Water Quality Sampling at Ada Hayden Heritage Park

May 18, 2017 to October 11, 2017

and

April 5, 2018 to September 27, 2018

Prepared by the State Hygienic Laboratory at the University of Iowa

Limnology Section

for the

City of Ames

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Summary

Water quality monitoring was conducted at Ada Hayden Heritage Park during the spring, summer, and fall of 2017 and 2018. State Hygienic Laboratory (SHL) Limnology Section staff collected samples from May 18, 2017 until October 11, 2017 and from April 5, 2018 until September 27, 2018. Samples were collected from the north and south cells of Ada Hayden Lake, the three wetlands that discharge to the lake, and the lake outlet.

During 2017, samples were collected twice per month at approximately two-week intervals in the north and south cells of the lake. In 2018, samples were collected once in April, once in May, and twice per month from June through September. The April 2018 sample was collected to obtain a set of results before the lake cells were thermally stratified. Lake sampling was conducted at the maximum depth location in each cell. Field measurements, depth profiles, integrated depth samples, phytoplankton samples, and zooplankton samples were collected from each cell during each visit. A total of 10 sets of lake samples were collected.

The tributary inlets and outlets of the north, middle, and south wetlands were sampled from two to three times a month during each field season. Most of the wetland samples in 2017 were collected under low flow conditions and many of the wetland inlet and outlet sites were dry for a significant portion of the summer. According to the National Weather Service climate summary for Ames, Iowa, rainfall was 5.05 inches (23%) less than normal during the 2017 sampling period. Despite the dry weather, two of the collections were after rainfall events.

While precipitation was less than normal in April 2018, the remainder of the 2018 sampling season was wetter than normal, according to the National Weather Service. During the 2018 sampling period, Ames received 17.33 inches (180%) more rain than normal. The north wetland was sampled four times after rainfall events and the middle and south wetlands were sampled five times after rainfall events.

The lake outlet was initially sampled once per month, but the frequency of sampling was increased to twice per month in early July 2017 to gain additional information regarding the characteristics of the lake discharge. The lake outlet was dry and not sampled during three visits in 2017 and during one visit in 2018.

Lake sampling demonstrated that Ada Hayden Lake is a eutrophic lake, similar to many lakes in Iowa. Both cells of the lake showed strong thermoclines throughout the entire sampling period and the dissolved oxygen concentration was reduced below the thermocline, indicative of a eutrophic lake (Carlson and Simpson 1996). In 2017, the thermocline deepened in both cells as the sampling season progressed, culminating in thermoclines of 5.5 m in both cells. In 2018, the thermocline deepened in both cells until mid-June, when thermoclines of 6.7 m in the south cell and 6.0 m in the north cells were reached. Secchi depth transparency ranged from 1.0 m to 2.2 m in the south cell and 1.2 m to 2.1 m in the north cell in 2017 and 0.7 m to 6.2 m in the south cell and 1.3 m to 2.3 m in the north cell in 2018.

Analysis of four algal toxins: microcystin, cylindrospermopsin, anatoxin-a, and saxitoxin were performed for every lake sample. In 2017, the concentration of cylindrospermopsin, anatoxin-a,

and saxitoxin were less than the quantitation limit in all samples. Microcystin was less than the quantitation limit in all samples collected from the north cell but was present in three of the ten samples collected from the south cell (range 0.18 µg/L to 0.46 µg/L, by ELISA method).

Microcystin was found above the quantitation limit in 17 of the 18 samples analyzed from the south cell and north cell analyzed in 2018. Average microcystin concentrations were also higher in 2018. The average concentration in the south cell was 0.28 µg/L in 2018 and 0.15 µg/L in 2017. In the north cell, average microcystin concentration was 0.25 µg/L in 2018 and <0.15 µg/L in 2017. During both years, microcystin concentrations were less than the Iowa warning level (≥ 20 µg/L) and the 10-day drinking water health advisory for school age children and adults (1.6 µg/L, USEPA 2017).

The phytoplankton community was dominated by blue-green algae (cyanobacteria) in both the south and north cells during both years. Other algae, such as Chrysosphyceae, Cryptophyta, and diatoms occasionally comprised a significant portion of the algal community. Algal biomass was greater in both cells in 2017 compared to 2018. In 2017, overall mean algal biomass was 19.9 mg/L in the south cell and 14.1 mg/L the north cell, while in 2018 overall mean algal biomass was 12.8 mg/L in the south cell and 12.1 mg/L the north cell.

