/05/13	0	0	0	0	0	0	0	0	0	0	0
06/06/13	0	0	0	0	0	0	0	0	0	0	0
06/07/13	0	0	0	0	0	0	0	0	0	0	0
06/08/13	0	0	0	0	0	0	0	0	0	0	0
06/09/13	0	0	0	0	0	0	0	0	0	0	0
06/10/13	0	0	0	0	0	0	0	0	0	0	0
06/11/13	0	0	0	0	0	0	0	0	0	0	0
06/12/13	0	0	0	0	0	0	0	0	0	0	0
06/13/13	0	0	0	0	0	0	0	0	0	0	0
06/14/13	0	0	0	0	0	0	0	0	0	0	0
06/15/13	0	0	0	0	0	0	0	0	0	0	0
06/16/13	0	0	0	0	0	0	0	0	0	0	0
06/17/13	0	0	0	0	0	0	0	0	0	0	0
06/18/13	0	0	0	0	0	0	0	0	0	0	0
06/19/13	0	0	0	0	0	0	0	0	0	0	0
06/20/13	0	0	0	0	0	0	0	0	0	0	0
06/21/13	0	0	0	0	0	0	0	0	0	0	0
06/22/13	0	0	0	0	0	0	0	0	0	0	0
06/23/13	0	0	0	0	0	0	0	0	0	0	0
06/24/13	0	0	0	0	0	0	0	0	0	0	0
06/25/13	0	0	0	0	0	0	0	0	0	0	0
06/26/13	0	0	0	0	0	0	0	0	0	0	0

DATE	FLOW	AMM	CHLA	NIT	TKN	TOC	DOC	OP	TP	TSS	VSS
06/27/13	0	0	0	0	0	0	0	0	0	0	0
06/28/13	0	0	0	0	0	0	0	0	0	0	0
06/29/13	0	0	0	0	0	0	0	0	0	0	0
06/30/13	0	0	0	0	0	0	0	0	0	0	0
07/01/13	0	0	0	0	0	0	0	0	0	0	0
07/02/13	0	0	0	0	0	0	0	0	0	0	0
07/03/13	0	0	0	0	0	0	0	0	0	0	0
07/04/13	0	0	0	0	0	0	0	0	0	0	0
07/05/13	0	0	0	0	0	0	0	0	0	0	0
07/06/13	0	0	0	0	0	0	0	0	0	0	0
07/07/13	0	0	0	0	0	0	0	0	0	0	0
07/08/13	0	0	0	0	0	0	0	0	0	0	0
07/09/13	0	0	0	0	0	0	0	0	0	0	0
07/10/13	0	0	0	0	0	0	0	0	0	0	0
07/11/13	0	0	0	0	0	0	0	0	0	0	0
07/12/13	0	0	0	0	0	0	0	0	0	0	0
07/13/13	0	0	0	0	0	0	0	0	0	0	0
07/14/13	0	0	0	0	0	0	0	0	0	0	0
07/15/13	0	0	0	0	0	0	0	0	0	0	0
07/16/13	0	0	0	0	0	0	0	0	0	0	0
07/17/13	0	0	0	0	0	0	0	0	0	0	0
07/18/13	0	0	0	0	0	0	0	0	0	0	0
07/19/13	0	0	0	0	0	0	0	0	0	0	0
07/20/13	0	0	0	0	0	0	0	0	0	0	0
07/21/13	0	0	0	0	0	0	0	0	0	0	0
07/22/13	721	60	46	176	940	4,017	3,566	23	106	46,877	16,004
07/23/13	1,510	113	103	369	1,963	8,493	7,484	48	223	104,508	34,308
07/24/13	1,480	100	107	362	1,919	8,401	7,351	47	219	108,640	34,403
07/25/13	1,490	89	114	365	1,927	8,536	7,417	47	221	115,624	35,416
07/26/13	1,490	77	120	365	1,922	8,615	7,432	47	222	121,874	36,198
07/27/13	1,500	66	126	367	1,930	8,751	7,498	48	224	128,984	37,227
07/28/13	1,490	53	132	365	1,911	8,771	7,463	47	224	134,374	37,760
07/29/13	1,490	42	137	365	1,906	8,849	7,479	47	224	140,624	38,541
07/30/13	1,490	30	143	365	1,901	8,927	7,495	47	225	146,874	39,323
07/31/13	1,490	18	149	365	1,896	9,005	7,510	47	226	153,124	40,104
08/01/13	1,490	18	150	365	1,927	8,974	7,467	48	236	148,749	40,590
08/02/13	1,490	18	150	365	1,959	8,942	7,423	48	245	144,374	41,076
08/03/13	1,490	18	150	365	1,991	8,910	7,379	49	254	139,999	41,562
08/04/13	1,500	18	151	367	2,036	8,938	7,385	50	266	136,534	42,330
08/05/13	1,500	18	152	367	2,068	8,907	7,341	50	275	132,130	42,820
08/06/13	1,500	18	152	367	2,099	8,875	7,297	51	285	127,725	43,309
08/07/13	1,700	21	172	416	2,415	10,022	8,219	58	334	139,764	49,638
08/08/13	1,810	22	184	443	2,610	10,632	8,698	62	367	143,493	53,441
08/09/13	857	10	87	210	1,254	5,016	4,093	30	179	65,425	25,583
08/10/13	0	0	0	0	0	0	0	0	0	0	0
08/11/13	0	0	0	0	0	0	0	0	0	0	0
08/12/13	0	0	0	0	0	0	0	0	0	0	0
08/13/13	0	0	0	0	0	0	0	0	0	0	0
08/14/13	0	0	0	0	0	0	0	0	0	0	0

