March 21, 2013

Ms. Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street N.E.
Washington, DC 20426

Subject: Spokane River Hydroelectric Project, FERC Project No. 2545 Submittal of the Coeur d'Alene Indian Reservation 2012 Water Quality Monitoring Annual Summary Report

Dear Secretary Bose:

In accordance with the Federal Energy Regulatory Commission's (FERC) June 18, 2009 Spokane River Hydroelectric Project (No. 2545) License, Appendix D, 4(e) Condition No. 5, Avista completed a Coeur d'Alene Indian Reservation Water Quality Monitoring Plan (WQMP), which the U.S. Department of Interior (Interior) and FERC approved in 2010. Avista, in cooperation with the Coeur d'Alene Tribe (Tribe), subsequently conducted the second full season of water quality monitoring in tribal waters in 2012, and recently developed the required Water Quality Annual Summary Report (ASR), which summarizes the work completed in 2012.

Avista is required to submit the ASR to Interior by March 1st and to FERC by April 1st on an annual basis. Avista submitted the ASR to Interior, on February 28, 2013 and subsequently revised it to incorporate their comments. The correspondence record with Interior is included as Appendix A in the ASR.

If you have any questions regarding the 2012 Water Quality Annual Summary Report, feel free to call me at (509) 495-4998 or Meghan Lunney at (509) 495-4643.

Sincerely,

Speed Fitzhugh

Elvin "Speed" Fitzhugh
Spokane River License Manager

Enclosure

cc: Bob Dach, BIA Portland
Phillip Cernera, Coeur d'Alene Tribe

AVISTA CORPORATION

COEUR D'ALENE RESERVATION

2012 WATER QUALITY MONITORING

ANNUAL SUMMARY REPORT

4(E) CONDITION NO. 5

SPOKANE RIVER HYDROELECTRIC PROJECT
FERC PROJECT NO. 2545

Prepared By:
Coeur d'Alene Tribe

In Cooperation With:
Avista Corporation

March 20, 2013

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1.0 INTRODUCTION

1.1 Background

On June 18, 2009, the Federal Energy Regulatory Commission (FERC) issued Avista Corporation (Avista) a new license (License) for the Spokane River Hydroelectric Project (Spokane River Project), FERC Project No. 2545 for a 50-year term (FERC, 2009). The License includes the Post Falls Hydroelectric Development (HED) in Idaho as a component of the Spokane River Project.

The Post Falls HED includes three dams located on the Spokane River approximately nine miles downstream from the outlet of Coeur d'Alene Lake. Coeur d'Alene Lake is a natural lake created by a channel restriction at the outlet, with the outlet serving as the headwaters of the Spokane River. The Post Falls HED's Project boundary encompasses Coeur d'Alene Lake, Spokane River upstream of the Post Falls Dams, and the lower reaches of the St. Joe, Coeur d'Alene and St. Maries rivers to the normal full pool water elevation of 2,128 feet.

1.2 License Requirements

Ordering Paragraph G of Avista's Spokane River Project License incorporated the U.S. Department of Interior's (Interior's) January 27, 2009 Federal Power Act 4(e) Conditions (Conditions). The Conditions can be found in Appendix D of the License. Condition No. 5 of Appendix D of the License regarding Water Quality Standards and Water Quality Monitoring (Condition 5) required Avista to complete a Coeur d'Alene Indian Reservation Water Quality Monitoring Plan (WQMP), in collaboration with the Coeur d'Alene Tribe (Tribe), within one year of License issuance (June 18, 2010). Interior and FERC subsequently approved the WQMP, which includes the following:

- Monitor water quality at the five sites (C5, C6, RL1, BL1, and SJ1) identified by Interior, or agreed to by Avista and the Tribe and approved by Interior;
- Conduct continuous temperature, specific conductance, pH, and dissolved oxygen (DO), at the specified sites annually from June through November;
- Develop profiles of water column conditions for temperature, specific conductance, pH, and DO at all sites annually at least twice monthly during the monitoring period;
- Collect profiles throughout the water column to characterize physical/chemical conditions in the euphotic zone and lower hypolimnion and to define the depth and magnitude of the thermocline;
- Follow specified methods for collecting water samples at each site;
- Use appropriate quality assurance and quality control measures for specified parameters and corresponding detection limits:
- Collect one phytoplankton subsample per month from the euphotic zone at all sites;

- Maintain data in an electronic database or spreadsheet, and provide reports; and
- Provide data within 30 working days after collection or laboratory analysis and promptly respond to requests for additional information.

2.0 DATA COLLECTION

Avista contracted with the Tribe to implement the WQMP during the June through November 2012 monitoring season and to conduct water quality monitoring at the five sites identified in Part A(1)(a-e) of Condition 5 (Table 1). These sites include C5 (Coeur d'Alene Lake), C6 (Chatcolet Lake), SJ1 (Lower St. Joe River), BL1 (Benewah Lake) and RL1 (Round Lake).

Figure 1 displays the location of the Coeur d'Alene Reservation Boundary and Figure 2 shows the locations of the five monitoring sites within the southern portion of Coeur d'Alene Lake and the St. Joe River.

2.1 In-Situ Profile Monitoring

In accordance with the WQMP, the Tribe, on behalf of Avista, conducted in-situ profile monitoring twice a month, at each of the five sites from June through November, with the exception of sites BL1 and RL1. These shallow sites, BL1 and RL1, were not sampled in November due to low lake levels which did not allow for boat passage.

The Tribe collected in-situ profiles from the lake surface to the lake bottom using a Hydrolab® DS5 multi-probe which created depth-profiles for the parameters identified in the WQMP. These parameters included water temperature, pH, specific conductance, depth, photosynthetic active radiation, dissolved oxygen (percent saturation and concentration), and relative fluorescence (chlorophyll-a). The Hydrolab DS5 multi-probe sensors were calibrated prior to each day's monitoring and dissolved oxygen was calibrated at the sample sites. Table 2 summarizes the dates the profiles were collected. The in-situ profile results are summarized by site in Section 4.1 through 4.5, and the full profile results are summarized in a database, which is available upon request.

2.2 Continuous Monitoring

The WQMP indicates continuous monitoring of temperature, specific conductance, pH, and dissolved oxygen (percent saturation and concentration) would be collected at each site, June through November, on a revolving five-year cycle. The continuous monitoring was conducted using a YSI 6600V2-4M (multi-probe system) deployed from a computer-controlled winch system which was attached to an anchored buoy platform. The Tribe conducted continuous monitoring during the 2012 season from June 1 through September 14 at Site RL1. The buoy profiler was removed from RL1 September 14 instead of the end of November due to low lake levels. The continuous monitoring profile results are summarized by site in Section 4.1 through

4.5, and the full continuous monitoring profile results are summarized in a database which is available upon request.

2.3 Water Sample Collection

2.3.1 Sample Depths

The WQMP indicated water samples would be collected for nutrients at each of the five sites (Table 1 and Figure 2) once per month from June through November on an annual basis, for the term of the License. During monthly sampling, at each of the five sites, water samples are collected from the following depths as indicated in Part A(5) of Condition 5:

- Euphotic zone composite (defined as 3-5 evenly spaced samples taken from 0.5 m below the surface to the depth to which 1% of incident solar radiation at the surface penetrates, composited in a churn splitter, and from which subsamples are withdrawn for laboratory analysis). This depth will be referred to as the “photic zone” in the remainder of the report;
- One meter above the lake bottom. This depth will be referred to as “bottom” in the remainder of the report; and
- At Site C5 only (part of A(1)(a) of Condition 5), in the zone of maximum chlorophyll fluorescence.

2.3.2 Nutrient Sampling

The WQMP further indicates the water samples collected at each of the five monitoring locations at the depths previously identified will be analyzed for the following nutrients as defined in Part A(6)(a-g) of Condition 5: total Nitrogen; nitrite (NO_2) + nitrate (NO_3) Nitrogen; ammonia nitrogen (NH_3); total Phosphorus; dissolved Phosphorus; ortho Phosphorus; and chlorophyll *a* (in the euphotic composite and zone of maximum chlorophyll fluorescence samples). In accordance with the WQMP, a certified laboratory, the Tshimakain Creek Labs (formerly Spokane Tribal Laboratory), analyzed the water quality samples for the constituents and method detection limits identified in Table 3 of the WQMP.

During the 2012 monitoring program water samples were collected from sampling sites BL1, RL1, C5, C6, and SJ1 for the nutrients previously identified. Table 3 summarizes the dates monitoring was conducted. A summary of the QA/QC results are presented in Section 3.0 and the *in-situ* profile and analytical results are included in Section 4.0.

2.3.3 Phytoplankton Sampling

Also, Part A(7) of Condition 5 indicates one phytoplankton sample will be collected per month, June through November, from the euphotic zone composite in accordance with Part A(5)(a) of Condition 5 at each of the five monitoring locations previously identified. The Tribe sub-contracted with Advanced Eco-Solutions, a certified laboratory, to analyze subsamples for taxa present (identified to species level whenever possible), cell counts and biovolume for samples collected at the five sites from June through November, with the exception of sites BL1 and RL1. These shallow sites, BL1 and RL1, were not sampled in November due to low lake levels which did not allow for boat passage.

3.0 QUALITY ASSURANCE AND QUALITY CONTROL

3.1 QA/QC Methods

Equipment blanks were prepared prior to the first sampling date following the methods described in section 2.3.4.1 of the WQMP. During the sampling season on August 15 field blanks were prepared following the methods described in section 2.3.4.1 of the WQMP.

3.2 QA/QC Results

For the pre season equipment blanks, results for all nutrients and chlorophyll *a* were below minimum reporting limit (MRL), indicating cleaning methods effectively eliminated contamination of water samples from the Van Dorn sampler and the churn splitter.

Field blanks were prepared on August 15 and one nutrient constituent was above the MRL. However, as explained below, the positive detection was at such a low concentration that it could not have cross-contaminated samples from different sites.

On August 15, total Kjeldahl nitrogen (TKN) from a combination Van Dorn and churn splitter blank was 60 μg/L, 10 μg/L above the 50 μg/L MRL. This 10 μg/L difference was not significant because the blank was prepared after sampling C6 and prior to sampling C5. The lowest TKN concentration at C5 that day was 120 μg/L from the photic zone, twice the concentration of the 60 μg/L blank.

4.0 RESULTS AND DISCUSSION

The following sections 4.1 through 4.5 consist of the combined results and discussion for each of the five sample sites described in Table 1. Table 4 demonstrates compliance of the 2012 monitoring activities with the requirements identified in the 4(e) Condition No. 5 and the Coeur d'Alene Reservation Water Quality Monitoring Plan.

For each site, dissolved oxygen concentrations were compared to the Tribe's dissolved oxygen standard as defined in the Water Quality Standard for Approved Surface Waters of the Coeur d'Alene Tribe (Tribe 2010). The Tribe has a dissolved oxygen standard of greater than 8.0 mg/L in the hypolimnion at depths greater than 8 meters. This standard is not applicable to sites BL1 and RL1, as they are less then 8 meters in depth. The DO standard was not met at C5, and C6, as discussed in the following sections. DO, pH and temperature are the only constituents with quantitative standards monitored under this sampling program. The variable, pH was not exceeded at any site during the 2012 sampling season. The Tribe's pH standard is; pH shall be within the range of 6.5 to 8.5, with a human caused variation within this range of less than 0.5 units over any 24-hour period.

The format and sequence of figures for each site are consistent between sites. Figure 3 presents the water quality and water column profile sample dates in relation to the St Joe River hydrograph and Coeur d'Alene Lake elevation. The first water quality sampling (June 12) was taken during the rapid regression of the hydrograph at a lake elevation 1.36 feet above the summer full pool elevation of 2128 feet (Figure 3). The remaining sample dates encompassed lake summer pool elevations through drawdown elevations. As noted previously, the shallow sites BL1 and RL1 were not sampled in November due to low lake levels which did not allow for boat passage. These sites were last sampled for water quality and water column profiles on October 24.

4.1 Lower St. Joe River (SJ1)

On June 12, water temperature at the St. Joe River sampling site (SJ1) in the upper seven meters was isothermal at 8.8°C. We were unable to collect profile samples deeper than seven meters due to heavy currents in the St Joe River. On June 29, the river remained isothermal but had warmed to 12.3 °C at the surface and 12.0°C near the bottom at 20 meters. From June 29 to July 24 the St. Joe River warmed substantially, but was still isothermal at 21.3 °C near the surface and 20.1°C near the bottom at 20 meters (Figure 4A). The river at SJ1 was warmest from late July through early September but did not thermally stratify in 2012. On August 28, the surface water was 21.1°C and 19.6 °C near the bottom at 19 meters (Figure 5A). From August 28 through to September 24, the river cooled an average 3.4°C throughout the water column. On November 28, the water column was isothermal at 3.8°C (Figure 6A) having cooled an average 12.6°C during the two-month time period from September 24 through November 28.

In the upper 7 meters that we were able to sample on June 12, dissolved oxygen at SJ1 averaged 10.7 mg/L (102% saturation). The dissolved oxygen concentration remained high through June and into early July but showed signs of depletion near the bottom at SJ1 on July 24 (Figure 4B). On July 24, near surface dissolved oxygen was 7.9 mg/L (99% saturation) and 6.6 mg/L (81% saturation) near the bottom at19 meters (Figure 4B). From July 24 to August 28, the dissolved oxygen concentration continued to decrease near the bottom at SJ1 and was 0.1 mg/L (1% saturation), creating anoxic conditions on August 28 (Figure 5B). Between August 28 and September 18, oxygen was resupplied to the bottom waters of SJ1, and on September 18, near surface dissolved oxygen concentrations were 8.5 mg/L (98% saturation) and 8.6 mg/L (98% saturation). Dissolved oxygen remained near 100% saturation from surface to bottom the rest of the sample period which ended November 28 (Figure 6B). Because the St. Joe River did not fully stratify (under the definition of stratification in the Tribal WQS) the Tribal standard was not applied to this site this year. Total nitrogen (TN) dynamics at SJ1 were variable throughout the season with large differences between the photic zone and bottom (Figure 7A). The maximum

TN concentration at SJ1 was 241 μg/L from the bottom on July 10 (Figure 7A). The geometric mean for TKN in the photic zone was 151.3 μg/L compared to 141.4 μg/L from bottom samples. Dissolved inorganic nitrogen (DIN) dynamics were similar in the photic zone and bottom, being relatively high in early summer, then decreased through late summer and early fall, followed by a large increase on November 28 (Figure 7B). The maximum DIN concentrations for the season at SJ1 were on November 28 at 50 μg/L and 44 μg/L in the photic zone and bottom respectively.

Total phosphorus dynamics in the photic zone and bottom at SJ1 were similar, increasing in both the photic zone and bottom from July 10 through September 18 (Figure 7C). Total phosphorus in the photic zone and bottom peaked on September 18 at 26 μg/L and 23 μg/L respectively (Figure 7C). The geometric mean for total phosphorus in the photic zone was 13.7 μg/L compared to 11.2 μg/L from the bottom. Orthophosphorus dynamics from the photic zone and bottom were very similar with concentrations from the photic zone slightly higher in October and November (Figure 7D). The geometric mean for orthophosphorus was 4.1 μg/L from the photic zone and 3.2 μg/L from the bottom.

Chlorophyll *a* concentration was very low throughout the sampling season at SJ1 with the maximum value of 1.7 μg/L on August 14 (Figure 7E). Phytoplankton biovolume at SJ1 was the lowest of the five sites with a season mean of 0.091 mm^3/L. Phytoplankton biovolume gradually increased throughout the summer reaching a maximum of 0.135 mm^3/L on September 18 (Figure 7F). Generally, small diatoms (bacillariophyceae) and small flagellates (chrysophyceae and cryptophyceae) dominate the composition of phytoplankton at SJ1 (Figure 28).

4.2 Benewah Lake (BL1)

On June 12, water temperature at the Benewah Lake sampling site (BL1) was 13.9°C near the surface and 9.9°C at the bottom (Figure 8A). BL1 is only six meters deep which inhibits the development of a stable thermocline because the surface water warms, and is then wind-mixed, weakening thermal stratification. As the summer progressed, temperature profiles revealed weak thermal stratification at times. Figure 9A presents an example of thermal stratification at BL1 with the largest temperature differential of 3.0°C between three and four meters depth. The warmest temperature measured at BL1 was on August 14, when the near the surface (0.5 meters) was 24.0°C, with a gradual temperature decrease to 14°C at the bottom. Figure 10A presents an example of the temperature profile at BL1 after a wind event and mixing, with only the deepest part of the water column having a significant temperature differential. The average water temperature was 3.1°C cooler on September 18 compared to the August 28 profile. On October 24, the water column was near isothermal at 8.7°C to 8.3°C from top to bottom (Figure 11A), having cooled 8.0°C over a five-week period from September 18 to October 24.

Dissolved oxygen at the shallow, macrophyte-dominated BL1 was highly variable. As early as June 12 there was a dissolved oxygen decline with the surface concentration at 8.8 mg/L (95%

saturation) and 6.6 mg/L (65%) near the bottom at 5.5 meters (Figure 8B). During the summer, high photosynthetic rates from the large standing crop of macrophytes and phytoplankton, coupled with thermal stratification produced supersaturated dissolved oxygen conditions in the upper water column. On July 10, a significant dissolved oxygen gradient existed with supersaturated dissolved oxygen in upper waters. The concentration range in the upper 3 meters was 9.8 to 9.3 mg/L (118% to 100% saturation) and no dissolved oxygen on the bottom (Figure 9B). This dissolved oxygen supersaturation in surface waters and deficit in bottom waters was most pronounced on August 14, when surface waters reached 130% saturation and bottom was still without measurable oxygen (Figure 10B). This dissolved oxygen pattern lasted through September 24, then water column cooling and wind mixing replenished oxygen throughout the water column and by October 9, the near surface dissolved oxygen concentration was 10.9 mg/L (101% saturation) with 10.8 mg/L (98% saturation) at the bottom (Figure 11B).

In early summer total nitrogen (TN) concentration at BL1 was greater in the bottom compared to the photic zone, with the highest TN concentration of 655 μg/L on July 10 (Figure 12A). From July into August, TN in the bottom decreased, and exhibited similar dynamics as in the photic zone (Figure 12A). The geometric mean for TKN in the photic zone was 380.2 and 502.8 μg/L from bottom samples. Relative to TN, dissolved inorganic nitrogen (DIN) was low in early summer in both photic zone and bottom, but increased through August into late September (Figure 12B). Dissolved inorganic nitrogen peaked in the photic zone on September 19 at 60 μg/L (Figure 12B). Dissolved inorganic nitrogen concentration dramatically declined from September 19 through October 24 in both photic zone and bottom at 10 μg/L and 15 μg/L respectively (Figure 12B).

Total phosphorus dynamics in the photic zone and bottom at BL1 were similar with the bottom concentrations being higher from June 12 through August 14 (Figure 12C). The maximum total phosphorus concentration in the photic zone was 50 μg/L on August 14 (Figure 12C). The maximum total phosphorus at the bottom was 71 μg/L on June 12 (Figure 12C). The geometric mean for total phosphorus in the photic zone was 40.2 μg/L compared to 51.9 μg/L from the bottom. Orthophosphorus dynamics in the photic zone and bottom were very similar with the season's maximum values of 15 μg/L in photic zone and 31 μg/L on bottom on June 12 (Figure 12D). Orthophosphorus concentrations declined dramatically from June 12 to July 10, and remained at relatively low concentrations throughout the rest of the sampling period (Figure 12D). The geometric mean for orthophosphorus in the photic zone was 5.2 μg/L and 5.6 μg/L from the bottom.