The zooplankton community was dominated by cladocerans, copepods, and rotifers during both years. The zooplankton biomass was usually greatest in the spring, declined during mid-summer, and increased during the late summer, although the zooplankton biomass in the south cell did increase significantly in June 2018. The phytoplankton density also increased in June of 2018, possibly in response to increased water and nutrient delivery to the south cell due to heavy rainfall in May and June.

The wetland inlets and outlets were visited 12 times during 2017 and 15 times during 2018. In 2017, the wetland inlets and outlets were dry during 40% of the sampling trips and were flowing and sampled 43 times. More precipitation was received in 2018 and the wetland inlets and outlets were dry only 9% of the time and 82 samples collected. The wetland inlets or outlets were sampled after rainfall events 10 times in 2017 and 28 times in 2018.

Results from the wetland inlet and outlet samples were studied to determine if the wetlands successfully sequestered solids and nutrients. All the wetlands were effective at reducing the average concentration of total nitrogen and orthophosphate reaching the lake. Average total nitrogen was 51% to 67% less and orthophosphate was 33% to 60% less in samples collected from wetland outlets compared to samples collected from wetland inlets. Water discharged from the wetlands, on average, had 72% to 79% less *E. coli* than water entering the wetlands.

The north wetland reduced the average concentration of turbidity and total suspended solids (TSS) reaching the lake by 25% and 75%, respectively. The water discharged from the middle and south wetlands was more turbid and contained more solids than water flowing into the wetlands. A portion of this increase may be attributed to an increase in algae growth in the middle and south wetlands, which was indicated by an increase in average chlorophyll *a* concentration in the wetland outlet samples.

Six samples were collected from the lake outlet during 2017. The two samples from September 2017 were not collected due to the lake outlet being dry. The lake outlet was sampled nine times and was dry once during 2018. Most of the results for parameters measured at the lake outlet were similar to the results for the south cell, with a few notable exceptions. For example, *E. coli* was greater in the outlet sample than in the south cell sample on twice in 2017 and twice in 2018.

Methods

SHL Limnology Section staff collected samples from the north and south cells of Ada Hayden Lake, the lake outlet, and the inlets and outlets of the north, middle, and south wetlands (Figure 1). Samples were collected during the months of May, June, July, August, September and October of 2017 and April, May, June, July, August, and September 2018.

Some analyses were performed in the field while others were performed at the Ankeny laboratory (Table 1, Table 2). All analyses were performed according to accepted methods and SHL standard operating procedures (Table 3, SHL 2016a, SHL 2016b, SHL 2017a, and SHL 2017b). All samples were preserved immediately after collection and transported to the SHL for analysis.

Lake Sampling

Integrated depth sampling, zooplankton sampling, depth profiling, and field measurements were performed at the north and south cells of the lake twice per month at approximately two-week intervals in 2017. In 2018, the first set of samples was collected in April in order collect one sample prior to thermal stratification near the lake substrate. Sampling was conducted at approximately the deepest point in each cell. Sampling locations were determined using bathymetric maps, depth sensors, and global positioning systems. During each visit, limnologists returned as close as possible to these sites, anchored the boat to maintain position, and collected the necessary samples.

A depth profile was performed using a YSI 6920 V2 multiparameter sonde. Measurements were taken just below the surface and at 0.5 m to 1.0 m intervals until the lake substrate was reached. Measurements were stored in the sonde and were reviewed on site to determine a thermocline. A thermocline was defined as a 1° C change in temperature within a 1.0 m change in depth (SHL 2016a).

Field parameters reported for each cell were measured at a depth of 0.5 m below the surface using a YSI 6920 V2 multiparameter sonde. Secchi disk transparency was measured using a standard Secchi disk (Carlson and Simpson 1996, SHL 2016a).

Integrated depth samples were collected above the thermocline, if present, using a two-meter water column sampler (Carlson and Simpson 1996). If a thermocline was not present or deeper than two meters, the integrated depth sample was taken to a depth of two meters.

A sample for phytoplankton analysis was collected using an integrated water column sampler, as described above. Phytoplankton was preserved with Lugol's solution and identified to the lowest possible/practical taxon (SHL 2017a).

Zooplankton was collected with a 63 µm Wisconsin plankton net. If a thermocline was present, the zooplankton sample was collected from above the thermocline. If a thermocline was not present, the zooplankton sample was collected from a half meter off the bottom of the lake or from a depth of 12 meters for lakes deeper than 12.5 m. Zooplankton were preserved with 70% ethanol and were identified to the lowest possible/practical taxon (SHL 2017b).