DATE	FLOW	AMM	CHLA	NIT	TKN	TOC	DOC	OP	TP	TSS	VSS
08/15/13	0	0	0	0	0	0	0	0	0	0	0
08/16/13	0	0	0	0	0	0	0	0	0	0	0
08/17/13	0	0	0	0	0	0	0	0	0	0	0
08/18/13	0	0	0	0	0	0	0	0	0	0	0
08/19/13	0	0	0	0	0	0	0	0	0	0	0
08/20/13	0	0	0	0	0	0	0	0	0	0	0
08/21/13	0	0	0	0	0	0	0	0	0	0	0
08/22/13	0	0	0	0	0	0	0	0	0	0	0
08/23/13	0	0	0	0	0	0	0	0	0	0	0
08/24/13	0	0	0	0	0	0	0	0	0	0	0
08/25/13	0	0	0	0	0	0	0	0	0	0	0
08/26/13	0	0	0	0	0	0	0	0	0	0	0
08/27/13	0	0	0	0	0	0	0	0	0	0	0
08/28/13	0	0	0	0	0	0	0	0	0	0	0
08/29/13	0	0	0	0	0	0	0	0	0	0	0
08/30/13	0	0	0	0	0	0	0	0	0	0	0
08/31/13	0	0	0	0	0	0	0	0	0	0	0
09/01/13	0	0	0	0	0	0	0	0	0	0	0
09/02/13	0	0	0	0	0	0	0	0	0	0	0
09/03/13	0	0	0	0	0	0	0	0	0	0	0
09/04/13	0	0	0	0	0	0	0	0	0	0	0
09/05/13	0	0	0	0	0	0	0	0	0	0	0
09/06/13	0	0	0	0	0	0	0	0	0	0	0
09/07/13	0	0	0	0	0	0	0	0	0	0	0
09/08/13	0	0	0	0	0	0	0	0	0	0	0
09/09/13	0	0	0	0	0	0	0	0	0	0	0
09/10/13	0	0	0	0	0	0	0	0	0	0	0
09/11/13	0	0	0	0	0	0	0	0	0	0	0
09/12/13	0	0	0	0	0	0	0	0	0	0	0
09/13/13	0	0	0	0	0	0	0	0	0	0	0
09/14/13	0	0	0	0	0	0	0	0	0	0	0
09/15/13	0	0	0	0	0	0	0	0	0	0	0
09/16/13	0	0	0	0	0	0	0	0	0	0	0
09/17/13	0	0	0	0	0	0	0	0	0	0	0
09/18/13	0	0	0	0	0	0	0	0	0	0	0
09/19/13	0	0	0	0	0	0	0	0	0	0	0
09/20/13	0	0	0	0	0	0	0	0	0	0	0
09/21/13	0	0	0	0	0	0	0	0	0	0	0
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09/24/13	0	0	0	0	0	0	0	0	0	0	0
09/25/13	0	0	0	0	0	0	0	0	0	0	0
09/26/13	0	0	0	0	0	0	0	0	0	0	0
09/27/13	0	0	0	0	0	0	0	0	0	0	0
09/28/13	0	0	0	0	0	0	0	0	0	0	0
09/29/13	0	0	0	0	0	0	0	0	0	0	0
09/30/13	0	0	0	0	0	0	0	0	0	0	0