Chlorophyll *a* concentration at BL1 was the highest of all sample sites with a mean of 7.4 μg/L and a peak chlorophyll *a* concentration of 18.0 μg/L on August 14 (Figure 12E). Phytoplankton biovolume at BL1 was second highest of the five sites with a seasonal mean of 0.23 mm^3/L, and a seasonal maximum of 0.63 mm^3/L on July 10 (Figure 12F). The cyanobacteria *Anabaena sp.*

comprised 47% of the biovolume during the July peak. Generally, small flagellates (chrysophyceae and cryptophyceae) e.g., *Cryptomonas sp.* and larger filamentous diatoms e.g., *Aulacoseira granulata* (bacillariophyceae) dominated the seasonal composition of phytoplankton at BL1 (Figure 28). The moderate cyanobacteria *Anabaena sp.* bloom in July skewed the percent composition (Figure 28).

4.3 Round Lake (RL1)

Temperature dynamics at the Round Lake sampling site (RL1) were similar to Benewah Lake (BL1). RL1 is approximately one meter shallower than BL1, and also shows evidence of being wind-mixed from surface to bottom. In addition to the water column profiles, a buoy profiler system measured temperature at 0.5 meter increments from 1.0 to 4.0 meters every two hours at RL1. On June 14, a small temperature gradient existed at RL1 with a 10.5°C surface temperature and 8.4°C at the bottom. As the water column warmed, a weak thermocline and shallow epilimnion developed. The temperature data in Figure 13A presents an example of the weak thermocline and a temperature gradient of 21.3°C near the surface and 14.9°C near the bottom. On July 24, the epilimnion was deeper, down to three meters with only the deepest 1.5 meters being stratified (Figure 14A). The high-resolution buoy profiler data revealed that many times during the summer wind events mixed the water column producing a homogenous temperature profile. The maximum temperature measured by the buoy profiler was 25.7°C at one meter on July 18. The water column at RL1 began a cooling trend starting August 22. From September 18 to October 9 the water column at RL1 cooled 5.7°C, and was isothermal at 7.0°C on October 23 (Figure 15A).

Similar to BL1, RL1 is also a shallow, macrophyte-dominated site and also exhibited dramatic dissolved oxygen dynamics at depth throughout the season. The continuous monitoring buoy profiler system also measured extreme diurnal dissolved oxygen fluctuations at depths. The buoy profiler measured the water column at 0.5 meter increments every two hours. On June 12, dissolved oxygen at RL1 was >10.4 mg/L ranging from 105% to 99% saturation from top to bottom of the water column. There was little diurnal change in dissolved oxygen on June 12 with the range for all times and depths being 10.9 mg/L to 11.6 mg/L (103% to 110%). As the summer progressed the bottom waters became deficient in dissolved oxygen and by July 10, a dissolved oxygen gradient existed with a near surface concentration of 9.3 mg/L (115% saturation) and 4.1 mg/L (45% saturation) at the bottom (Figure 13B). The diurnal swing in dissolved oxygen was significant on July 10 with a diurnal difference of 2.2 mg/L, 2.6 mg/L and 2.4 mg/L at 1, 2 and 4 meters respectively. Late July produced the largest dissolved oxygen gradient at depth, and on July 24, dissolved oxygen concentration was 8.1 mg/L (115% saturation) near the surface and 0.6 mg/L (45% saturation) at the bottom (Figure 14B). On July 24, the diurnal dissolved oxygen fluctuation was quite different at depth with 1 through 3 meters exhibiting a diurnal swing of <1 mg/L, while the bottom depth of 4 meters had a dramatic 6.7 mg/L diurnal change, from a low of 1.0 mg/L (12% saturation) to a high of 7.7 mg/L (94%

saturation). The dissolved oxygen gradient at depth weakened substantially in late August, and from August 22 through October 23, RL1 did not have dissolved oxygen concentrations at any depth below 7.5 mg/L and 86% saturation. On October 23, dissolved oxygen was >10.8 mg/L (88% saturation) throughout the water column (Figure 15B).

Following relatively low concentrations in June, total nitrogen (TN) at RL1 increased throughout the summer season, peaking on August 14 in both photic zone and bottom at 685 µg/L and 683 µg/L respectively (Figure 16A). These were the highest TN concentrations from all sites in 2012. The geometric mean for TN in the photic zone was 330.6 µg/L and 358.0 µg/L from bottom samples. Dissolved inorganic nitrogen (DIN) was consistently higher from bottom samples compared to the photic zone throughout the season (Figure 16B). Dissolved inorganic nitrogen increased from June through late September, peaking on September 18 at 78 µg/L and 106 µg/L in the photic zone and bottom respectively (Figure 16B). As with the Benewah Lake (BL1) concentrations of DIN decreased from late September to late October (Figure 16B).

Total phosphorus was similar in the photic zone and bottom, increasing throughout the summer and peaking on September 18 (Figure 16C), at 42 µg/L in the photic zone, and 43 µg/L on the bottom. The geometric mean for total phosphorus in the photic zone was 29.5 µg/L compared to 31.6 µg/L from the bottom. Orthophosphorus dynamics from the photic zone and bottom were nearly identical and very similar to BL1, except overall concentrations were lower than BL1. The maximum orthophosphorus concentration was 13 µg/L in the photic zone and 14 µg/L on the bottom on June 12 (Figure 16D). The geometric mean for orthophosphorus was 3.8 µg/L in the photic zone and 4.0 µg/L at the bottom.

Chlorophyll *a* concentration at RL1 was lower than at BL1 with a mean of 3.2 µg/L and a peak chlorophyll *a* concentration of 4.8 µg/L on July 10 (Figure 16E). Phytoplankton biovolume at RL1 was third lowest of the five sites with a mean phytoplankton biovolume of 0.20 mm^3/L. Phytoplankton biovolume peaked at RL1 on July 10 at 0.36 mm^3/L, then decreased dramatically in August before steadily increasing through October (Figure 16F). Diatoms comprised 37% of the seasonal phytoplankton composition (Figure 28), with the large non-colonial diatoms *Pinnularia sp.* and *Navicula sp.* comprising 42% of the annual diatom biovolume. The small flagellates (chrysophyceae and cryptophyceae) comprised 33% of the seasonal phytoplankton composition (Figure 28), with *Cryptomonas sp*.dominating this group throughout the season.

4.4 Chatcolet Lake (C6)

Temperature dynamics at the Chatcolet Lake sampling site (C6) differ from BL1 and RL1 due the increased depth at C6 (Table 1). The increased depth at C6 reduces the wind-mixing effect allowing for thermal stratification which intensified throughout the summer. On June 13, the water column at C6 exhibited weak thermal stratification with a 5 meter 10.9°C to 10.7°C epilimnion. On June 13 the metalimnion was narrow from 5-7 meters with a 2.7°C differential.

From June 13 to July 24, the near surface water warmed 12.3°C and was 22.9°C near the surface on July 24 (Figure 17A). On July 24 thermal stratification was strengthening and the metalimnion was from 3 to 7 meters with an 8.2°C differential in 4 meters (Figure 17A). From July 24 through August 15, the epilimnion deepened to 5 meters and was near isothermal at 23.0°C near the surface and 22.7°C at 5 meters. On July 24, thermal stratification was strengthening and the metalimnion was from 3 to 7 meters with an 8.2°C differential in 4 meters (Figure 18A). On August 15, thermal stratification was strongest of the season with the metalimnion from 5 to 8 meters and 8.8°C differential in 3 meters (Figure 18A). The water column cooled from August 28 through September 24 with a mean epilimnetic temperature change from 21.0°C to 16.9 °C respectively. From September 24 through October 23 the water column cooled another 6.5°C as thermal stratification weakened (Figure 19A). From October 23 to November 27, the water column cooled another 6.0°C and was isothermal at 4.4°C on November 27.

As described above, C6 thermally stratifies which affects dissolved oxygen dynamics. During thermally stratified periods, the warm epilimnion is wind-mixed, which replenishes the epliminion with atmospheric oxygen. Photosynthesis during daylight hours provides additional oxygen in the epilimnion. The density gradient in the metalimnion reduces mixing, and the deeper, cooler hypolimnion does not get replenished with atmospheric oxygen. As thermal stratification continues throughout the summer, oxygen in the hypolimnion is consumed by aerobic decomposition of organic matter. As this decomposition progresses throughout the summer, the dissolved oxygen in the hypolimnion decreases. In productive lakes the decomposition of large amounts of organic matter can consume all of the oxygen, creating anoxic conditions. These anoxic conditions developed in Chatcolet Lake at site C6.

On June 13 dissolved oxygen throughout the water column at C6 was >10.4 mg/L ranging from 104% to 97% saturation. On July 24, the dissolved oxygen concentration was >8.7 mg/L and >112% saturation in the shallow, 3 meter deep epilimnion. Below the epilimnion, in the metalimnion, dissolved oxygen concentration was decreasing rapidly and dissolved oxygen in the bottom 3 meters of the hypolimnion were less than (<) 4.3 mg/L and <45% saturation (Figure 17B). As thermal stratification intensified, dissolved oxygen concentrations in the hypolimnion further decreased. On August 15, dissolved oxygen throughout the 5 meter deep epilimnion was >9.0 mg/L (> 114% saturation), decreased rapidly through the metalimnion from 9.6 mg/L at 6 meters decreasing to 1.4 mg/L at 8 meters (Figure 18B). On August 15 the entire hypolimnion was anoxic from 8 meters to the bottom (Figure 18B). The anoxic conditions in the hypolimnion lasted at least through September 24. Between September 24 and October 9, as the water column at C6 cooled and became near isothermal, wind-mixing replenished dissolved oxygen to the lake bottom with a dissolved oxygen concentration of 9.1 mg/L (85% saturation) at the bottom (10.5) meters. From October 9 through November 27 the lake was near isothermal and although several wind events occurred, dissolved oxygen was never fully replenished to 100% saturation.

On November 27, dissolved oxygen concentration throughout the water column was near 95% saturation (11.3 to 9.9 mg/L), (Figure 19B). The Tribe's dissolved oxygen standard was not met at C6 on 6 of 12 (50%) sample dates.

On June 12, total nitrogen (TN) was relatively low in both the photic zone (116 µg/L) and bottom (142 µg/L), but increased through August (Figure 20A). Total nitrogen peaked in the hypolimnion (bottom) on September 19 at 662 µg/L (Figure 20A). Total nitrogen in the photic zone exhibited a smaller peak at 385 µg/L on August 15 (Figure 20A). The geometric mean for TN in the photic zone was 209.1 µg/L and 299.3 µg/L from the bottom. The seasonal trend for dissolved inorganic nitrogen (DIN) differed between the photic zone and bottom. As with TN, DIN concentration was low in June in both the photic zone and bottom, but increased significantly in the hypolimnion (bottom) as the season progressed, reaching a seasonal high of 284 µg/L (Figure 20B). In the photic zone the DIN concentration changed little throughout the season and peaked at 45 µg/L on November 28 (Figure 20B), only after several wind mixing events.

Total phosphorus (TP) was significantly higher from the bottom of C6 compared to photic zone samples (Figure 20C). This significant difference was due to the liberation of phosphorus and increased concentrations due to the hypolimnion becoming anoxic sometime between July 24 and August 15. Total phosphorus at the bottom increased dramatically beginning August 15, reaching a maximum concentration of 356 µg/L on September 19 (Figure 20C). Total phosphorus was highest in the photic zone on October 23, at 31 µg/L (Figure 20C). The geometric mean for TP in the photic zone was 20.1 µg/L, and 46.8 µg/L from the bottom. Orthophosphorus dynamics followed the same trend as TP (Figure 20D). Orthophosphorus at the bottom peaked at 221 µg/L on September 19 (Figure 20D). As with TP, the spike in orthophosphorus was driven by the anoxic conditions in the hypolimnion. The geometric mean for orthophosphorus in the photic zone was 3.5 µg/L and 14.1 µg/L at the bottom.

Chlorophyll *a* concentration at C6 increased throughout the early summer, peaked at 5.7 µg/L on August 15, declined in September, then increased to 5.1 µg/L on October 23 (Figure 20F). The sampling season mean for chlorophyll *a* was 3.2 µg/L. Phytoplankton biovolume at C6 was the highest of the five sites with a seasonal mean biovolume of 0.30 mm^3/L (figure 27). Phytoplankton biovolume stayed relatively low from June through August, decreased slightly in September, then significantly increased reaching a maximum of 0.77 mm^3/L on October, 23 (Figure 20F). The October peak biovolume at C6 was the highest of the five sites with the filamentous diatom *Aulacoseira granulata* comprising 90% of the biovolume. The diatoms (Bacillariophyceae) dominated the phytoplankton biovolume at C6 , comprising 68% of the annual biovolume at the site (Figure 28).

4.5 Coeur d'Alene Lake Southern Pelagic Station (C5)

On June 13, the water column at the Coeur d'Alene Lake southern pelagic sampling station (C5) was 9.8°C at surface to 7.1°C at bottom (18 meters). From June 13 to July 24 the water column at C5 began to weakly thermally stratify with the upper 10 meters of water warming 5.8°C. Between July 24 and August 15, thermal stratification intensified but the epilimnion remained relatively shallow at 4 meters (Figure 21A). The metalimnion on August 15 was deep, ranging from 4 meters to 10 meters with a small, 8.4°C temperature differential over 6 meters. (Figure 21A). The water column cooled from August 28 through September 24 with a mean epilimnetic temperature change from 21.1°C to 16.9°C respectively (Figure 22A). On September 24, the cooling epilimnion was 12 meters deep with a 3 meter wide and weak metalimnion (Figure 22A). Thermal stratification at C5 continued to weaken and by October 23, only a gradual temperature gradient existed with a near surface to bottom temperature range of 11.6°C to 8.9°C respectively. Between October 23 and November 27 the entire water column cooled 4.1°C producing near isothermal conditions with a surface temperature of 7.0°C gradually decreasing to 5.4°C at the bottom (Figure 23A).

On June 13, mean dissolved oxygen concentration was uniform from surface to 16 meters was 10.6 mg/L (102% saturation) and exhibited a small decrease from 16 to 18 meters with 8.8 mg/L, (80%) near the bottom at 18 meters. Low dissolved oxygen in the hypolimnion at C5 intensified as the summer progressed, but unlike Chatcolet Lake (C6), the hypolimnion at C5 did not become anoxic. Between June 13 and July 24, dissolved oxygen in the deepest 4 meters of water at C5 decreased from 9.9 mg/L to 7.5 mg/L (94% to 73% saturation) respectively. From July 24 through August 15 as thermal stratification strengthened, dissolved oxygen in the hypolimnion decreased another 2.0 mg/L at a concentration of 5.5 mg/L (54% saturation) near the bottom at 17.5 meters (Figure 21B). From August 15 through September 24, dissolved oxygen continued to decline in the hypolimnion reaching a low for the season at 4.1 mg/L, (41%) near the bottom at 15 meters (Figure 22B). Between September 24 and October 23, as the water column temperature cooled and thermal stratification weakened, dissolved oxygen concentration increased in the hypolimnion. Average dissolved oxygen concentration from 14 meters to 17 meters increased from 4.6 mg/L (47% saturation) on September 24 to 7.9 mg/L (68% saturation) on October 23. Between October 23 and November 15 dissolved oxygen increased throughout the water column. On November 15, the dissolved oxygen at near surface was 10.8 mg/L (92% saturation) and 11.0 mg/L (91% saturation) near the bottom (Figure 23B). The Tribe's dissolved oxygen standard was not met at C5 on 7 of 12 (58%) sample dates.

An additional sample depth was included at C5 on August 15. This additional depth is where relative fluorescence (a surrogate for chlorophyll *a* concentration) is highest in the water column. This maximum fluorescence depth is sampled to capture the higher chlorophyll a concentration and associated nutrients. Experience from past sampling seasons under the Coeur d'Alene Lake Management Plan (DEQ and Cd'A Tribe, 2009) and the Avista 4(e) Condition Number 5 sampling (Avista and Tribe, 2012) indicated that during years when the maximum fluorescence value was <2x the mean photic zone value, we were not successful at collecting a sample with a higher concentration of chlorophyll *a* compared to the photic zone. On August 15 the maximum fluorescence at 10 meters was 3.1 times greater than the mean photic zone value. The chlorophyll *a* and nutrients associated with this maximum fluorescence depth will be discussed with the photic zone and bottom nutrient results for C5.

Total nitrogen (TN) at C5 was highest in the photic zone and bottom on July 11, at 204 µg/L and 205 µg/L respectively (Figure 24A). As summer progressed, TN decreased significantly in the photic zone and hypolimnion (bottom), (Figure 24A). On September 19, the photic zone and bottom had the lowest TN concentrations of the season at 115 µg/L and 107 µg/L respectively, then increased slightly into October and November (Figure 24A). The geometric mean for TKN in the photic zone was 147.8 µg/L compared to 151.7 µg/L from bottom samples. Dissolved inorganic nitrogen (DIN) was significantly higher in the hypolimnion (bottom) compared to the photic zone (Figure 24B). The DIN maximum from bottom samples was 70 µg/L on June 13 declining rapidly to 17 µg/L on July 11, then showed an increasing trend throughout the summer peaking again on October 23 at 54 µg/L (Figure 24B). Dissolved inorganic nitrogen in the photic zone was much lower with a seasonal range of 10 µg/L to 19 µg/L (Figure 24B). The geometric mean for DIN in the photic zone was 12.3 µg/L compared to 34.3 µg/L from bottom samples.

Total phosphorus (TP) dynamics were similar between bottom samples compared to photic zone samples (Figure 24C). On June 13, TP concentration was 15 µg/L in the photic zone and bottom, when the water column was near isothermal and well mixed (Figure 24C). Total phosphorus concentrations increased from July 11 through September 19, when the photic zone exhibited a sampling season maximum TP concentration of 18 µg/L (Figure 24C). Total phosphorus was highest at the bottom on November 27 at 20 µg/L (Figure 24C). The geometric mean for TP in both photic zone and bottom was 12.4 µg/L. Orthophosphorus dynamics at C5 from the photic zone and bottom were similar with the bottom exhibiting higher concentrations on June 13, then decreasing into July and remaining relatively low throughout the summer (Figure 24D). Following the low summer values, orthophosphorus concentration increased in the fall to 4.8 µg/L in the photic zone and 3.0 µg/L at the bottom on October 23 (Figure 24D). The geometric mean for orthophosphorus in the photic zone was 1.8 µg/L and 2.8 µg/L at the bottom.

Chlorophyll *a* concentration at C5 remained relative low from June 13 through September 19 ranging from 1.0 µg/L to 1.4 µg/L during that time period (Figure 24E). Chlorophyll *a* concentration increased in the fall, reaching the sampling season maximum of 3.3 µg/L on November 27 (Figure 24E). The season mean for chlorophyll *a* was 1.7 µg/L. Phytoplankton biovolume at C5 was the second lowest of the five sites with a seasonal mean of 0.16 mm3/L

(Figure 27). Phytoplankton biovolume remained low from June through mid September, then increased significantly to the seasonal maximum of 0.30 mm3/L on October 23 (Figure 24F). The colonial diatom *Asterionella formosa* and the filamentous diatom *Aulacoseira granulata* comprised 11% and 68% of the October 23 maximum respectively. Diatoms (Bacillariophyceae) dominated the phytoplankton assemblage at C5, accounting for 52% of the season biovolume (Figure 28). The small flagellates (chrysophyceae and cryptophyceae) comprised 28% of the seasonal phytoplankton composition (Figure 28), with *Cryptomonas sp.* comprising 30% of this group.