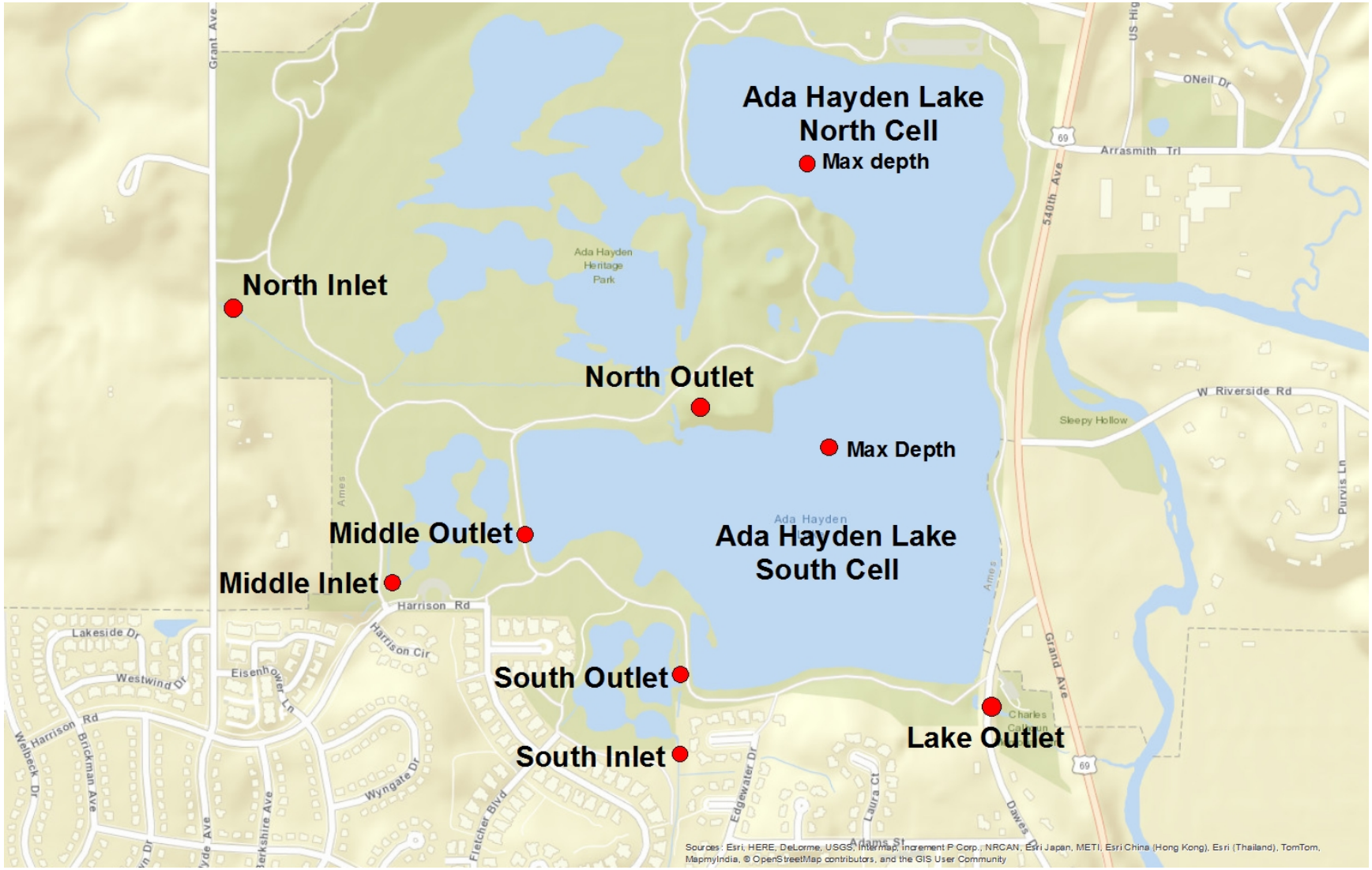


Figure 1. Map showing the approximate location of lake sampling sites, wetland inlet and outlet sampling sites, and lake outlet sampling site.

Table 1. Water quality parameters and sample type for samples collected from the north and south cells of the lake at Ada Hayden Heritage Park.