**Appendix 10**

Idaho Power Company documentation of consultation with the Idaho Department of Environmental Quality, the Idaho Department of Fish and Game, the U.S. Fish and Wildlife Service, and the National Oceanic and Atmospheric Administration Fisheries Service on the Middle Snake River water-quality monitoring annual report for water year 2013

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**From:** [Hoelscher, Brian](#)  
**To:** ["Balthasar.Buhidar@deq.idaho.gov"](mailto:Balthasar.Buhidar@deq.idaho.gov); ["Robertson,Cindy"](#); ["dave\\_hopper@fws.gov"](mailto:dave_hopper@fws.gov); ["Richard Domingue"](#); [Michael Morse](#)  
**Cc:** [Deering, Mike](#); [Hoelscher, Brian](#)  
**Subject:** RE: Water Year 2013 Middle Snake River Water Quality Monitoring Annual Report  
**Date:** Wednesday, January 15, 2014 10:59:22 AM  
**Attachments:** [image001.png](#)

---

The deadline for submitting comments is February 14, 2014.

---

**From:** Hoelscher, Brian  
**Sent:** Wednesday, January 15, 2014 10:57 AM  
**To:** 'Balthasar.Buhidar@deq.idaho.gov'; 'Robertson,Cindy'; 'dave\_hopper@fws.gov'; 'Richard Domingue'; Michael Morse  
**Cc:** Deering, Mike; Hoelscher, Brian  
**Subject:** Water Year 2013 Middle Snake River Water Quality Monitoring Annual Report

Dear Agency Representative:

Idaho Power is e-filing the Middle Snake River Water-Quality Monitoring Report for water year 2013 as required by articles 404 and 405 of the Shoshone Falls, Upper Salmon Falls, Lower Salmon Falls, and Bliss licenses as amended by the Federal Energy Regulatory Commission (Commission) on March 15, 2013. The Commission requires Idaho Power consult with the Idaho Department of Environmental Quality, Idaho Department of Fish and Game, U.S. Fish and Wildlife Service, and National Oceanic and Atmospheric Administration Fisheries Service regarding the monitoring results by January 15. Idaho Power will allow 30 days for the agencies to comment and to make recommendations before filing the report, agency comments, and our responses to agency comments with the Commission.

IPC hereby submits a draft Middle Snake River Water-Quality Monitoring Annual Report for water year 2013. Please submit your comments to me no later than February 14, 2013.