5.0 CROSS-SITE COMPARISON

Mean total phosphorus (TP) concentration in the photic zone was highest from Benewah Lake (BL1) at 42.0±11.4 µg/L (Figure 25). Chatcolet Lake (C6) had the highest mean concentration of 100.2±144.6 µg/L from the bottom (Figure 25). Chatcolet Lake (C6) had the largest difference between photic zone and bottom with 22.6±10.2 µg/L and 100.2±144.6 µg/L respectively (Figure 25). This difference between photic zone and bottom at C6 is explained by the anoxic conditions that persisted in the hypolimnion, releasing bound phosphorus from the sediments. The southern pelagic site (C5) had the lowest TP concentration of all sites, in both photic zone and bottom at 11.6±2.6 µg/L and 11.8±3.7 µg/L respectively (Figure 25).

The mean total nitrogen (TN) concentration of 510.0±87.2 µg/L from the bottom depth zone of Benewah lake (BL1) was the highest of all sites in 2012 (Figure 26). Round Lake (RL1) had the highest photic zone mean TN concentration at 408.2±240.4 µg/L. (Figure 26). Chatcolet Lake (C6) had the largest difference between photic zone and bottom with 215.2±107.7 µg/L and 331.6±196.5 µg/L respectively (Figure 26). As with total phosphorus, the higher concentration of TKN is explained by the anoxic conditions that persisted in the hypolimnion at C6, releasing the bound nitrogen from the sediments. Site C5 had the lowest mean TN concentration in the photic zone at 156.8±36.7 µg/L (Figure 26).

The shallow-macrophyte dominated site BL1 exhibited twice the chlorophyll *a* concentration, but similar phytoplankton biovolume compared to RL1, a similar shallow site with a large macrophyte standing crop (Figure 27). The pelagic Chatcolet Lake site (C6) was twice as productive as the Coeur d'Alene Lake southern pelagic sampling station (C5), (Figure 27). Large colonial diatoms and small flagellated chrysophytes and cryptophytes dominated the phytoplankton composition at both C5 and C6 in 2012 (Figure 28).

A cross-site comparison was not completed for DO and temperature as the data for these parameters consists of profiles which could not be compared between sites, however were summarized for each specific site.

6.0 MULTI-YEAR COMPARISON

One objective of this project is to quantify interannual variability of nutrients and primary production at the five sites. Two sample seasons have been completed under this project (2011 and 2012). The sample size is not yet large enough to apply a statistical analysis (i.e., multiple comparisons test). Instead, for this report box plot figures were produced to compare 2011 and 2012. The box plot figures depict the mean (black square). The rectangle is the upper and lower spread (hinge) of the data based on the difference between the 25th and 75th percentile from the median. The median is the horizontal bar across the rectangle. Attached to the upper and lower ends of the rectangle are the error bars, defined as the largest and smallest points within 1.5 times the upper and lower hinge points. The open circles are outliers, data points between 1.5 and 3 times the upper and lower hinge points.

Total phosphorus (TP) concentration was higher at all five sites in 2012 compared to 2011 (Figure 29). The difference in TP between years was lowest at SJ1 and C5 (Figure 29). Chatcolet Lake (C6) exhibited the greatest difference in TP concentration between years with a mean of 13.4 µg/L in 2011 and 22.2 µg/ L in 2012. The shallow macrophyte-dominated sites exhibited the greatest within-season TP variability (Figure 29).

As with total phosphorus, total nitrogen (TN) concentration was higher at all five sites in 2012 compared to 2011 (Figure 30). Although the within-season variability was higher in 2011 at BL1, there was little difference in mean TN between years at 328.2 µg/ L in 2011 and 384.2 µg/ L in 2012 (Figure 30). Round Lake (RL1) exhibited the greatest difference in TN concentration between years with a mean of 189.0 µg/L in 2011 and 408.2 µg/ L in 2012, a greater than 2X difference between years (Figure 30).

The lower St. Joe River (SJ1) was the only site to have lower mean chlorophyll *a* concentration in 2012 compared to 2011 (Figure 31). Site C5 mean chlorophyll *a* concentration was similar between years at 1.27 µg/ L and 1.54 µg/ L in 2011 and 2012 respectively (Figure 31). In 2012, chlorophyll *a* concentration in Round Lake (RL1) was greater than 2X as in 2011 (Figure 31). Benewah Lake (BL1) had the highest chlorophyll *a* concentration of all sites in both years, and the highest within-season variability for chlorophyll *a* compared to all other sites (Figure 31).

7.0 PROPOSED CHANGES FROM PRIOR YEAR AIR

Avista and the Tribe do not anticipate any changes to the proposed 2013 water quality monitoring activities stated in the Interior-approved 2012 Annual Implementation Report. The 2012 Annual Implementation Report was submitted to FERC for approval on December 12, 2012.

8.0 REFERENCES

Avista and the Coeur d'Alene Tribe. 2010. Coeur d'Alene Reservation Water Quality Monitoring Plan. June 14.

Coeur d'Alene Tribe's Lake Management Department. 2010. Water Quality Standards for Approved Surface Waters of the Coeur d'Alene Tribe. Prepared for: The United State's Environmental Protection Agencey (Region 10).

FERC. 2010. Order Approving Water Quality Monitoring Plan Under Paragraph G. October 15.

FERC. 2009. Order Issuing New License and Approving Annual Charges For Use of Reservation Lands. Project Nos. 2545-091 and 12606-000. June 18.

IDEQ and C'dA Tribe. 2009b. Coeur d'Alene Lake Management Plan, 2009. Idaho Department of Environmental Quality, Coeur d'Alene Idaho, and Coeur d'Alene Tribe, Plummer, Idaho.

TABLES

Table 1. Description and coordinates of water quality sampling site locations per Part A(1)(a-e) of Condition 5.

Site Code	Site Name & Location	Total Depth (meters)*	Site Latitude	Site Longitude
C5	Coeur d'Alene Lake mid-lake between Browns Point and north-end of Shingle Bay (near Chippy Point), south of Harrison, ID (referred to as C5)	17	N47° 25' 15.927"	W116° 45' 30.509"
C6	Chatcolet Lake Chatcolet Lake in the central portion of the deepest area, 0.4 miles northwest of Rocky Point near Plummer, ID (referred to as C6)	11	N47° 21' 30.272"	W116° 44' 54.080"
BL1	Benewah Lake East of Chatcolet Lake, south of St Joe River (referred to as BL1)	3	W116° 41' 42.743"	N47° 21' 17.551"
SJ1	Lower St. Joe River the "60-foot deep hole" in the sharp bend upstream of USGS gage 12415140, St. Joe River near Chatcolet, Idaho and ~1 km downstream of USGS gage 12415135 at Ramsdell (referred to as SJ1)	18	N47° 21' 27.906"	W116° 41' 10.986"
RL1	Round Lake East of Chatcolet Lake, north of St Joe River (referred to as RL1)	3	N 47° 21' 48.925"	W116° 43' 35.865"

*** At full summer pool, lake surface elevation 2128 feet.**

Table 2. Dates the in-situ profile monitoring was completed during the 2012, June through November monitoring season.

	In-Situ Profile Monitoring Sites				
	SJ1	BL1	RL1	C5	C6
Monitoring Dates	6/12/2012	6/12/2012	6/12/2012	6/13/2012	6/13/2012
	6/29/2012	6/29/2012	6/29/2012	6/29/2012	6/29/2012
	7/10/2012	7/10/2012	7/10/2012	7/11/2012	7/11/2012
	7/24/2012	7/24/2012	7/24/2012	7/24/2012	7/24/2012
	8/14/2012	8/14/2012	8/14/2012	8/15/2012	8/15/2012
	8/28/2012	8/28/2012	8/28/2012	8/28/2012	8/28/2012
	9/18/2012	9/18/2012	9/18/2012	9/19/2012	9/19/2012
	9/24/2012	9/24/2012	9/24/2012	9/24/2012	9/24/2012
	10/9/2012	10/9/2012	10/9/2012	10/9/2012	10/9/2012
	10/23/2012	10/24/2012	10/24/2012	10/23/2012	10/23/2012
	11/15/2012	No Sample*	No Sample*	11/15/2012	11/15/2012
	11/28/2012	No Sample*	No Sample*	11/27/2012	11/27/2012

* No sample collected as the sites were inaccessible.

Table 3. Dates the water quality sampling was completed during the 2012, June through November monitoring season.

	In-Situ Profile Monitoring Sites				
	SJ1	BL1	RL1	C5	C6
Monitoring Dates	6/12/2012	6/12/2012	6/12/2012	6/13/2012	6/13/2012
	7/10/2012	7/10/2012	7/10/2012	7/11/2012	7/11/2012
	8/14/2012	8/14/2012	8/14/2012	8/15/2012	8/15/2012
	9/18/2012	9/18/2012	9/18/2012	9/19/2012	9/19/2012
	10/23/2012	10/24/2012	10/24/2012	10/23/2012	10/23/2012
	11/28/2012	No Sample*	No Sample*	11/27/2012	11/27/2012

* No sample collected as the sites were inaccessible.

Table 4. Compliance of 2012 monitoring activities with the requirements identified in the 4(e) Condition No. 5 and the Coeur d'Alene Reservation Water Quality Monitoring Plan.

		C5		C6		BL1		SJ1		RL1	
		Sampling Completed per 4(e) Condition[1]	Within Tribal Water Quality Standards[2]	Sampling Completed per 4(e) Condition[1]	Within Tribal Water Quality Standards[2]	Sampling Completed per 4(e) Condition[1]	Within Tribal Water Quality Standards[2]	Sampling Completed per 4(e) Condition[1]	Within Tribal Water Quality Standards[2]	Sampling Completed per 4(e) Condition[1]	Within Tribal Water Quality Standards[2]
In-Situ Profiles	pH	Yes	Yes	Yes	Yes	Yes, with one exception[6]	Yes	Yes	Yes	Yes, with one exception[6]	Yes
	Dissolved Oxygen (mg/L)		No[3]		No[4]		NA[5]		Yes		NA[5]
	Water Temperature (°C)		Yes[7]		Yes[7]				NA[8]		
	Specific Conductance (µS/cm)		No Quantitative Standard		No Quantitative Standard		No Quantitative Standard		No Quantitative Standard		No Quantitative Standard
	Photosynthetic Active Radiation (µE/s/m²)										
	Relative Fluorescence (Chlorophyll a) (Volts)										
Nutrient Monitoring	Chlorophyll-a										
	Ammonia as N										
	Nitrate as N										
	Nitrite as N										
	Total Kjeldahl Nitrogen										
	Total Phosphorus										
	Total Dissolved Phosphorus										
	Ortho-phosphate as P										

Notes:

(1) Sampling completed in accordance with the requirements identified in 4(e) Condition 5 No. and the Coeur d'Alene Reservation Water Quality Monitoring Plan.

(2) Dissolved oxygen, temperature and pH are the only constituents with quantitative standards monitored under the Coeur d'Alene Reservation Water Quality Monitoring Program.

(3) The Tribe's dissolved oxygen standard was not met at C5 on 7 of 12 (58%) sample dates.

(4) The Tribe's dissolved oxygen standard was not met at C6 on 6 of 12 (50%) sample dates.

(5) The dissolved oxygen and temperature standard is not applicable to sites BL1 and RL1 as they are less then 8 meters in depth.

(6) During the November sampling event, sampling was not completed at sites BL1 and RL1 as low lake levels rendered the sites inaccessible.

(7) Temperature standard attainment based on limited data, 7day avg temp not fully established

(8) SJ1 did not maintain a stable stratified condition, therefore the temperature standard could not be applied.

FIGURES

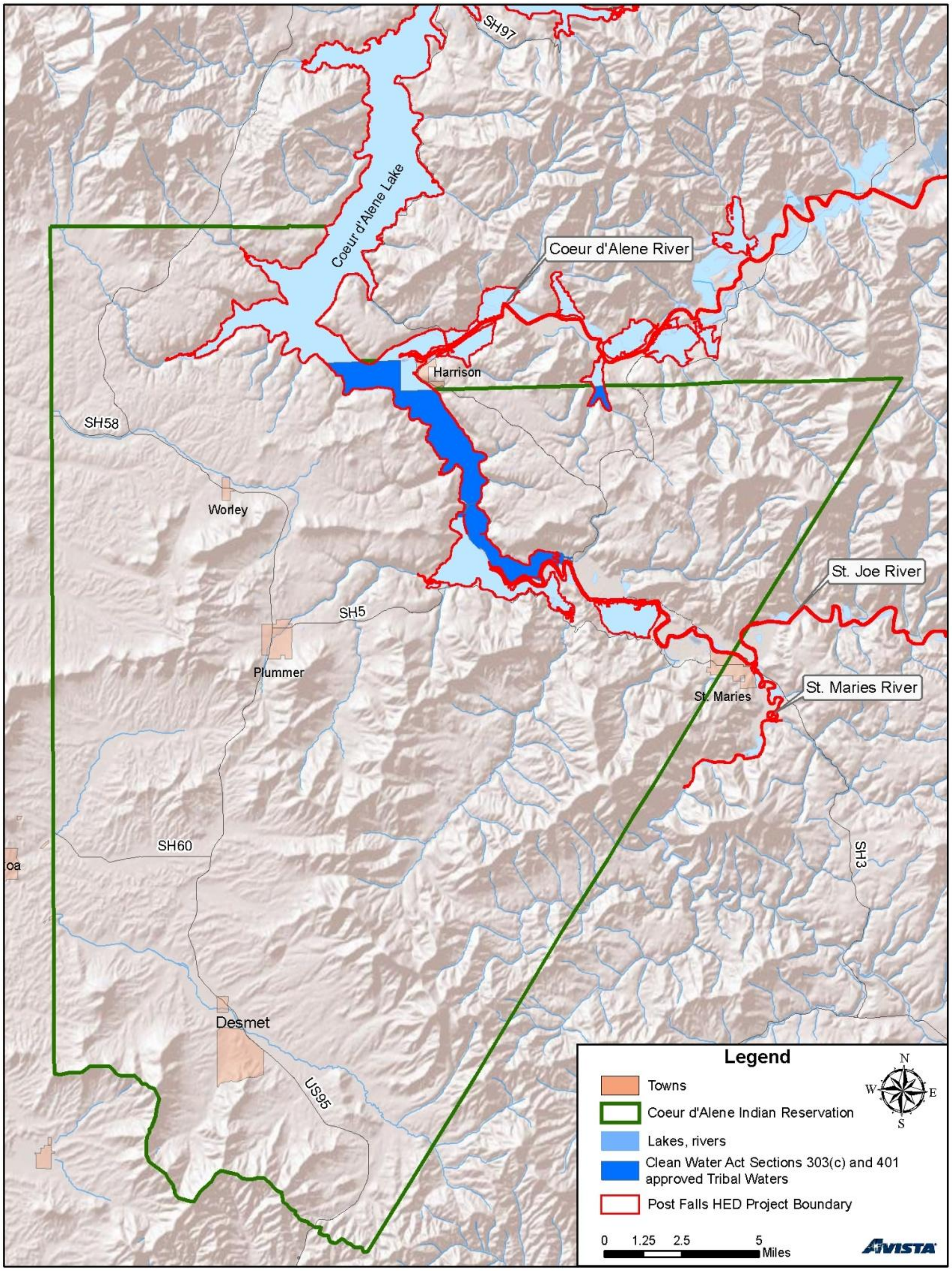

Figure 1. Current Exterior Boundaries of the Coeur d'Alene Indian Reservation.

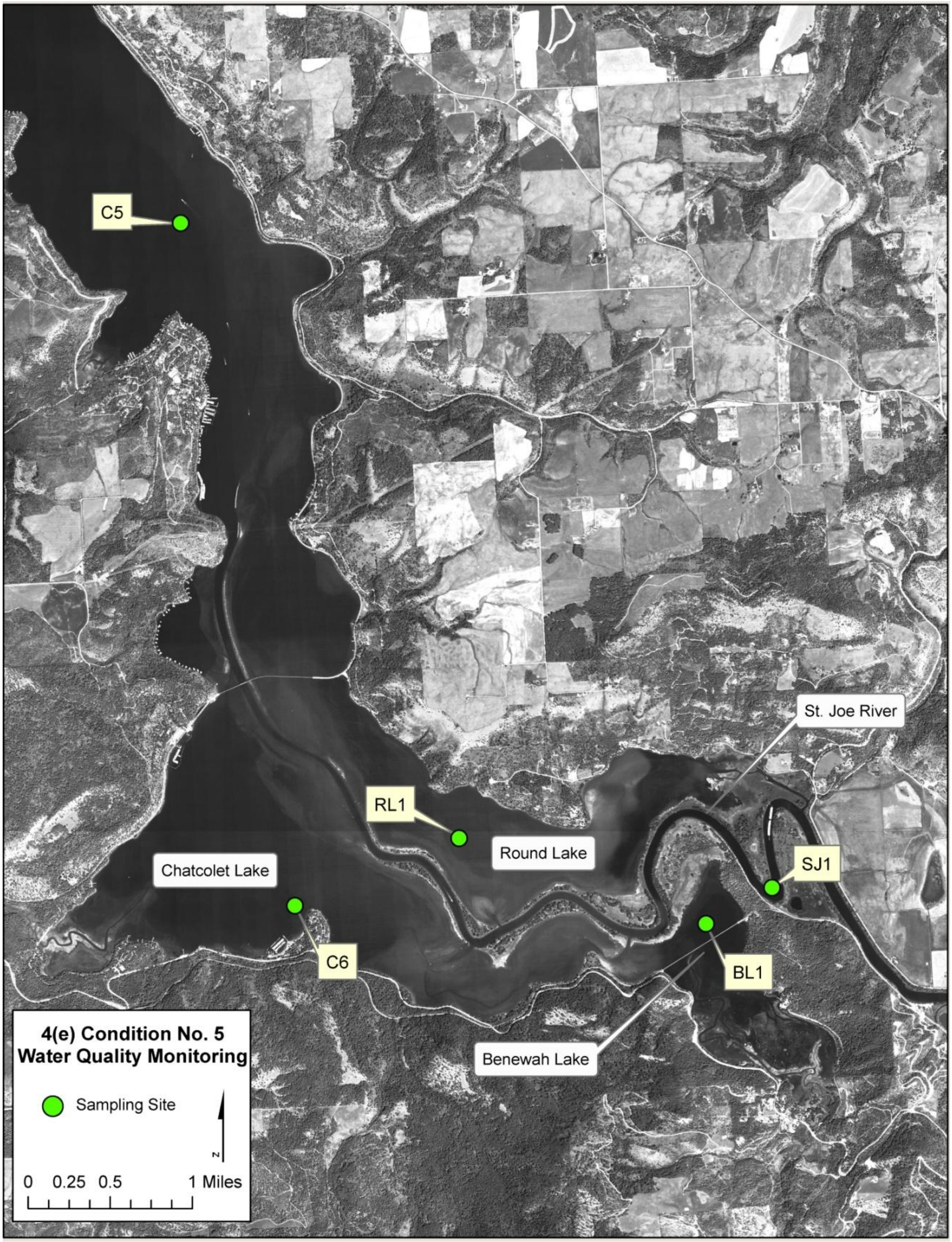

Figure 2. Map of sampling sites located in Coeur d'Alene Lake and the St. Joe River.