Parameter	Type of Sample
Temperature	Field measurement
pH	Field measurement
Dissolved oxygen	Field measurement
Conductivity	Field measurement
Turbidity	Field measurement
Secchi Disk Transparency	Field measurement
Thermocline Depth	Field measurement
Total Depth	Field measurement
Depth Profile	Field measurement
Orthophosphate (Dissolved Phosphorus)	Integrated depth sample
Total Phosphorus	Integrated depth sample
Nitrite + Nitrate as N	Integrated depth sample
Ammonia Nitrogen	Integrated depth sample
Unionized Ammonia	Integrated depth sample
Total Kjeldahl Nitrogen	Integrated depth sample
Total Suspended Solids	Integrated depth sample
Total Volatile Suspended Solids	Integrated depth sample
Total Fixed Suspended Solids	Integrated depth sample
Total Alkalinity	Integrated depth sample
E. coli bacteria	Integrated depth sample
Phytoplankton	Integrated depth sample
Microcystin	Integrated depth sample
Anatoxin	Integrated depth sample
Saxitoxin	Integrated depth sample
Cylindrospermopsin	Integrated depth sample
Chlorophyll *a*	Integrated depth sample
Zooplankton	Vertical tow

Table 2. Water quality parameters and sample type for samples collected from the tributary inlets and outlets of the north, middle, and south wetlands and the lake outlet.

Parameter	Type of Sample
Temperature	Field measurement
pH	Field measurement
Dissolved Oxygen	Field measurement
Conductivity	Field measurement
Turbidity	Field measurement
Stream Discharge	Field measurement
Chlorophyll *a**	Grab sample
Nitrite + Nitrate as N	Grab sample
Ammonia Nitrogen	Grab sample
Unionized Ammonia	Grab sample
Total Kjeldahl Nitrogen	Grab sample
Orthophosphate (Dissolved Phosphorus)	Grab sample
Total Phosphorus	Grab sample
Total Suspended Solids	Grab sample
Total Volatile Suspended Solids*	Grab sample
E. coli bacteria	Grab sample

*added in 2018 to the wetland tributary inlets and outlets only.

Table 3. Water quality parameters and methods for samples collected from the north and south cells of Ada Hayden Lake, the tributary inlets and outlets of the north, middle, and south wetlands, and the lake outlet.

Parameter	Method
Temperature	SM 2550
pH	SM 4500 h
Dissolved oxygen	ASTM d 888-09
Conductivity	ISO 7888-1985
Turbidity	EPA 180.1
Secchi Disk Transparency	Welch 1948
Thermocline Depth	Birge 1904
Total Depth	Buchanan Somers 1969
Stream Discharge	USGS CA8
Orthophosphate (Dissolved Phosphorus)	lac 10-115-01-1a
Total Phosphorus	lac 10-115-01-1c
Nitrite + Nitrate as N	lac 10-107-04-1j
Ammonia Nitrogen	lac 10-107-06-1j
Unionized Ammonia	SM 8010 f
Total Kjeldahl Nitrogen	lac 10-107-06-2e
Total Suspended Solids	USGS i-3765-85
Total Volatile Suspended Solids	EPA 160.4
Total Fixed Suspended Solids	EPA 160.4
Total Alkalinity	SM 2320 b
E. coli bacteria	Colilert MPN
Phytoplankton	SM 10200 f
Microcystin	Immunoasssay: Abraxis Product No. 520011OH
Anatoxin	Immunoasssay: Abraxis Product No. 520060
Saxitoxin	Immunoasssay: Abraxis Product No. 52255B
Cylindrospermopsin	Immunoasssay: Abraxis Product No. 522011
Chlorophyll *a*	EPA 445.0 rev 1.2
Zooplankton	Wetzel Likens 2000

Water samples collected near the lake bottom were requested twice per year from both cells, once prior to thermal stratification in the spring and once after lake turn-over in the fall. Unfortunately, the lake was stratified during each visit in 2017 therefore the near-bottom samples were not collected. In 2018, the lake was sampled once in early April before the cells were thermally stratified with one near-bottom sample collected in each cell. The near-bottom samples were collected with a Wildco 4.2 L horizontal Beta Plus Bottle.

Wetland Sampling

Water samples were collected upstream (inlet) and downstream (outlet) from the north, middle, and south wetlands up to three times per month. Field parameters were measured using the YSI 6920 V2 multiparameter sonde and instantaneous flow was measured using a Price AA current meter, Pygmy current meter, or Sontek FlowTracker II. Samples requiring laboratory analysis were preserved immediately after collection and transported to the SHL for analysis.

The north wetland inlet samples were collected from a small stream on the west side of the park on the east side of Grant Avenue (Figure 2). The north wetland outlet samples were collected from the culvert draining the north wetland, prior to the discharge entering the lake (Figure 2).