Sincerely,



--

Brian Hoelscher  
SENIOR BIOLOGIST  
WATER QUALITY COMPLIANCE PROGRAM  
Idaho Power | Environmental Affairs

1221 W. Idaho St. | Boise, ID | 83702

Work 208-388-2591  
Fax 208-433-2849  
Mobile 208-559-4614

Email [BHoelscher@idahopower.com](mailto:BHoelscher@idahopower.com)

**Appendix 11**

Idaho Department of Fish and Game comments on the Middle Snake River water-quality monitoring annual report for water year 2013

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**From:** [Robertson,Cindy](#)  
**To:** [Hoelscher, Brian](#); "[Balthasar.Buhidar@deq.idaho.gov](mailto:Balthasar.Buhidar@deq.idaho.gov)"; "[dave\\_hopper@fws.gov](mailto:dave_hopper@fws.gov)"; "[Richard Domingue](#)"; [Michael Morse](#)  
**Cc:** [McDonald, Mike](#)  
**Subject:** RE: Water Year 2013 Middle Snake River Water Quality Monitoring Annual Report  
**Date:** Tuesday, February 11, 2014 1:17:40 PM  
**Attachments:** [image001.png](#)

---

Hi Brian,

I have reviewed the Middle Snake River Water Quality Monitoring Annual Report and have no comments or questions at this time. Thank you for the opportunity to comment.

Cindy

---

Cindy Robertson  
Natural Resource Program Coordinator  
Idaho Department of Fish and Game  
P.O. Box 25  
Boise, ID 83707  
208.287.2715  
[cindy.robertson@idfg.idaho.gov](mailto:cindy.robertson@idfg.idaho.gov)

---

**From:** Hoelscher, Brian [mailto:[BHoelscher@idahopower.com](mailto:BHoelscher@idahopower.com)]  
**Sent:** Wednesday, January 15, 2014 10:59 AM  
**To:** '[Balthasar.Buhidar@deq.idaho.gov](mailto:Balthasar.Buhidar@deq.idaho.gov)'; Robertson,Cindy; '[dave\\_hopper@fws.gov](mailto:dave_hopper@fws.gov)'; '[Richard Domingue](#)'; Michael Morse  
**Cc:** Deering, Mike; Hoelscher, Brian  
**Subject:** RE: Water Year 2013 Middle Snake River Water Quality Monitoring Annual Report

The deadline for submitting comments is February 14, 2014.

---

**From:** Hoelscher, Brian  
**Sent:** Wednesday, January 15, 2014 10:57 AM  
**To:** '[Balthasar.Buhidar@deq.idaho.gov](mailto:Balthasar.Buhidar@deq.idaho.gov)'; 'Robertson,Cindy'; '[dave\\_hopper@fws.gov](mailto:dave_hopper@fws.gov)'; '[Richard Domingue](#)'; Michael Morse  
**Cc:** Deering, Mike; Hoelscher, Brian  
**Subject:** Water Year 2013 Middle Snake River Water Quality Monitoring Annual Report

Dear Agency Representative:

Idaho Power is e-filing the Middle Snake River Water-Quality Monitoring Report for water year 2013 as required by articles 404 and 405 of the Shoshone Falls, Upper Salmon Falls, Lower Salmon Falls, and Bliss licenses as amended by the Federal Energy Regulatory Commission (Commission) on March 15, 2013. The Commission requires Idaho Power consult with the Idaho Department of Environmental Quality, Idaho Department of Fish and Game, U.S. Fish and Wildlife Service, and National Oceanic and Atmospheric Administration Fisheries Service regarding the monitoring results by January 15. Idaho Power will allow 30 days for the agencies to comment and to make recommendations before filing the report, agency comments, and our responses to agency

comments with the Commission.

IPC hereby submits a draft Middle Snake River Water-Quality Monitoring Annual Report for water year 2013. Please submit your comments to me no later than February 14, 2013.