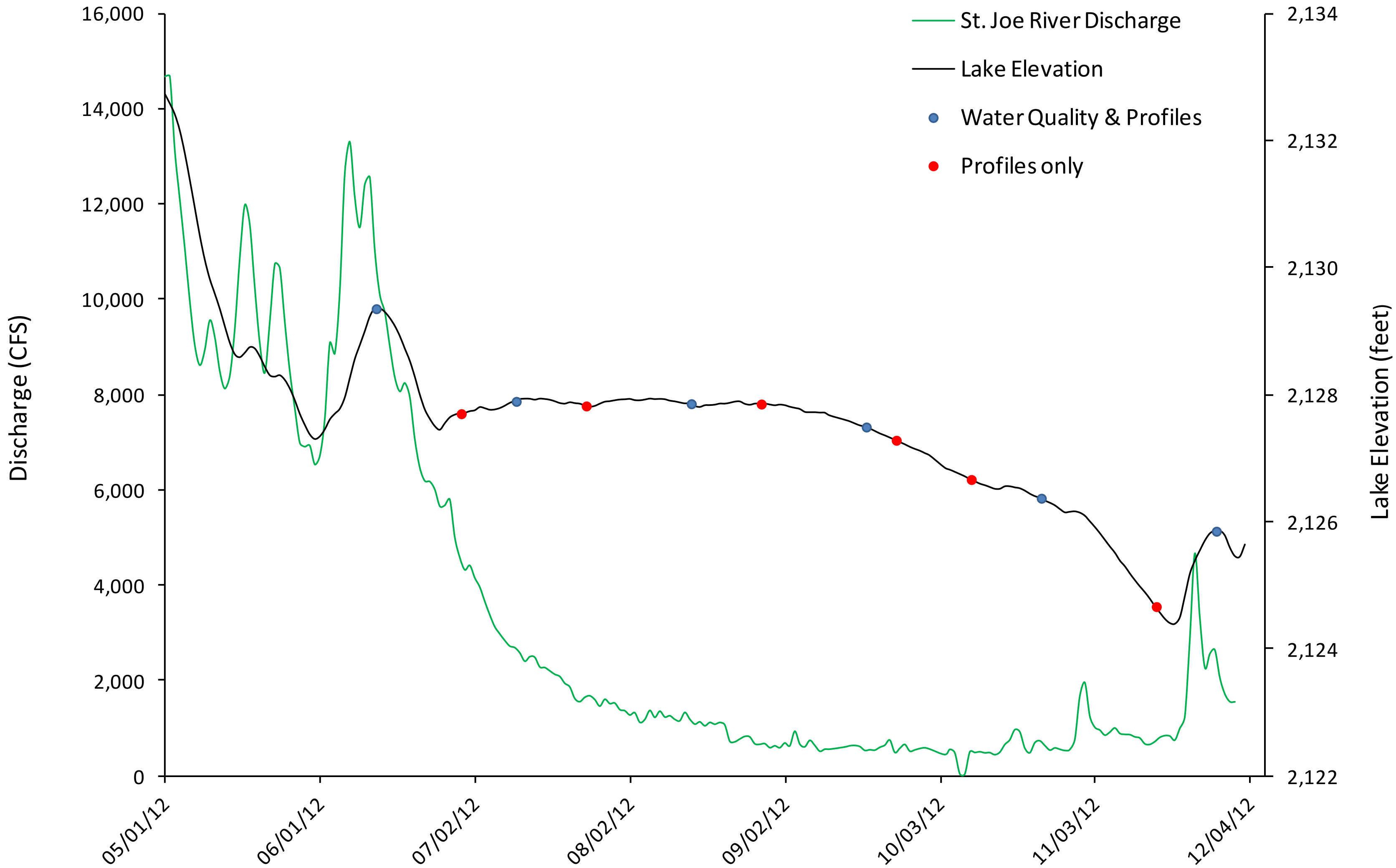

Figure 3. Discharge of lower St. Joe River (USGS gage #12415135) and elevation of Coeur d'Alene Lake (USGS gage #12415500) relative to water quality and water column profile sample dates in 2012.

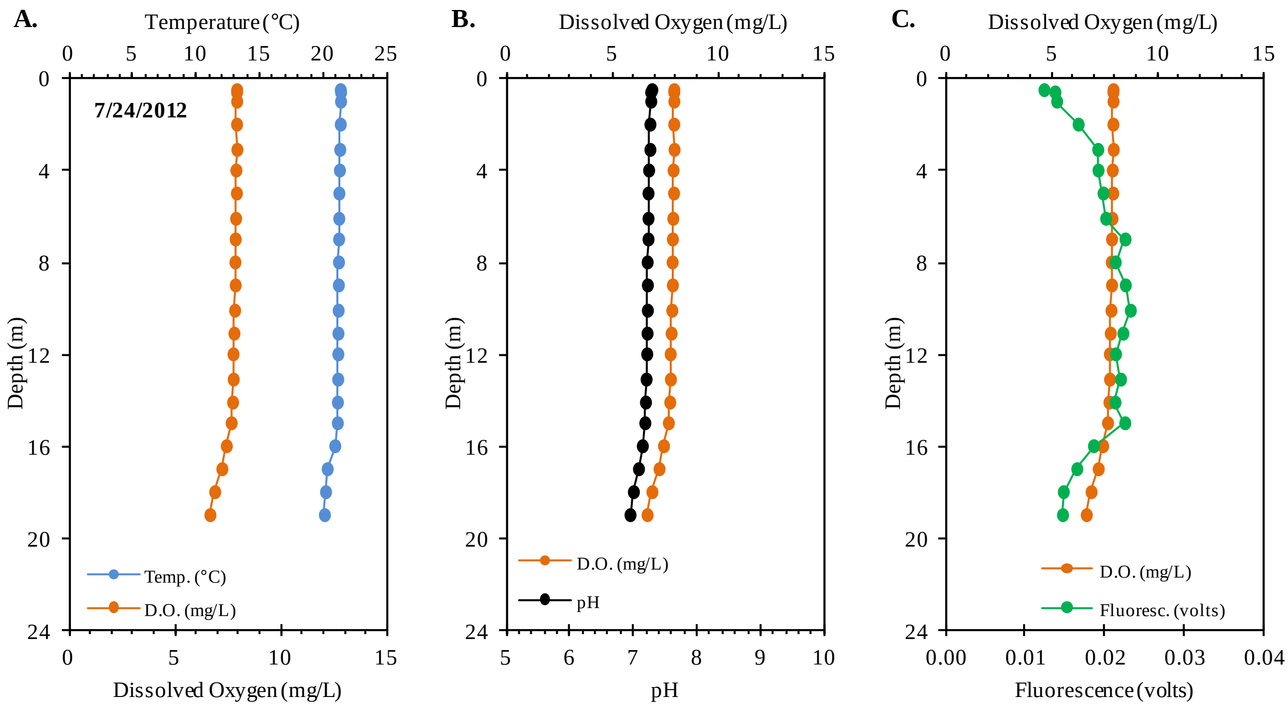

Figure 4. Temperature, dissolved oxygen, pH and relative fluorescence profiles from the lower St. Joe River (SJ1) taken on July 24, 2012.

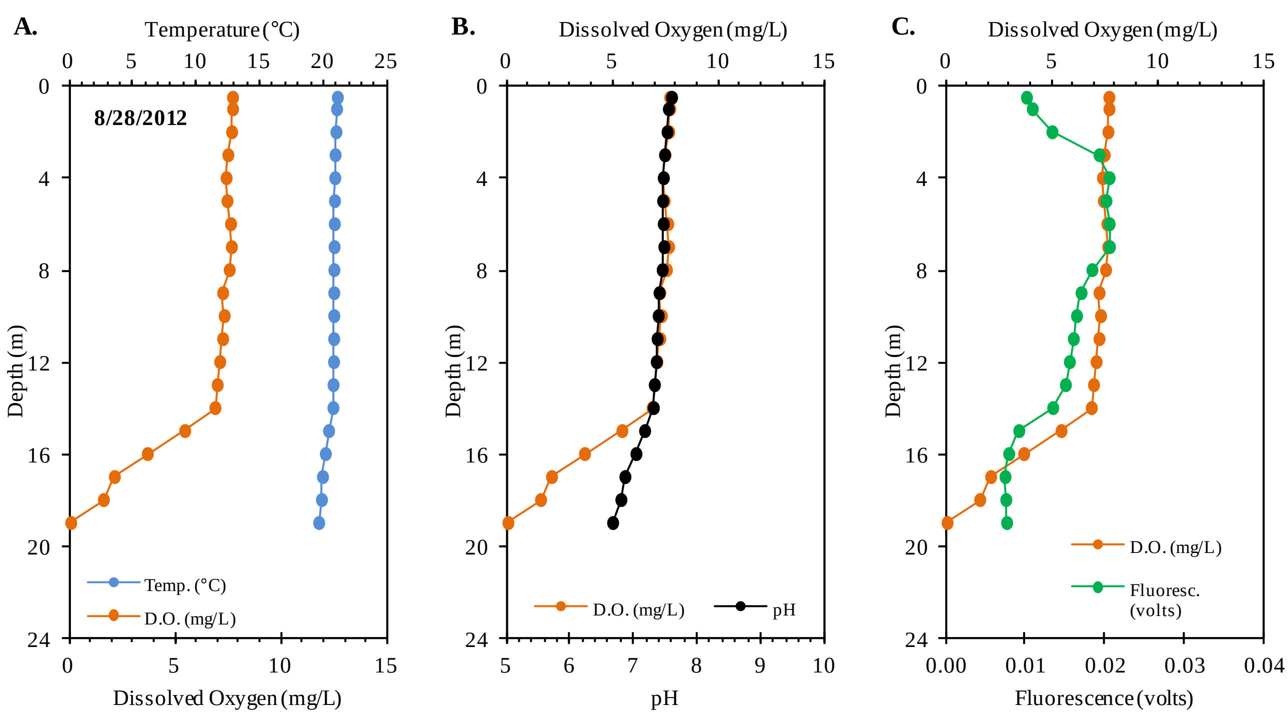

Figure 5. Temperature, dissolved oxygen, pH and relative fluorescence profiles from the lower St. Joe River (SJ1) taken on August 28, 2012.

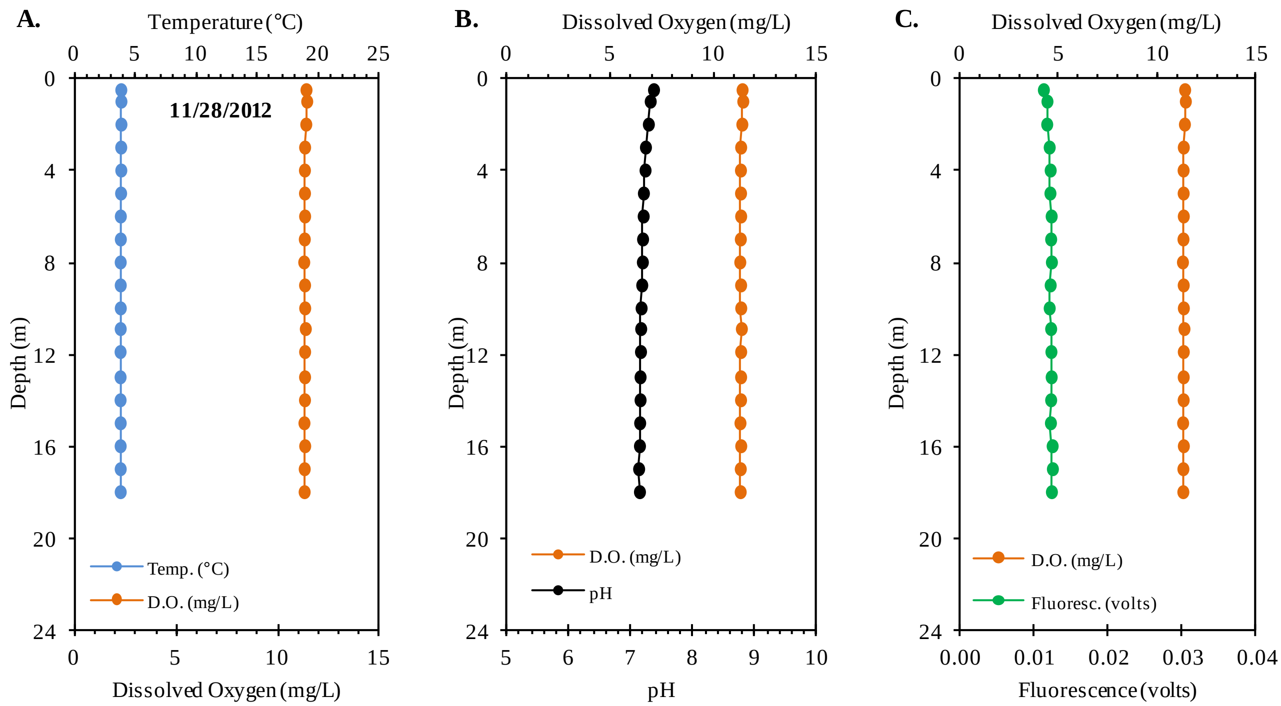

Figure 6. Temperature, dissolved oxygen, pH and relative fluorescence profiles from the lower St. Joe River (SJ1) taken on November 28, 2012.

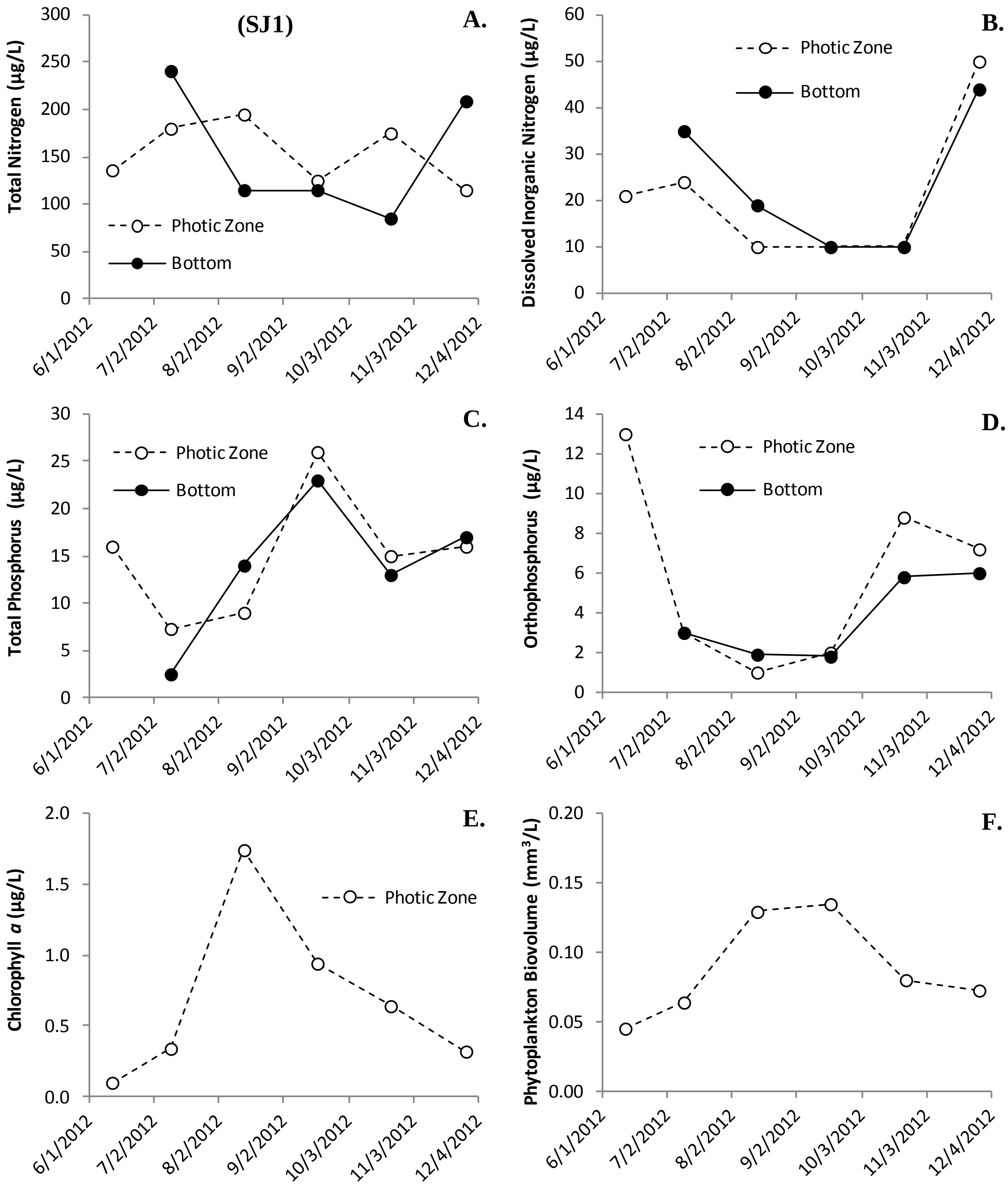

Figure 7. Nitrogen, phosphorus and phytoplankton dynamics from the photic zone and bottom collected from the lower St. Joe River (SJ1) in 2012.

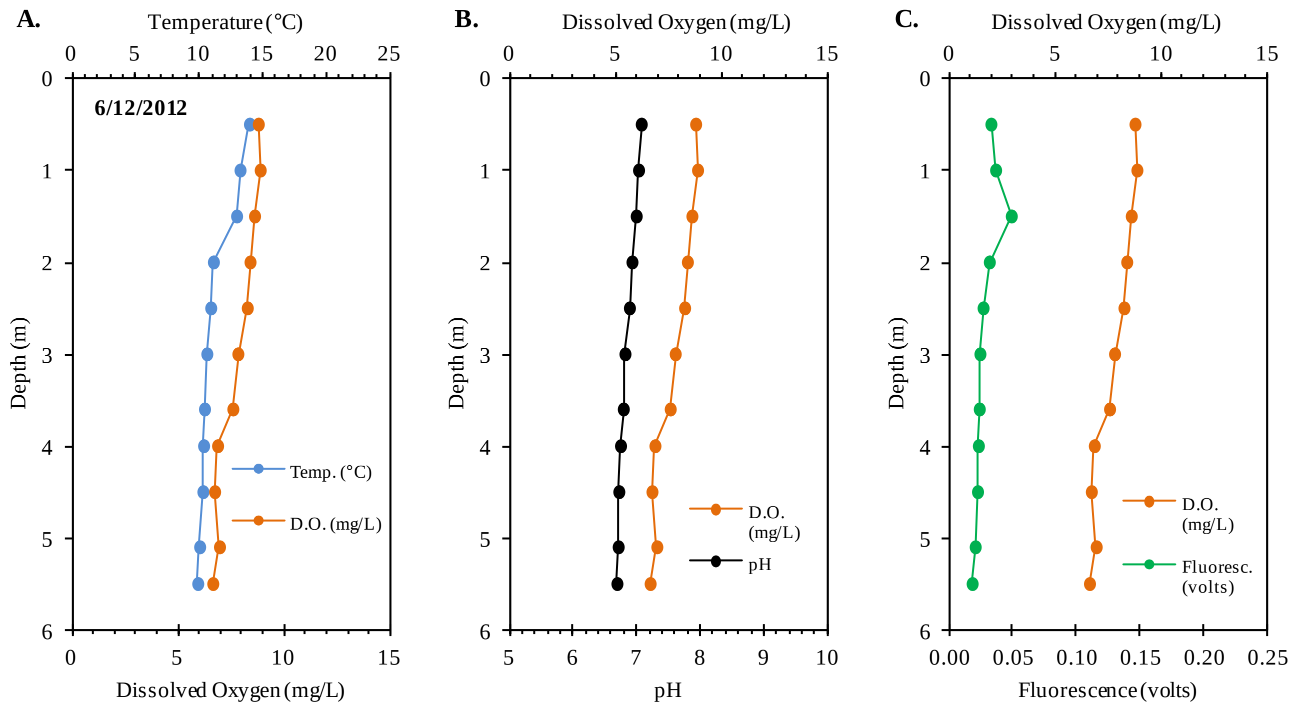

Figure 8. Temperature, dissolved oxygen, pH and relative fluorescence profiles from Benewah Lake (BL1) taken on June 12, 2012.