Middle wetland inlet samples were collected from a small stream near the southern edge of the park on Stone Brook Road and the outlet samples were collected from a three-culvert structure where the middle wetland discharged into the lake (Figure 3).

Samples were collected at the south wetland inlet from a small tributary upstream of the south wetland and the south wetland outlet was sampled from a concrete structure downstream of the wetland, prior to where the south wetland discharged into the lake (Figure 4).

Wetland inlet and outlet samples were paired and collected during the same sampling trip, whenever possible. Whenever possible, one or two samples per month were collected during or after significant rainfall runoff events, while the remaining samples for each month were collected during base flow conditions.

Lake Outlet Sampling

The lake outlet samples were collected immediately downstream of the lake overflow structure at the culvert on the downstream side of the walking path (Figure 5). Initially, a grab sample was collected at the outlet of the lake once per month, but the sampling frequency was increase to twice per month mid-way during the 2017 sampling. Total phosphorus and orthophosphate were added to the list of analyses in early July 2017. Field parameters were measured using the YSI 6920 V2 multiparameter sonde and instantaneous flow was measured using a Price AA current meter, Pygmy current meter, or Sontek FlowTracker II. Samples requiring laboratory analysis were preserved immediately after collection and transported to the SHL for analysis.

Figure 2. Photographs of the sampling locations at the north wetland inlet (top) and outlet (bottom) taken during the 2017 water quality sampling.

Figure 3. Photographs of the sampling locations at the middle wetland inlet (top) and outlet (bottom) taken during the 2017 water quality sampling.

Figure 4. Photographs of the sampling locations at the south wetland inlet (top) and outlet (bottom) taken during the 2017 water quality sampling.

Figure 5. Photographs of the outlet of Ada Hayden Lake showing the overflow structure (top) and the location where samples were collected (bottom) during the 2017 water quality sampling.

Calculations

A quantitation limit is the lowest value that can be accurately reported due to limitations of procedures and equipment. If a result is less than the quantitation limit it is reported as less than the quantitation limit. For example, the quantitation limit for ammonia nitrogen is 0.05 mg/L, therefore results less than 0.05 mg/L were reported as <0.05 mg/L. When performing calculations, a value of one half of the quantitation limit was used when a result of less than the quantitation limit was reported.

When computing basic statistics for the results, the geometric mean of *E. coli* results was calculated since it may provide a better estimate of the true mean because of the non-linear growth rate of bacteria (Robertson 1932).

Total nitrogen is reported as the sum of TKN and nitrate + nitrite nitrogen.

Results

Samples were collected on 12 separate visits to Ada Hayden Heritage Park in 2017 and 15 separate visits in 2018 (Table 4, Table 5). Twenty sets of field measurements, depth integrated samples, depth profiles, zooplankton samples, and phytoplankton samples were collected from each lake cell. The sonde malfunctioned during the visit on July 11, 2018, and the turbidity and the dissolved oxygen depth profile were not reported for the north cell on that date. Fifteen lake outlet samples and 125 wetland inlet or outlet samples were collected during the two-year study period.

Lake Sampling

Forty depth integrated samples were collected during twenty visits to Ada Hayden Heritage Park (Table 4, Table 5). Results for all analyses can be found in the appendix.

Nitrate + nitrite nitrogen was present early in the sampling season in both cells during both years but was not detected later in the year (Appendix: Table 14, Table 20). On average, nitrate + nitrite nitrogen concentration was greater in the south cell (0.33 mg/L in 2018 and 0.13 mg/L in 2017) than in the north cell, averaging <0.1 for both years.

Ammonia nitrogen was only detected once in 2017 (0.09 mg/L in the south cell on August 9th) and was less than the quantitation limit in the remainder of samples collected from the north and south cell samples. Four samples were above detection limits in 2018 with a maximum concentration of 0.42 mg/L in the south cell and 0.13 mg/L in the north cell on April 5, 2018. Unionized ammonia was less than the quantitation limit in every sample in both years.

TKN was measured in all depth integrated samples except for the samples collected on September 19, 2017 (Appendix: Table 14, Table 20). Concentrations for the two-year study period ranged from <0.1 mg/L to 1.5 mg/L in the south cell and <0.1 mg/L to 1.0 mg/L in the north cell. Average TKN was greater in 2018 than in 2017 in both the north and south cells (0.9 mg/L vs 0.5 mg/L in the south cell and 0.6 mg/L vs 0.4 mg/L in the north cell).