Sincerely,



--

Brian Hoelscher  
SENIOR BIOLOGIST  
WATER QUALITY COMPLIANCE PROGRAM  
Idaho Power | Environmental Affairs

1221 W. Idaho St. | Boise, ID | 83702

Work 208-388-2591  
Fax 208-433-2849  
Mobile 208-559-4614

Email [BHoelscher@idahopower.com](mailto:BHoelscher@idahopower.com)



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**Appendix 12**

Idaho Department of Environmental Quality comments on the Middle Snake River water-quality monitoring annual report for water year 2013

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**From:** [Balthasar.Buhidar@deq.idaho.gov](mailto:Balthasar.Buhidar@deq.idaho.gov)  
**To:** [Hoelscher, Brian](mailto:Hoelscher_Brian); [cindy.robertson@idfg.idaho.gov](mailto:cindy.robertson@idfg.idaho.gov); [dave\\_hopper@fws.gov](mailto:dave_hopper@fws.gov); [Richard.Domingue@noaa.gov](mailto:Richard.Domingue@noaa.gov); [michael\\_morse@fws.gov](mailto:michael_morse@fws.gov)  
**Cc:** [Deering, Mike](mailto:Deering_Mike); [Balthasar.Buhidar@deq.idaho.gov](mailto:Balthasar.Buhidar@deq.idaho.gov); [Barry.Burnell@deq.idaho.gov](mailto:Barry.Burnell@deq.idaho.gov); [Douglas.Conde@deq.idaho.gov](mailto:Douglas.Conde@deq.idaho.gov); [Susan.Switzer@deq.idaho.gov](mailto:Susan.Switzer@deq.idaho.gov)  
**Subject:** RE: Water Year 2013 Middle Snake River Water Quality Monitoring Annual Report  
**Date:** Thursday, February 13, 2014 8:49:45 PM  
**Attachments:** [image001.png](#)

---

Brian:

I've done a review of the document on the Middle Snake River WQ Monitoring Annual Report for WQ2013. I have no comments on the data.

If you could forward an Excel spreadsheet of the data to me, we can document into our Snake River WQ data for the Mid-Snake WAG.

I appreciate IPC assisting DEQ in monitoring the Snake River and providing this information.

If you have any questions, please don't hesitate to contact me directly.

---

**From:** Hoelscher, Brian [mailto:[BHoelscher@idahopower.com](mailto:BHoelscher@idahopower.com)]  
**Sent:** Wednesday, January 15, 2014 10:57  
**To:** Balthasar Buhidar; 'Robertson,Cindy'; 'dave\_hopper@fws.gov'; 'Richard Domingue'; Michael Morse  
**Cc:** Deering, Mike; Hoelscher, Brian  
**Subject:** Water Year 2013 Middle Snake River Water Quality Monitoring Annual Report

Dear Agency Representative:

Idaho Power is e-filing the Middle Snake River Water-Quality Monitoring Report for water year 2013 as required by articles 404 and 405 of the Shoshone Falls, Upper Salmon Falls, Lower Salmon Falls, and Bliss licenses as amended by the Federal Energy Regulatory Commission (Commission) on March 15, 2013. The Commission requires Idaho Power consult with the Idaho Department of Environmental Quality, Idaho Department of Fish and Game, U.S. Fish and Wildlife Service, and National Oceanic and Atmospheric Administration Fisheries Service regarding the monitoring results by January 15. Idaho Power will allow 30 days for the agencies to comment and to make recommendations before filing the report, agency comments, and our responses to agency comments with the Commission.

IPC hereby submits a draft Middle Snake River Water-Quality Monitoring Annual Report for water year 2013. Please submit your comments to me no later than February 14, 2013.

Sincerely,



--

Brian Hoelscher  
SENIOR BIOLOGIST  
WATER QUALITY COMPLIANCE PROGRAM  
Idaho Power | Environmental Affairs

1221 W. Idaho St. | Boise, ID | 83702

Work 208-388-2591  
Fax 208-433-2849  
Mobile 208-559-4614

Email [BHoelscher@idahopower.com](mailto:BHoelscher@idahopower.com)

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| |

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