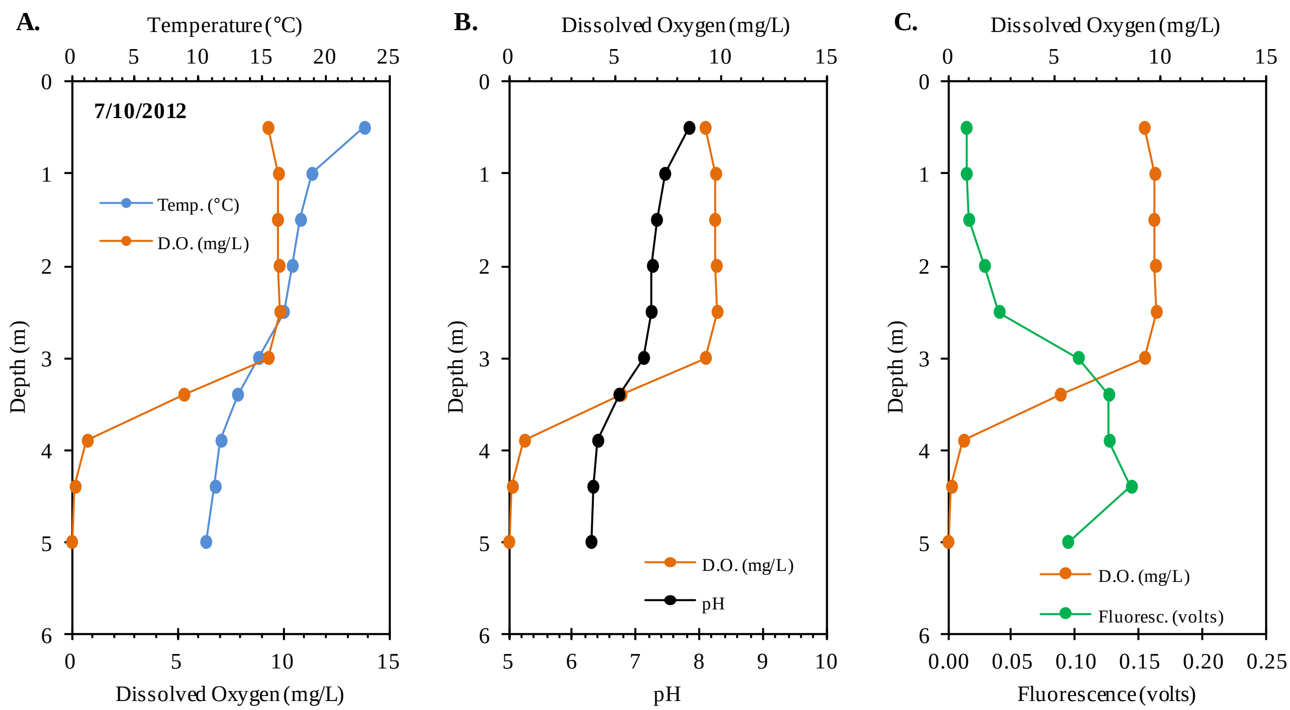

Figure 9. Temperature, dissolved oxygen, pH and relative fluorescence profiles from Benewah Lake (BL1) taken on July 10, 2012.

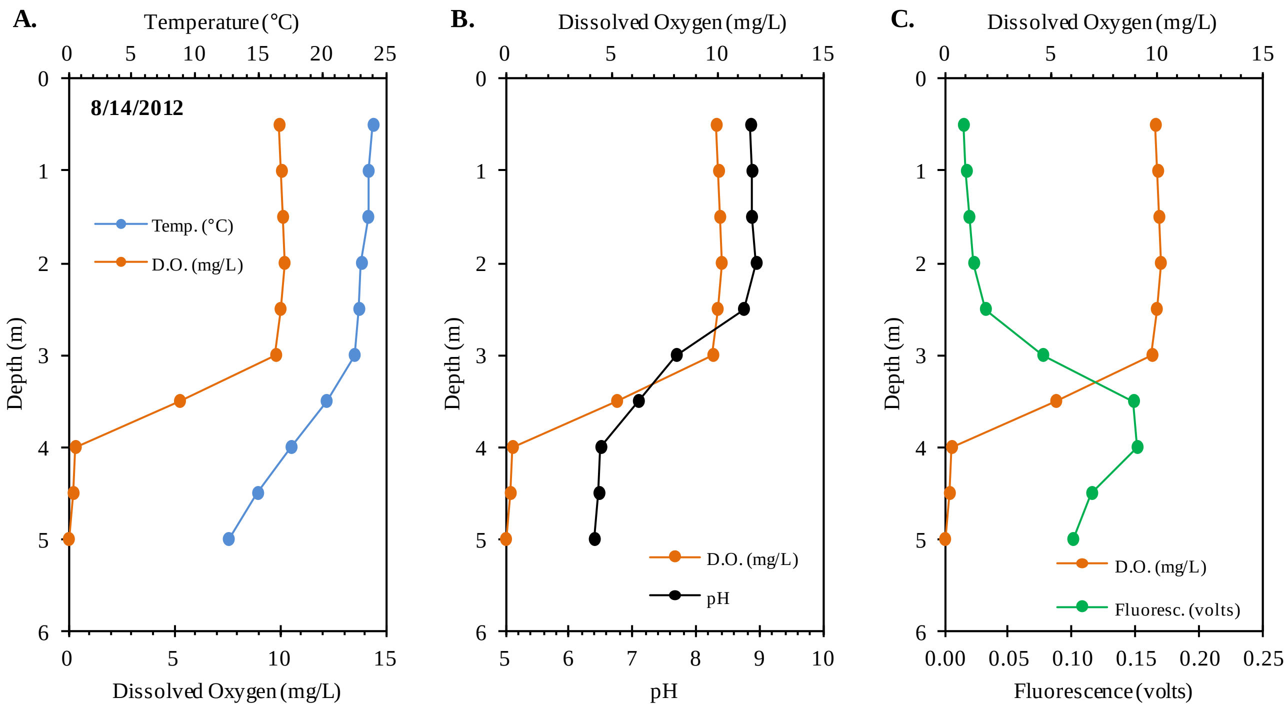

Figure 10. Temperature, dissolved oxygen, pH and relative fluorescence profiles from Benewah Lake (BL1) taken on August 14, 2012.

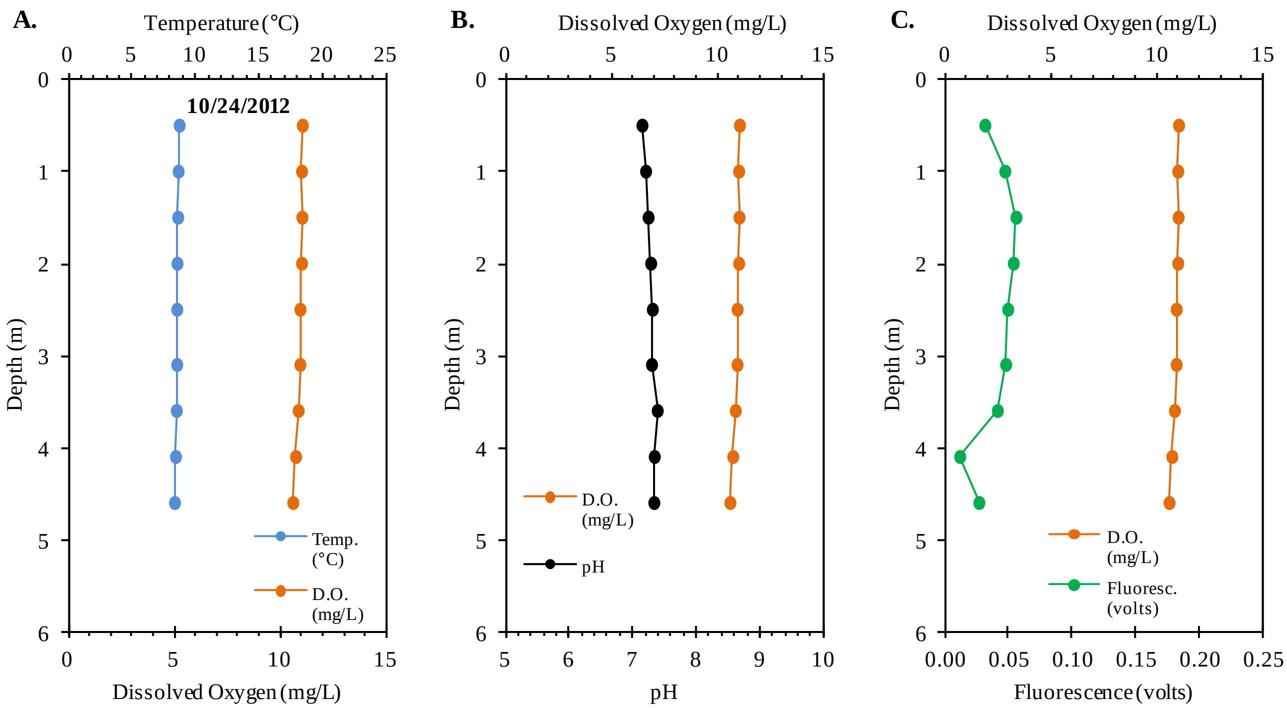

Figure 11. Temperature, dissolved oxygen, pH and relative fluorescence profiles from Benewah Lake (BL1) taken on October 24, 2012.

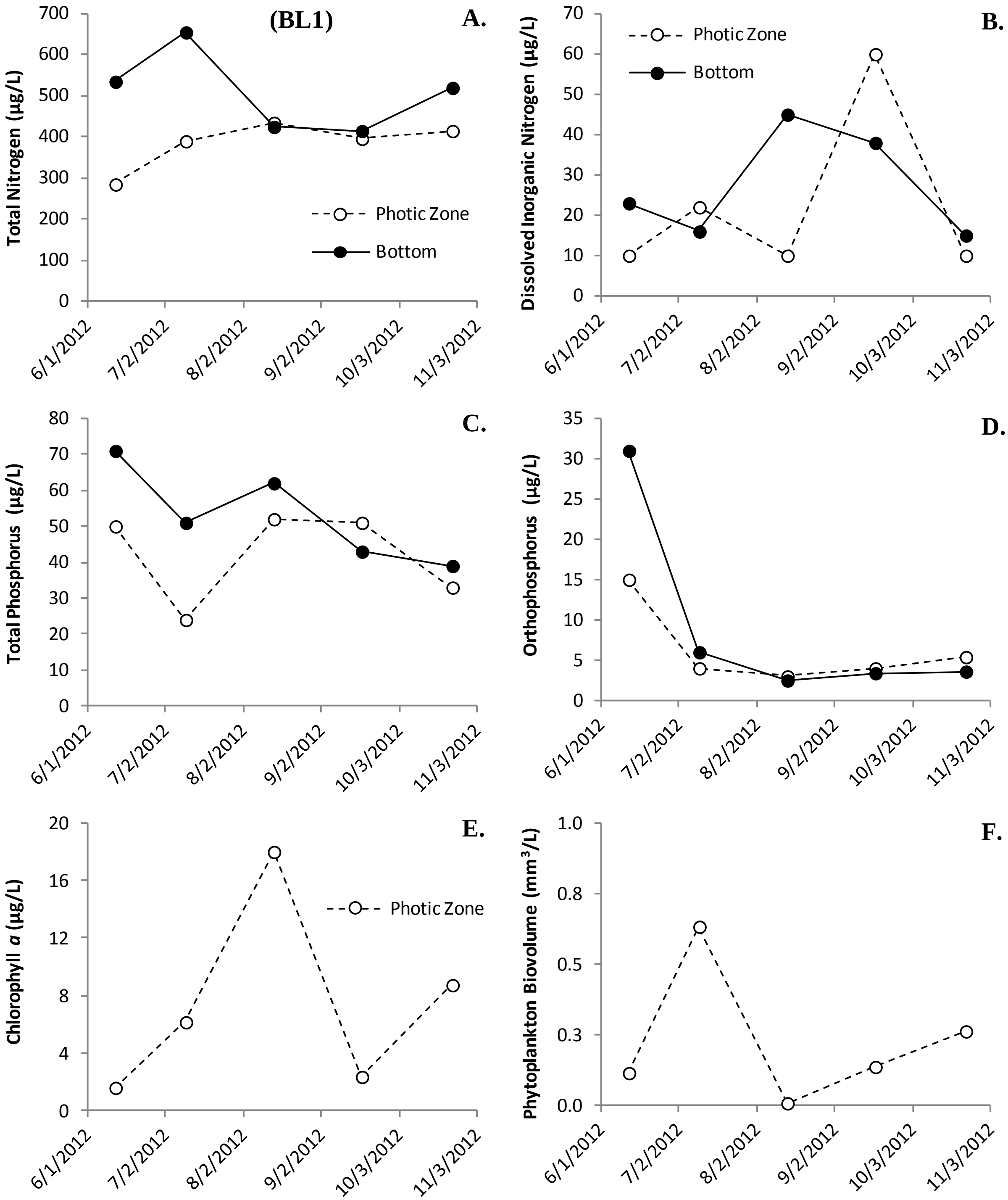

Figure 12. Nitrogen, phosphorus and phytoplankton dynamics from the photic zone and bottom collected from Benewah Lake (BL1) in 2012.

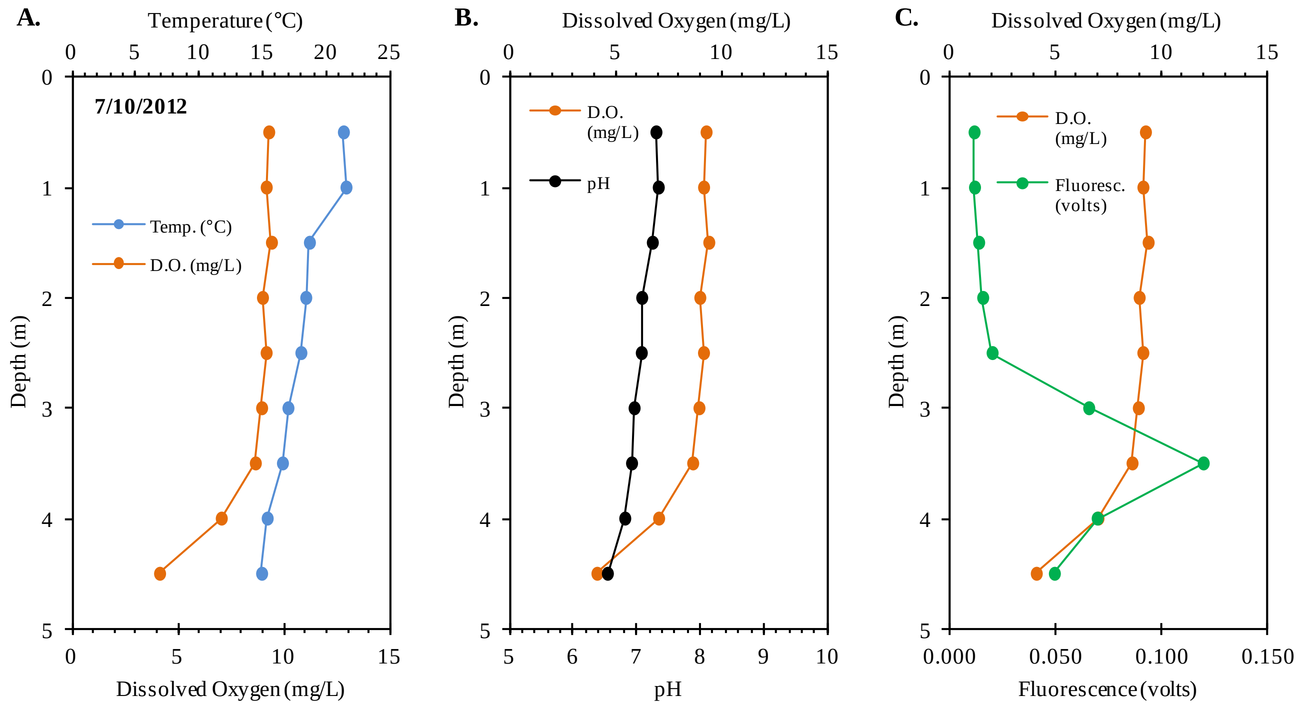

Figure 13. Temperature, dissolved oxygen, pH and relative fluorescence profiles from Round Lake (RL1) taken on July 10, 2012.

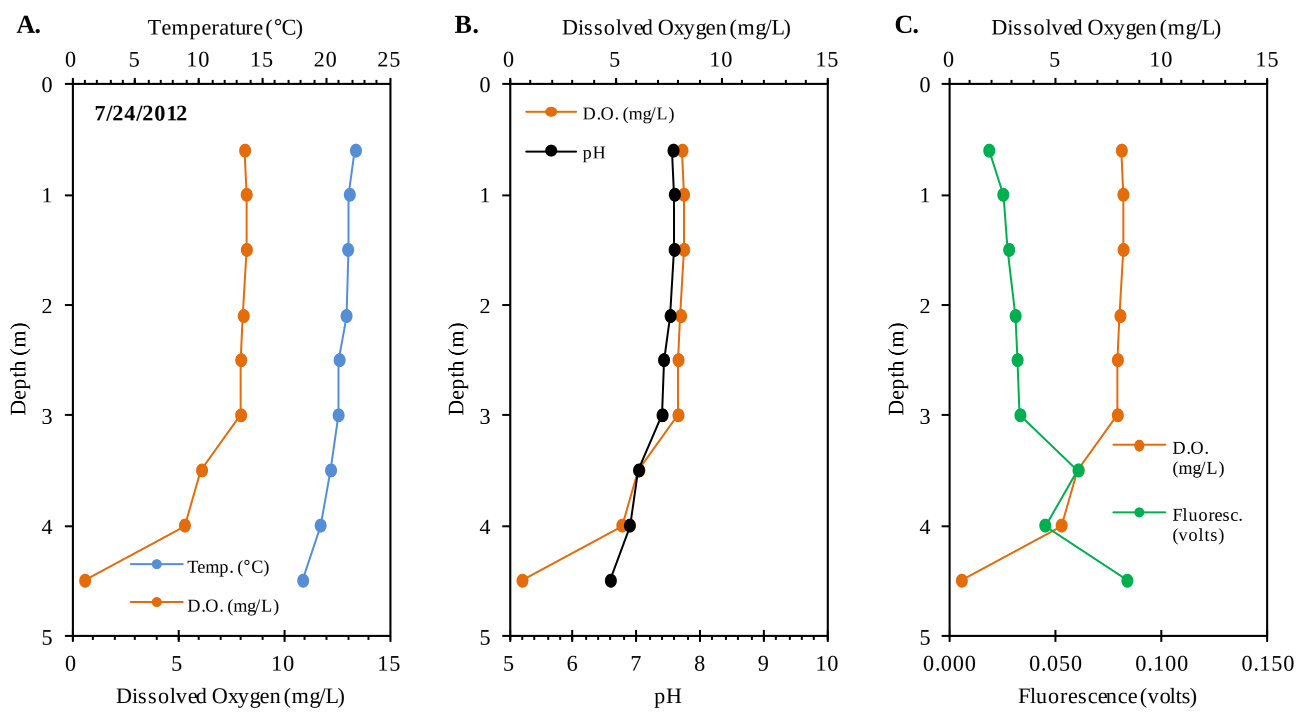

Figure 14. Temperature, dissolved oxygen, pH and relative fluorescence profiles from Round Lake (RL1) taken on July 24, 2012.