Total phosphorus concentrations were above detection level in 75% of the samples collected for both years in both cells. The average total phosphorus concentration in 2018 was lower in both cells than in 2017 (Appendix: Table 16, Table 22). Over the two-year study period, total phosphorus ranged from <0.02 mg/L to 0.16 mg/L in the south cell and <0.2 mg/L to 0.15 mg/L in the north cell. Orthophosphate concentrations were less than the quantitation limit for every depth integrated sample in both cells in both years.

E. coli was greater than the quantitation limit more frequently in 2018 than in 2017 (Appendix: Table 16, Table 22). In 2017, *E. coli* was greater than the quantitation limit only once in the south cell and twice in the north cell. During 2018, *E. coli* was found to be greater than the quantitation limit three times in the south cell and four times in the north cell. The *E. coli* results were generally higher in 2018. The maximum amount of *E. coli* in 2017 was 31 MPN/100 mL in the south cell and 20 MPN/100 mL in the north cell, while in 2018 the maximum results were

Table 4. Collection dates, sampling locations, and samples collected at the Ada Hayden Heritage Park during the 2017 sampling season. Samples collected are denoted with an 'x', samples that were not collected because the streams were dry are denoted with a 'd', and wetland inlet/outlet samples collected after a rainfall event are denoted with a 'r'. Samples collected from the south and north cells of Ada Hayden Lake include a depth integrated sample, field measurements, zooplankton sample, and a phytoplankton sample.

Date Collected	South Cell	North Cell	Lake Outlet	North Wetland Inlet	North Wetland Outlet	Middle Wetland Inlet	Middle Wetland Outlet	South Wetland Inlet	South Wetland Outlet
5/18/2017	x	x	x	x	x	x	x	x	x
5/21/2017				r	r	r	r	r	r
5/31/2017	x	x		x	x	x	x	x	x
6/13/2017	x	x	x	x	d	x	d	x	x
6/27/2017	x	x		x	d	x	d	x	d
7/11/2017	x	x	x	x	d	x	d	x	d
7/26/2017	x	x	x	x	d	x	d	x	d
8/9/2017	x	x	x	x	d	d	d	x	d
8/22/2017	x	x	x	x	d	x	d	x	x
9/5/2017	x	x	d	d	d	d	d	d	d
9/19/2017	x	x	d	d	d	d	d	x	x
10/11/2017				d	d	r	r	r	r

Table 5. Collection dates, sampling locations, and samples collected at the Ada Hayden Heritage Park during the 2018 sampling season. Samples collected are denoted with an 'x', samples that were not collected because the streams were dry are denoted with a 'd', and wetland inlet/outlet samples collected after a rainfall event are denoted with a 'r'. Samples collected from the south and north cells of Ada Hayden Lake include a depth integrated sample, field measurements, zooplankton sample, and a phytoplankton sample.

Date Collected	South Cell	North Cell	Lake Outlet	North Wetland Inlet	North Wetland Outlet	Middle Wetland Inlet	Middle Wetland Outlet	South Wetland Inlet	South Wetland Outlet
4/5/2018	x	x	x	x	d	x	x	x	x
5/16/2018	x	x	x	x	x	x	x	x	x
6/7/2018				r	r	r	r	r	r
6/12/2018				r	r	r	r	r	r
6/15/2018	x	x	x	x	x	x	x	x	x
6/28/2018	x	x	x	x	x	x	x	x	x
7/5/2018				r	r	r	r	r	r
7/11/2018	x	x	x	x	x	x	x	x	x
7/26/2018	x	x	d	x	d	x	d	x	x
8/8/2018	x	x	x	x	d	x	x	x	x
8/21/2018				d	d	r	r	r	r
8/28/2018	x	x	x	x	d	x	d	x	x
9/3/2018				r	r	r	r	r	r
9/12/2018	x	x	x	x	x	x	x	x	x
9/27/2018	x	x	x	x	x	x	x	x	x

310 MPN/100 mL in the south cell and 74 MPN/100 mL in the north cell. The average amount of *E. coli* was slightly higher in both cells in 2018 compared to 2017TSS concentrations ranged from 2 mg/L to 12 mg/L over the two-year study period (Appendix: Table 15, Table 26). Average TSS was similar in the north cell during 2017 and 2018 (4.4 mg/L and 4.7 mg/L, respectively). In the south cell, average TSS was slightly greater during 2018 compared to 2017 (6.3 mg/L and 4.7 mg/L, respectively). TVSS concentrations ranged from 1 mg/L to 10 mg/L and the mean concentrations for TVSS were similar for both cells during both years (Appendix: Table 15, Table 26).