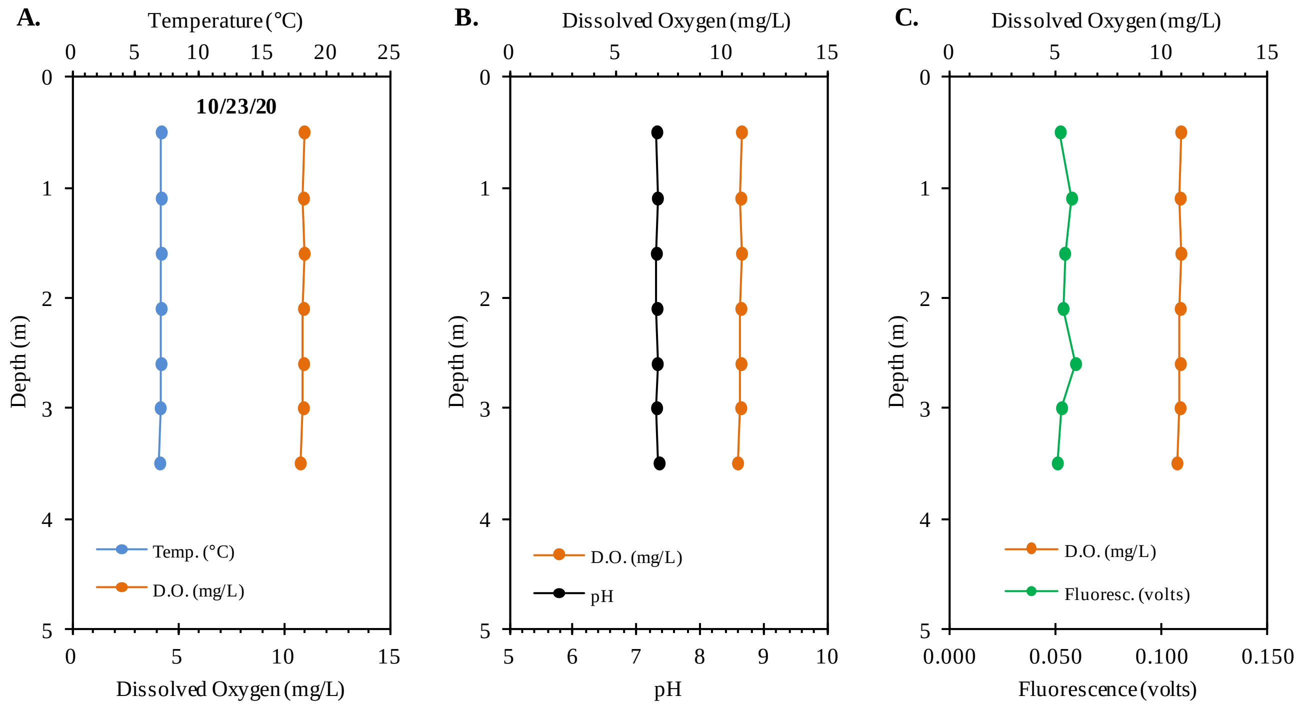

Figure 15. Temperature, dissolved oxygen, pH and relative fluorescence profiles from Round Lake (RL1) taken on October 23, 2012.

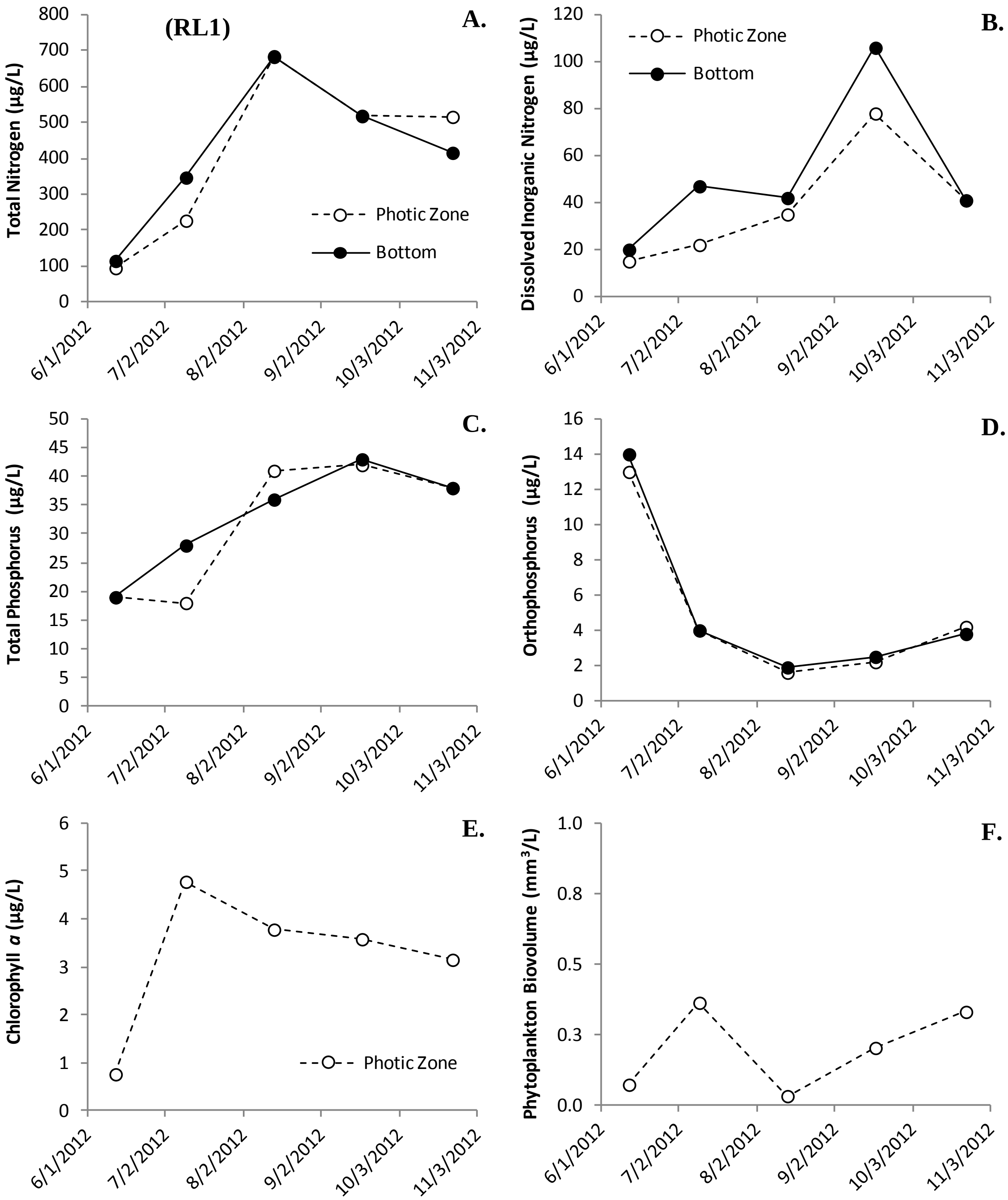

Figure 16. Nitrogen, phosphorus and phytoplankton dynamics from the photic zone and bottom collected from Round Lake (RL1) in 2012.

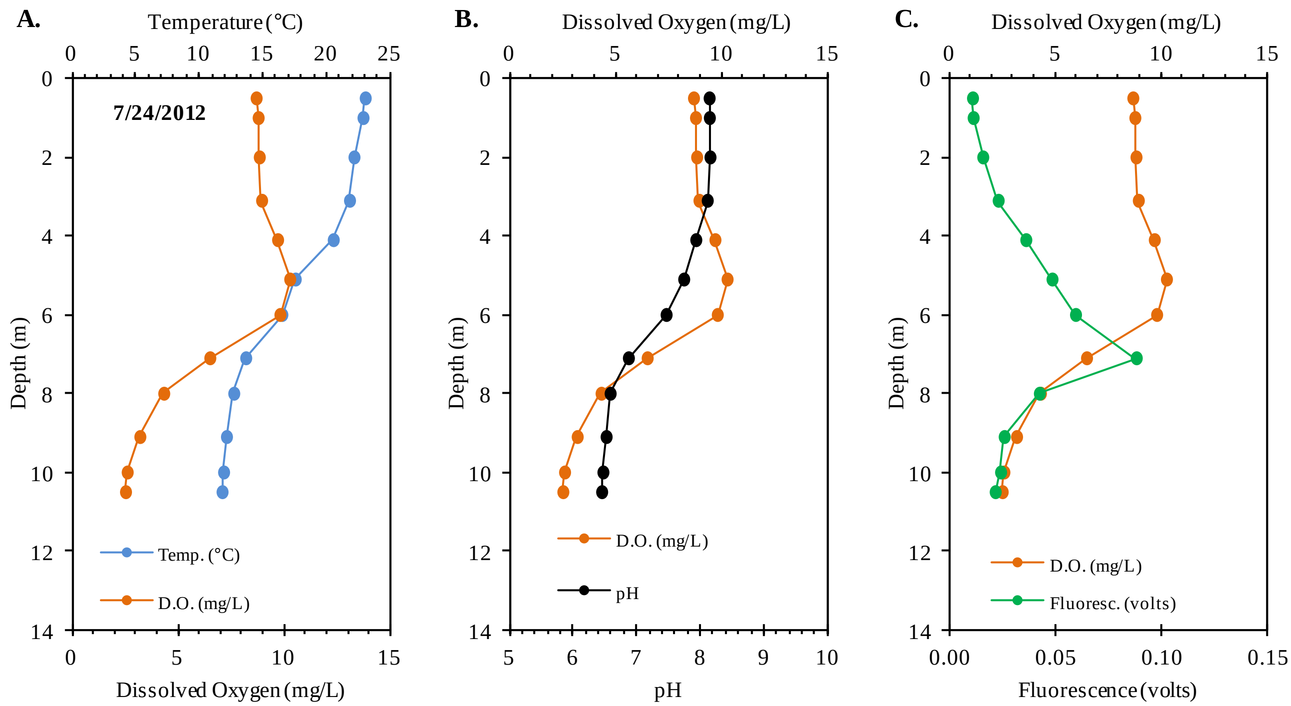

Figure 17. Temperature, dissolved oxygen, pH and relative fluorescence profiles from Chatcolet Lake (C6) taken on July 24, 2012.

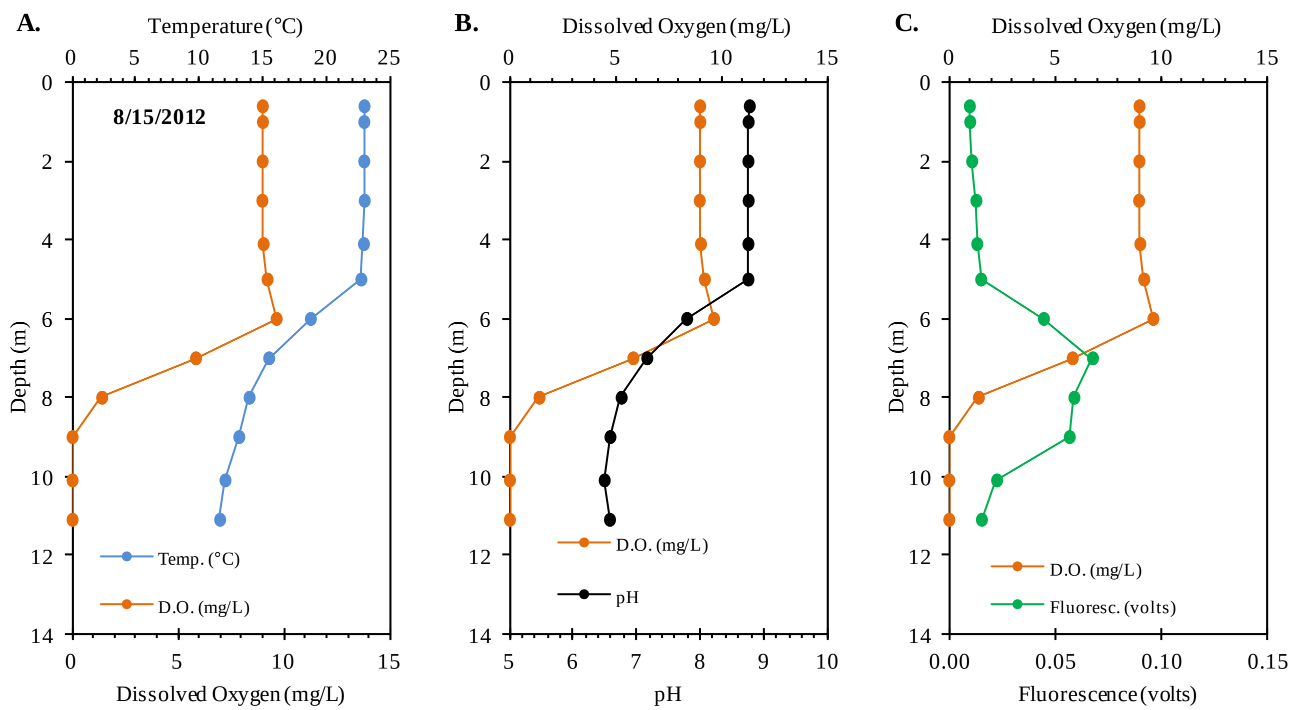

Figure 18. Temperature, dissolved oxygen, pH and relative fluorescence profiles from Chatcolet Lake (C6) taken on August 15, 2012.

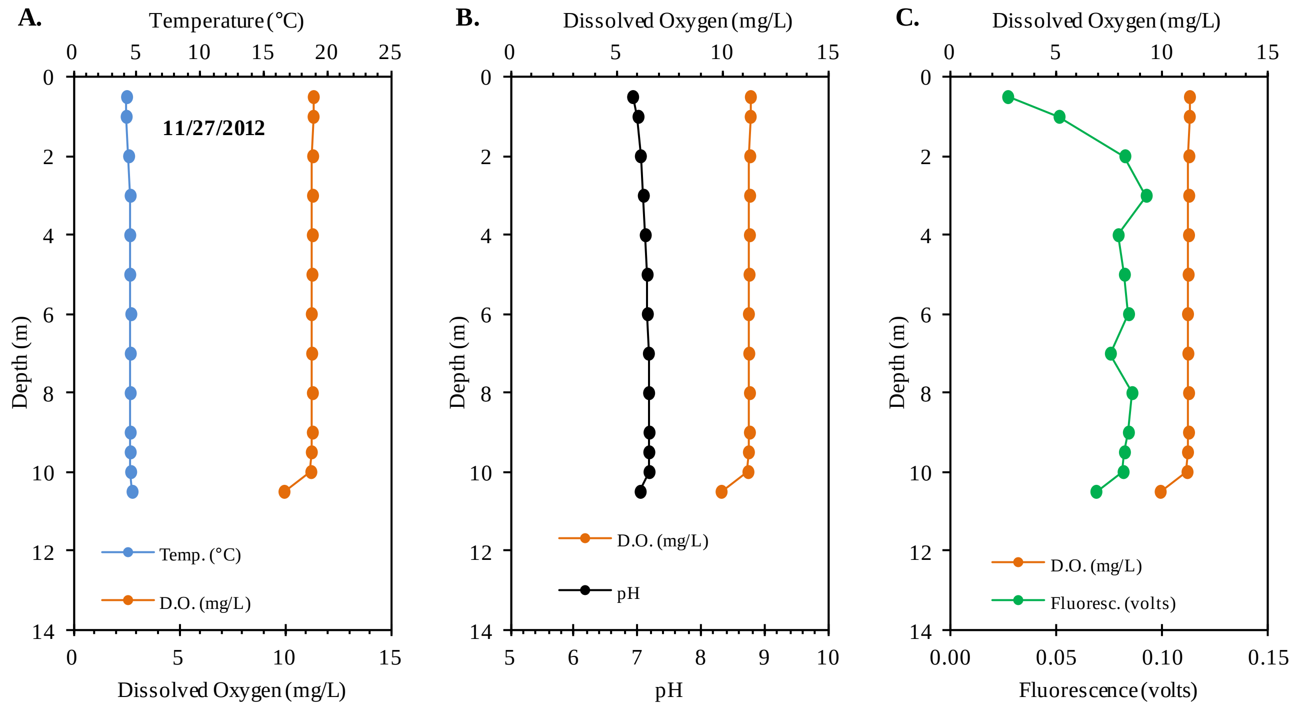

Figure 19. Temperature, dissolved oxygen, pH and relative fluorescence profiles from Chatcolet Lake (C6) taken on November 27, 2012.

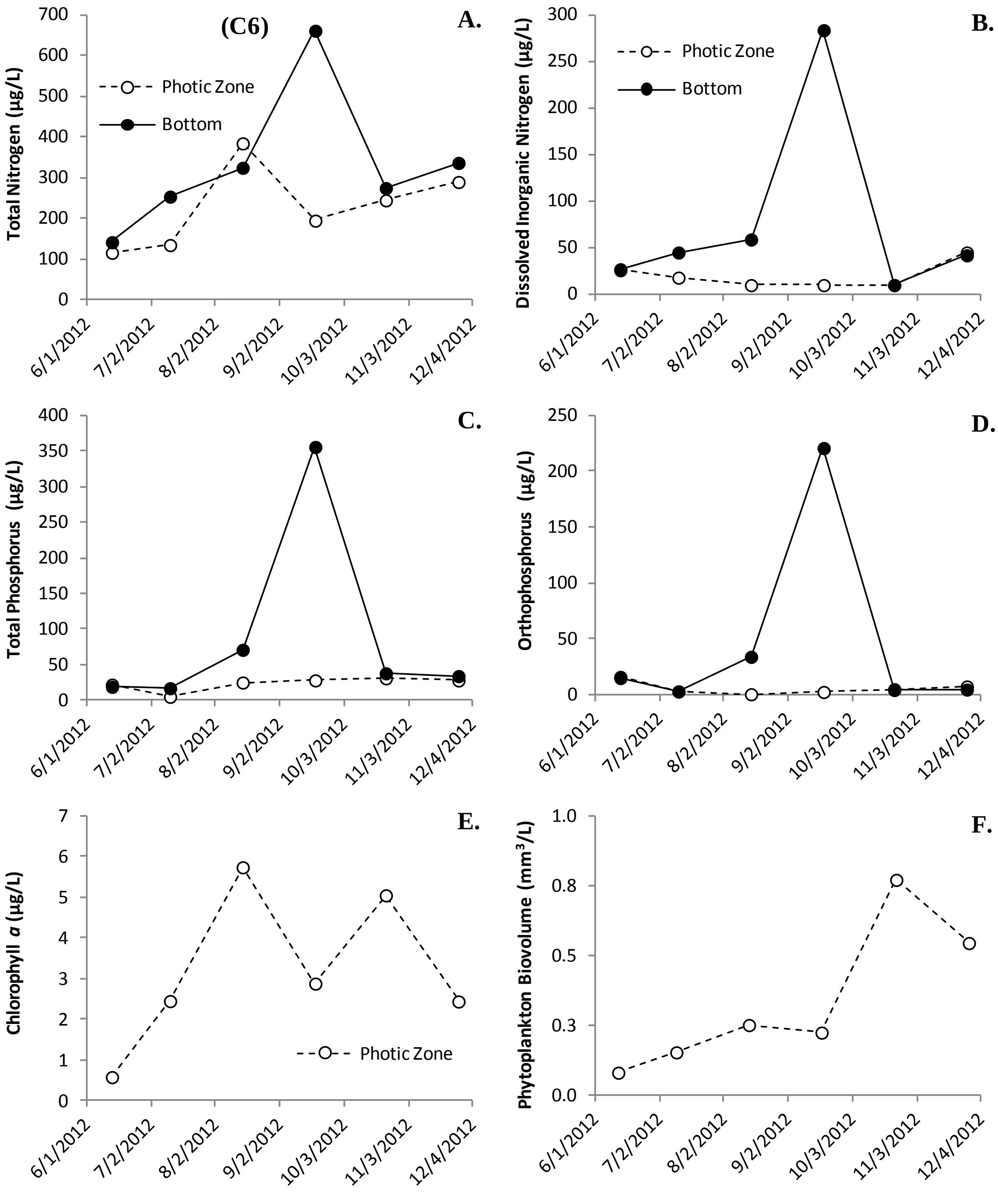

Figure 20. Nitrogen, phosphorus and phytoplankton dynamics from the photic zone and bottom collected from Chatcolet Lake (C6) in 2012.