The average chlorophyll *a* concentration was greater in the south cell than the north cell in both years, and average chlorophyll *a* concentrations were greater in both cells in 2018 than in 2017 (Appendix: Table 16, Table 21). Chlorophyll *a* concentration ranged from 5 mg/L to 50 mg/L in the south cell and 4 mg/L to 45 mg/L in the north cell during the two-year study period.

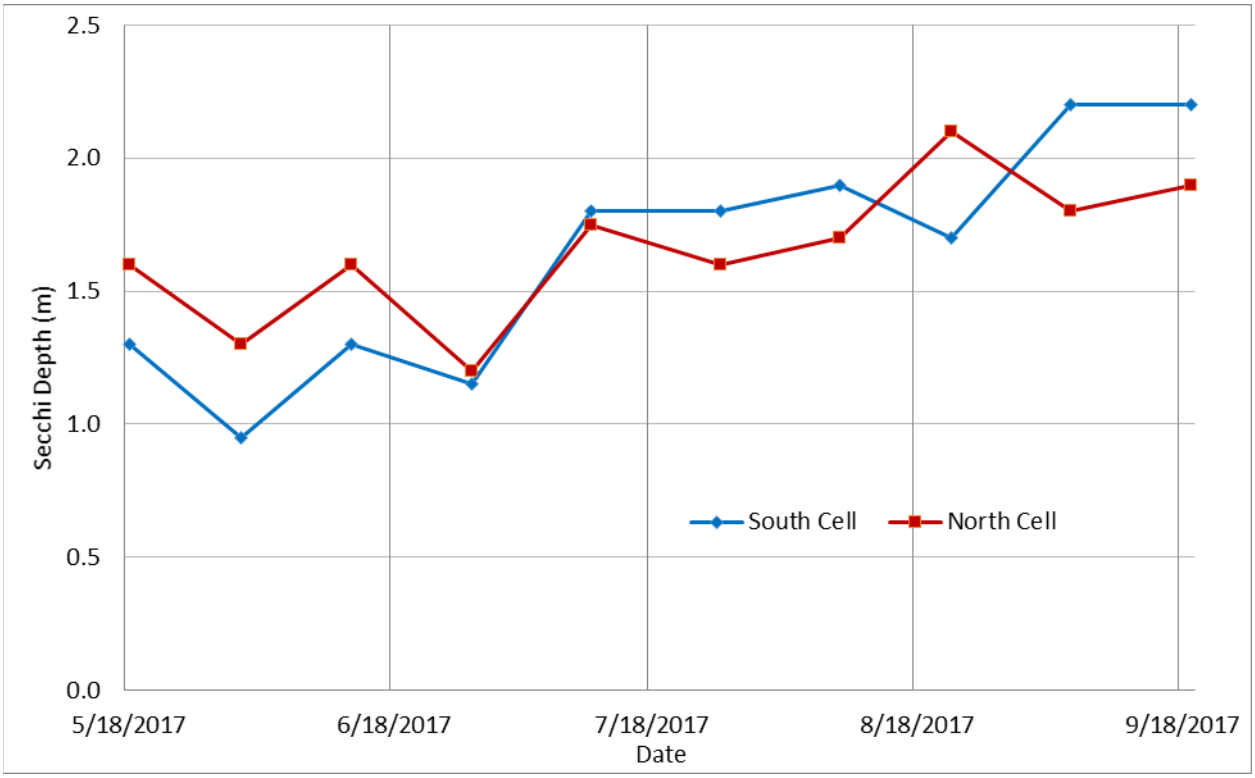
Concentrations of cylindrospermopsin, anatoxin-a, and saxitoxin were less than the quantitation limit in all samples in both years (Appendix: Table 17, Table 22). In 2017, microcystin was found above the quantitation limit only in the south cell and was 0.18 µg/L on May 18, 2017, 0.46 µg/L on May 31, 2017, and 0.38 µg/L on June 27, 2017. All other results for microcystin in the south cell were less than the quantitation limit during 2017.

In 2018, microcystin was found above the quantitation limit in all nine samples from the south cell and in eight of the nine samples from the north cell analyzed (Appendix: Table 22). Samples collected on June 15, 2018, were not analyzed due to a laboratory accident. Average microcystin concentration was also higher in 2018: average concentration in the south cell was 0.28 µg/L in 2018 and 0.15 µg/L in 2017. In the north cell, average microcystin concentration was 0.25 µg/L in 2018 and <0.15 µg/L in 2017.