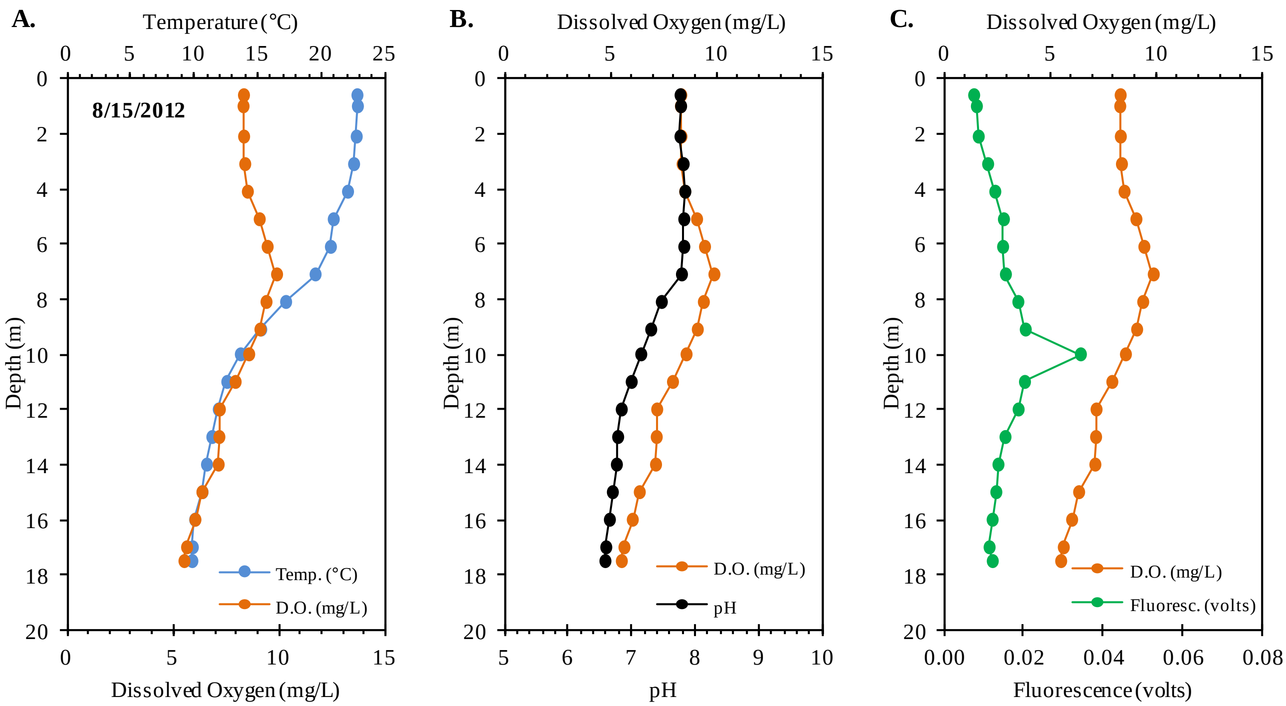

Figure 21. Temperature, dissolved oxygen, pH and relative fluorescence profiles from the Coeur d'Alene Lake southern pelagic site (C5) taken on August 15, 2012.

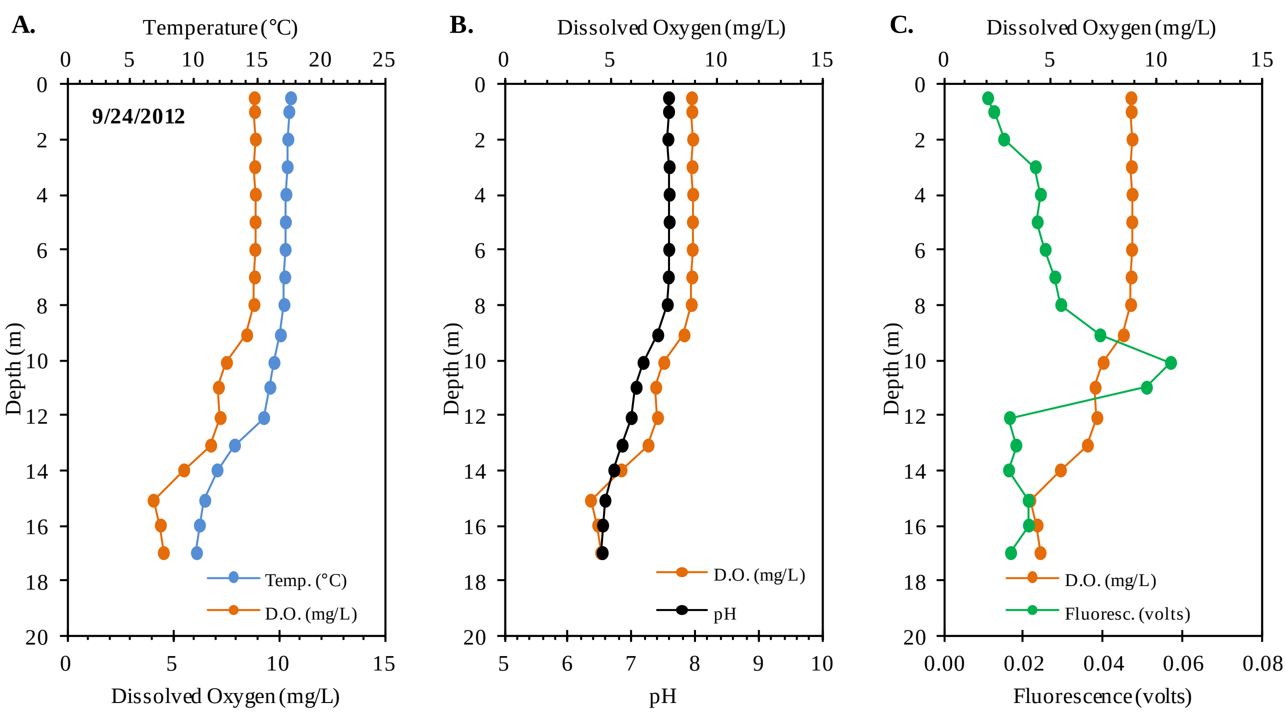

Figure 22. Temperature, dissolved oxygen, pH and relative fluorescence profiles from the Coeur d'Alene Lake southern pelagic site (C5) taken on September 24, 2012.

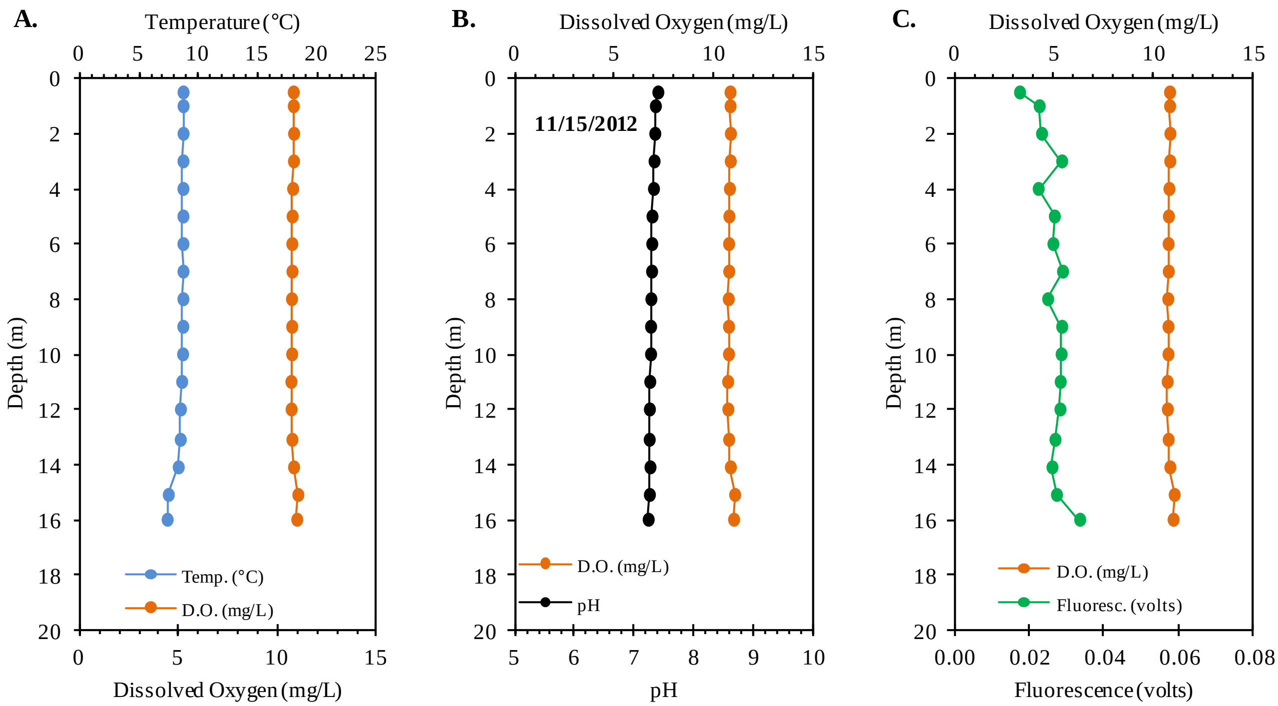

Figure 23. Temperature, dissolved oxygen, pH and relative fluorescence profiles from the Coeur d'Alene Lake southern pelagic site (C5) taken on November 15, 2012.

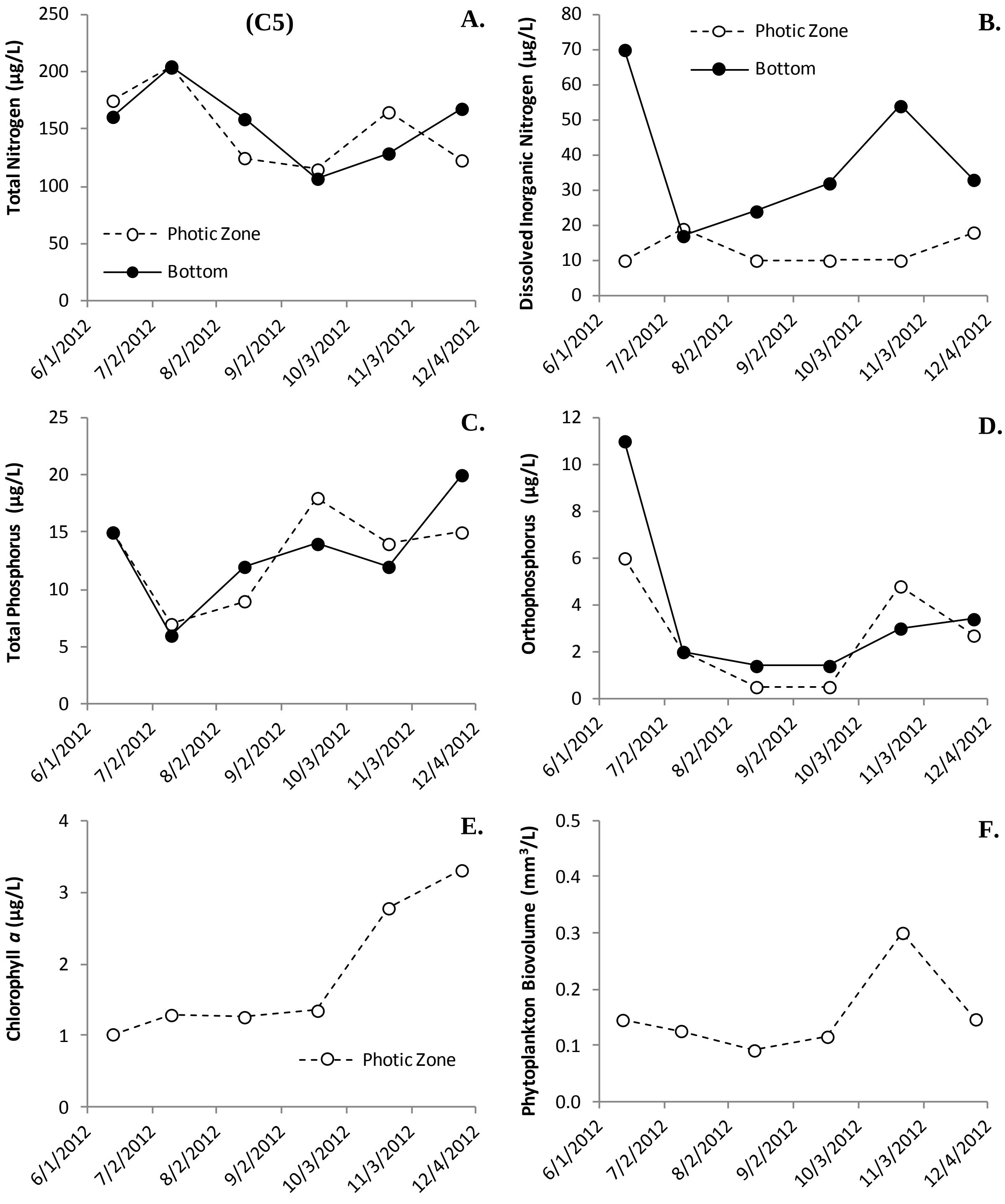

Figure 24. Nitrogen, phosphorus and phytoplankton dynamics from the photic zone and bottom collected from Coeur d'Alene Lake southern pelagic site (C5) in 2012.

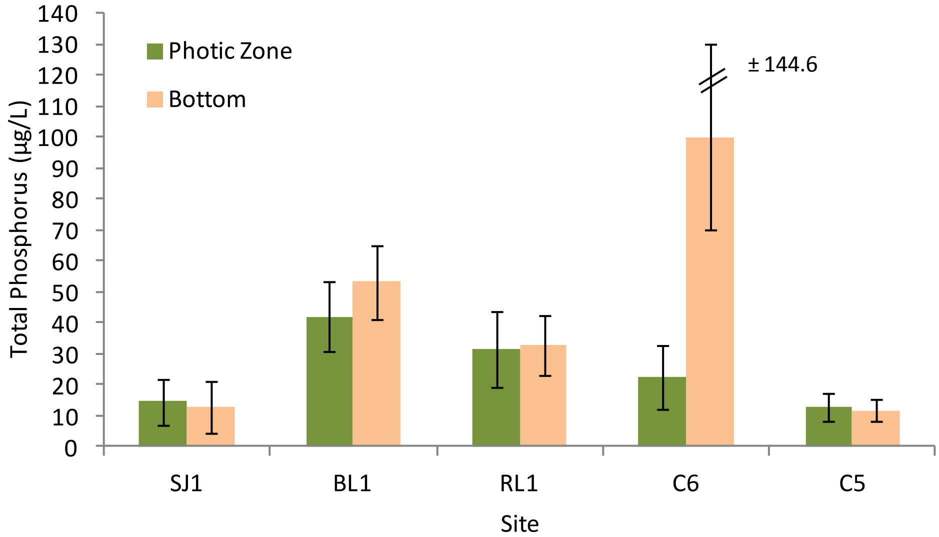

Figure 25. Total Phosphorus comparison from photic zone and bottom depths for the five sample sites, from June through October (mean ± 1 SD, n=5).

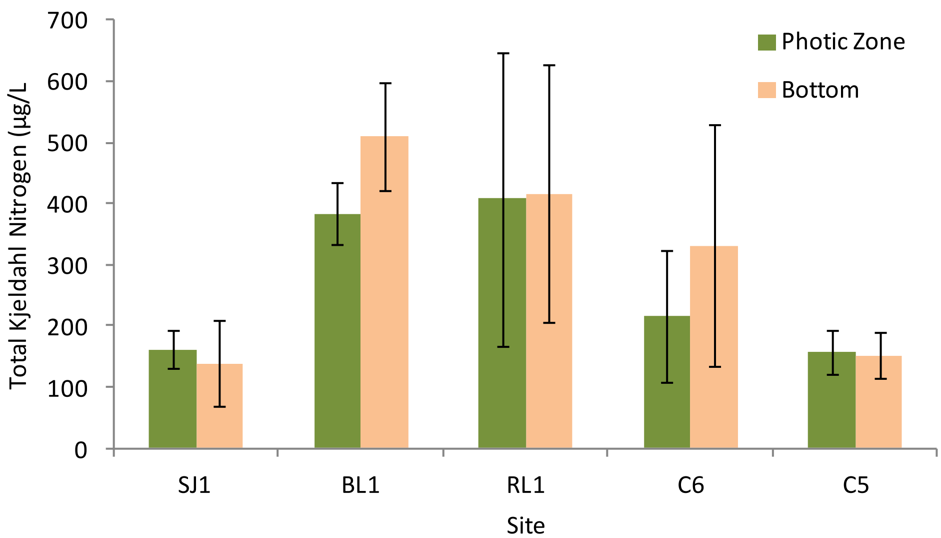

Figure 26. Total Nitrogen from photic zone and bottom depths for the five sample sites, from June through October (mean ± 1 SD, n=5).

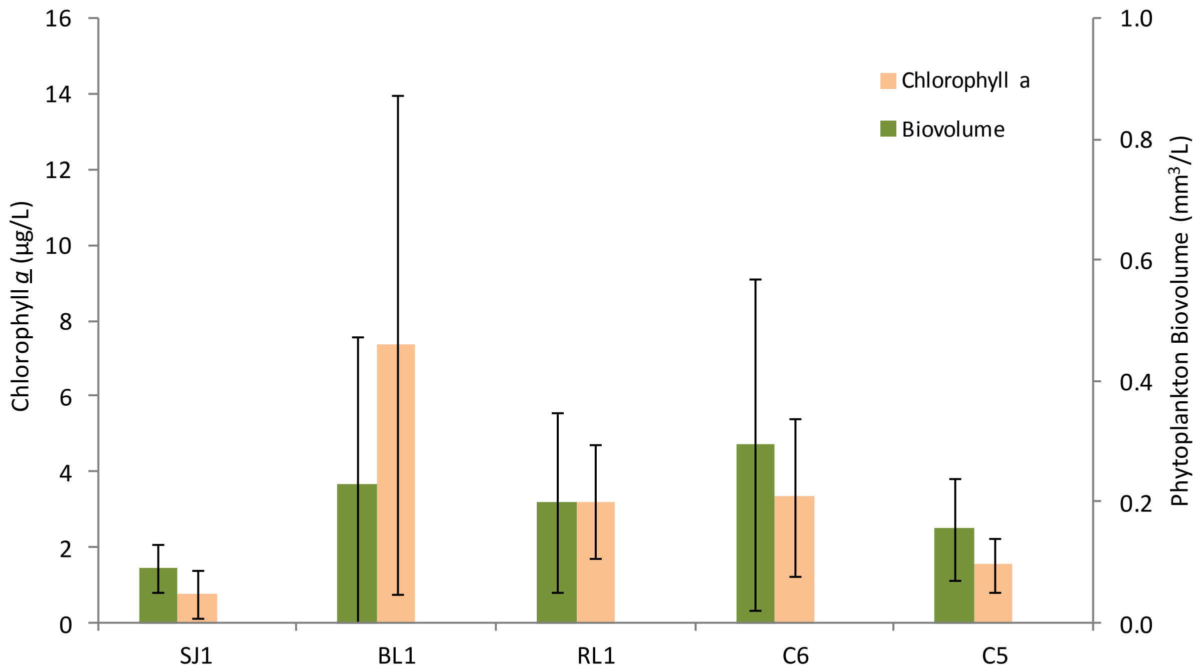

Figure 27. Chlorophyll *a* and phytoplankton biovolume in the photic zone at five sample sites, from June through October (mean ± 1 SD, n=5).

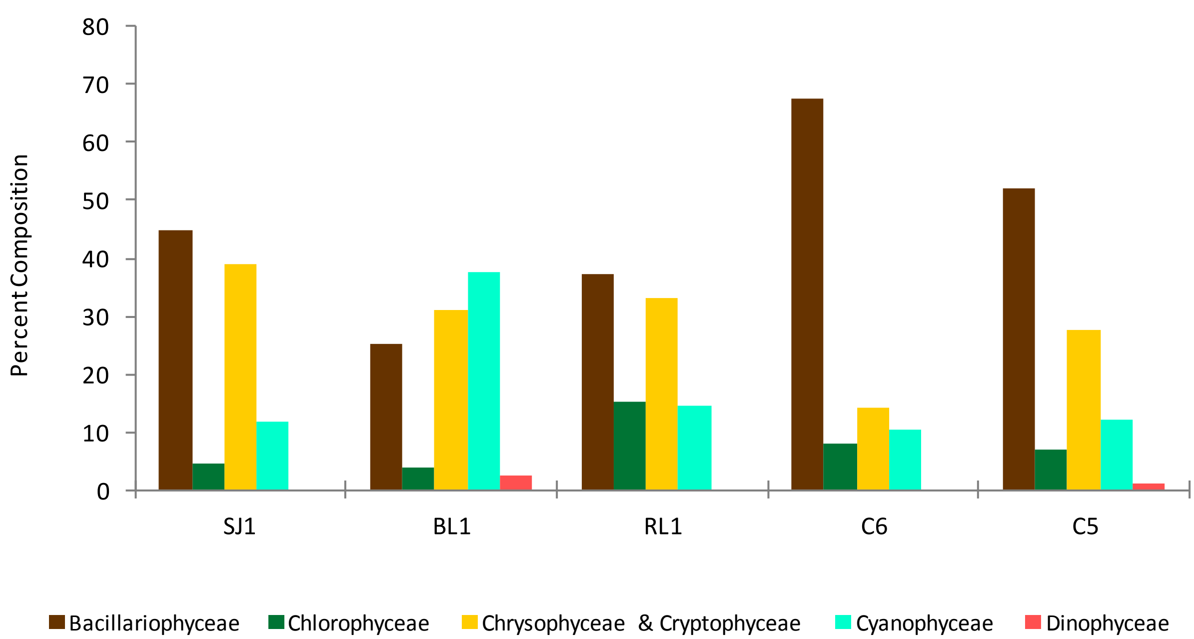

Figure 28. Phytoplankton and cyanobacteria percent composition based on biovolume of the major classes sampled at the five sites, from June through October.

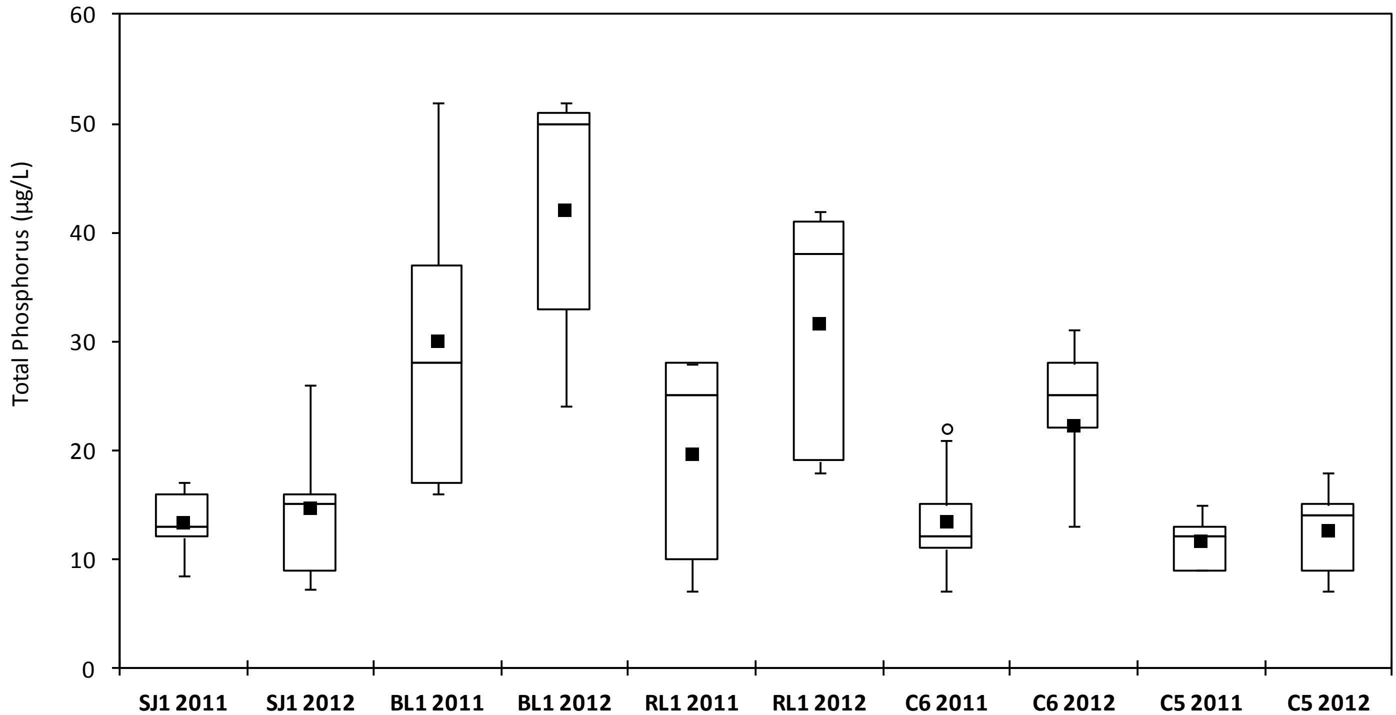

Figure 29. Box Plot for total phosphorus from the photic zone in 2011 and 2012 sampling seasons.

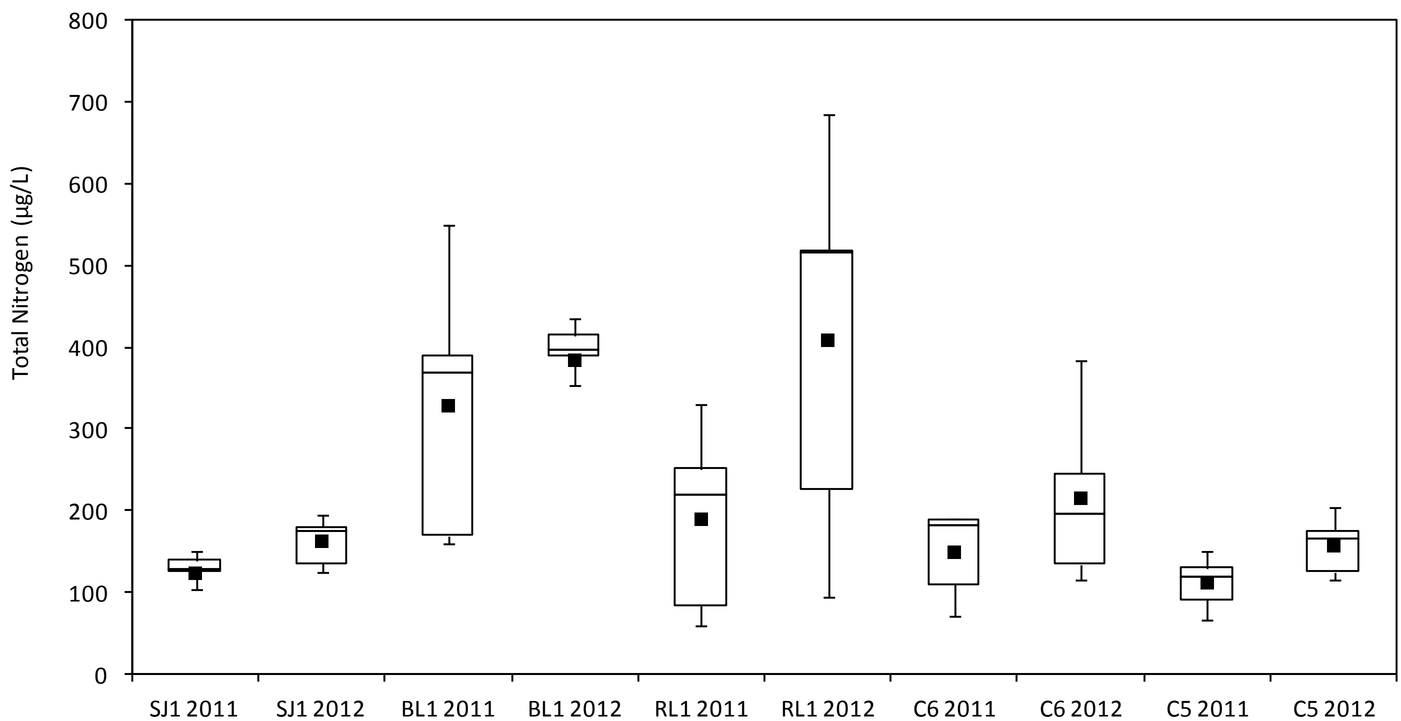

Figure 30. Box Plot for total nitrogen from the photic zone in 2011 and 2012 sampling seasons.

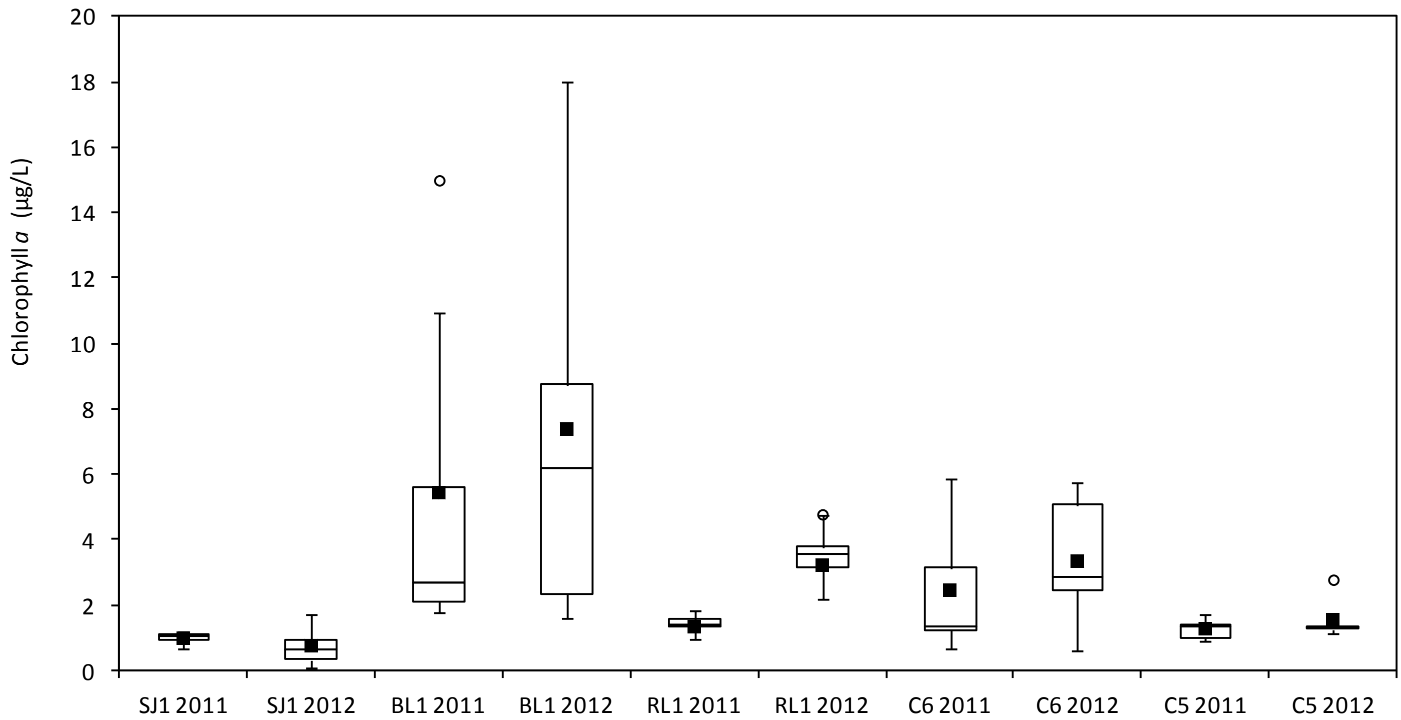

Figure 31. Box Plot for chlorophyll *a* from the photic zone in 2011 and 2012 sampling seasons.

APPENDIX A

Correspondence with Interior

AVISTA

February 28, 2013

Stanley M. Speaks, Regional Director
Bureau of Indian Affairs
911 NE 11th Avenue, Suite 2
Portland, OR 97232

Subject: Spokane River Hydroelectric Project, FERC Project No. 2545
Submittal of the Coeur d'Alene Reservation 2012 Water Quality Monitoring Annual Summary Report

Dear Mr. Speaks:

Ordering Paragraph G of the Spokane River Hydroelectric Project License (Federal Energy Regulatory Commission Project No. 2545) incorporated the U.S. Department of Interior's January 27, 2009 Federal Power Act 4(e) Conditions as Appendix D. In accordance with Appendix D, Condition No. 5, Avista completed a Coeur d'Alene Indian Reservation Water Quality Monitoring Plan (WQMP), which Interior and FERC approved in 2010.

In accordance with the WQMP, Avista conducted the first full season of water quality monitoring in 2011. The enclosed Water Quality Annual Summary Report (ASR) summarizes the work that was completed in 2011. Avista is required to submit the ASR to Interior by March 1st and to FERC by April 1st on an annual basis.

If you have any questions regarding the Water Quality Annual Summary Report, feel free to call me at (509) 495-4998 or Meghan Lunney at (509) 495-4643.

Sincerely,

Speed Fitzhugh

Elvin "Speed" Fitzhugh
Spokane River License Manager

Enclosure

cc: Bob Dach, BIA Portland
Phillip Cernera, Coeur d'Alene Tribe
Scott Fields, Coeur d'Alene Tribe
Meghan Lunney, Avista

Fitzhugh, Speed (Elvin)

From: Dach, Robert [robert.dach@bia.gov]
Sent: Monday, March 18, 2013 3:44 PM
To: Fitzhugh, Speed (Elvin)
Cc: Lunney, Meghan
Subject: Re: FW: Avista's Coeur d'Alene Reservation 2012 Water Quality Monitoring Report

Hi Speed, your responses address my concerns. Feel free to submit the report to FERC at your convenience.

Thanks for your help!

On Mon, Mar 18, 2013 at 2:58 PM, Fitzhugh, Speed (Elvin) <SpeedElvin.Fitzhugh@avistacorp.com> wrote:

Bob,

I have included our answers, including a revised Number 1, in blue following your questions pertaining to the Water Quality Monitoring Report. Please let me know if they are acceptable, and if so we'll go ahead and submit the report to FERC. Feel free to call either Meghan or me if you have any questions.

1. Page 4, section 3.2, last paragraph in section: I wasn't able to follow your logic in the last paragraph. Stating that C5 had a higher reading than the blank doesn't seem to address the potential contamination issue. The way I understand 2.3.4.1 of the WQMP, a blank reading above MRL indicates a contaminated sampler? If you have a contaminated sampler, how are the subsequent readings not somehow contaminated?

ANSWER:

For every sampling date the Van Dorn sampler and the churn splitter are cleaned between sample sites. To clean the Van Dorn sampler and churn splitter between sampling sites, we first rinse the equipment with 5% HCL, then rinse with distilled water. We then travel to the next site with the cleaned equipment. Prior to collecting a sample at the next site, the Van Dorn Bottle is rinsed in the lake water, then a sample of lake water from the same water column that the water sample is taken from is pulled and used to rinse the churn splitter. All rinse water is poured out before grabbing the actual sample. Thus, the native lake water with the concentration of nutrients is used to rinse the already 5% HCL-cleaned equipment prior to collecting the sample. When we do a field blank between sample sites, we do the same cleaning as described previously. For the field blank samples, after the equipment cleaning, we pour ASTM type2 distilled (DI) water into the Van Dorn Bottle, swish the bottle, then pour the DI water into the churn splitter. We then draw samples from the churn splitter as we would a normal lake sample.

On August 15, a field blank was 60 µg/L (10 µg/L above the 50 µg/L minimum detection limit), but was not considered a significant source of contamination because the lake water at C5 being used to rinse the equipment was at least twice the concentration of the blank. If any residual contaminated water was left in the equipment following the 5% HCL cleaning and DI rinsing it was rinsed away with a high volume of native lake water. While the field blank concentration was 60 µg/L, this concentration is so close to the minimum detection limit that it’s within a margin of error. As such, we feel the field blank concentration is insignificant. We would, however, consider a field blank contamination to be significant if the concentration had been greater than the concentration detected at C5.

In addition, after each monthly sampling run is completed, all equipment is thoroughly cleaned with a certified non-phosphorus, detergent (Liquinox) which is designed for laboratory equipment. After the detergent cleaning, the equipment is rinsed with 5% Hydrochloric acid and rinsed with distilled water, then dried and stored in a clean environment.

2. Page 5, section 4.1, last paragraph on page: The report states "Between August 28 and September 18, oxygen was resupplied to the bottom waters of SJI." How was "oxygen resupplied"? I assume you mean through normal biological processes and not a giant tank of liquid oxygen - so just a clarification here (i.e., what happened to raise O2 levels?).

ANSWER:

It would not have been biological processes that resupplied oxygen to the deeper waters of the river. It was the mixing of sinking, cooler, oxygen-laden water of the upper river that supplied the deeper waters with oxygen.

3. Figures: I appreciate the new figures 29 - 31. Is it possible to indicate the Tribe's water quality standards on these figures? Also, I re-read your response to a comment I had last year regarding the Tribe's temperature standard - I assume the same is true for DO?

ANSWER:

The Tribe has no quantitative standards for Total Phosphorus, Total Nitrogen and Chlorophyll a. Your assumption is correct, the D.O. standard applies to the same part of the hypolimnion for dissolved oxygen as temperature.

Other than these little things, the report looked good. I expect when you start adding this information to the AIR, table 4 will cover most of what I'll need to see. Is that what you're thinking as well?

ANSWER:

We agree and will include a similar table in the Water Quality Sections of future AIRs.

Thanks,

Speed

Elvin "Speed" Fitzhugh

Spokane River License Manager

Avista Utilities

(509)495-4998

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Bob Dach
Bureau of Indian Affairs
Hydropower Program Manager
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Portland, OR 97232
wk: 503-231-6711
cell: 503-310-4492