Field measurements were made at approximately 0.5 m below the lake surface and mean results were similar during both years for most parameters (Appendix: Table 18, Table 19, Table 23, Table 24). Two exceptions were mean turbidity and mean dissolved oxygen concentration, which were higher in the south cell than the north cell during both 2017 and 2018.

In 2017, Secchi disk transparency depth generally increased from the beginning to the end of the sampling season (Figure 6), increasing by approximately 69% in the south cell and by approximately 19% in the north cell. With one exception of a significantly deep Secchi depth measurement in the south cell on May 16, 2018 (6.2 m), Secchi disk transparencies were relatively level throughout the 2018 season (Figure 6). Mean Secchi depth was similar in the north cell during both years (1.7 m), while the average Secchi depth in the south cell was greater in 2018 than 2017 (1.8 m and 1.6 m, respectively).

The depth profiles provided information on the position of the thermocline and the availability of dissolved oxygen at various depths. Thermoclines were observed on all visits to both cells, except on April 5, 2018, when temperatures were similar from the water's surface to the substrate (Figure 7, Figure 8, Figure 9, Figure 10). The maximum thermocline depths observed were 6.7 m in the south cell and 6.5 m in the north cell, both in 2018 (Figure 11).



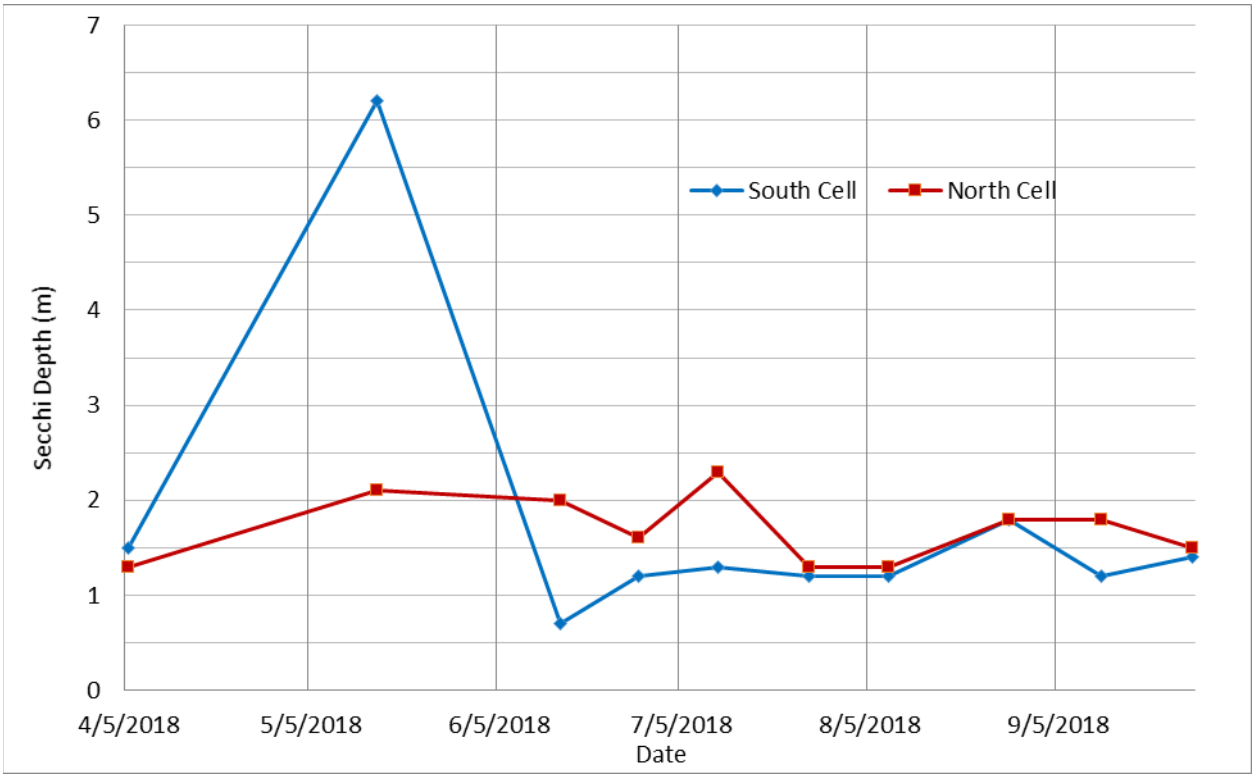


Figure 6. Secchi transparency depth (m) measured in the south and north cells of Ada Hayden Lake during 2017 and 2018.

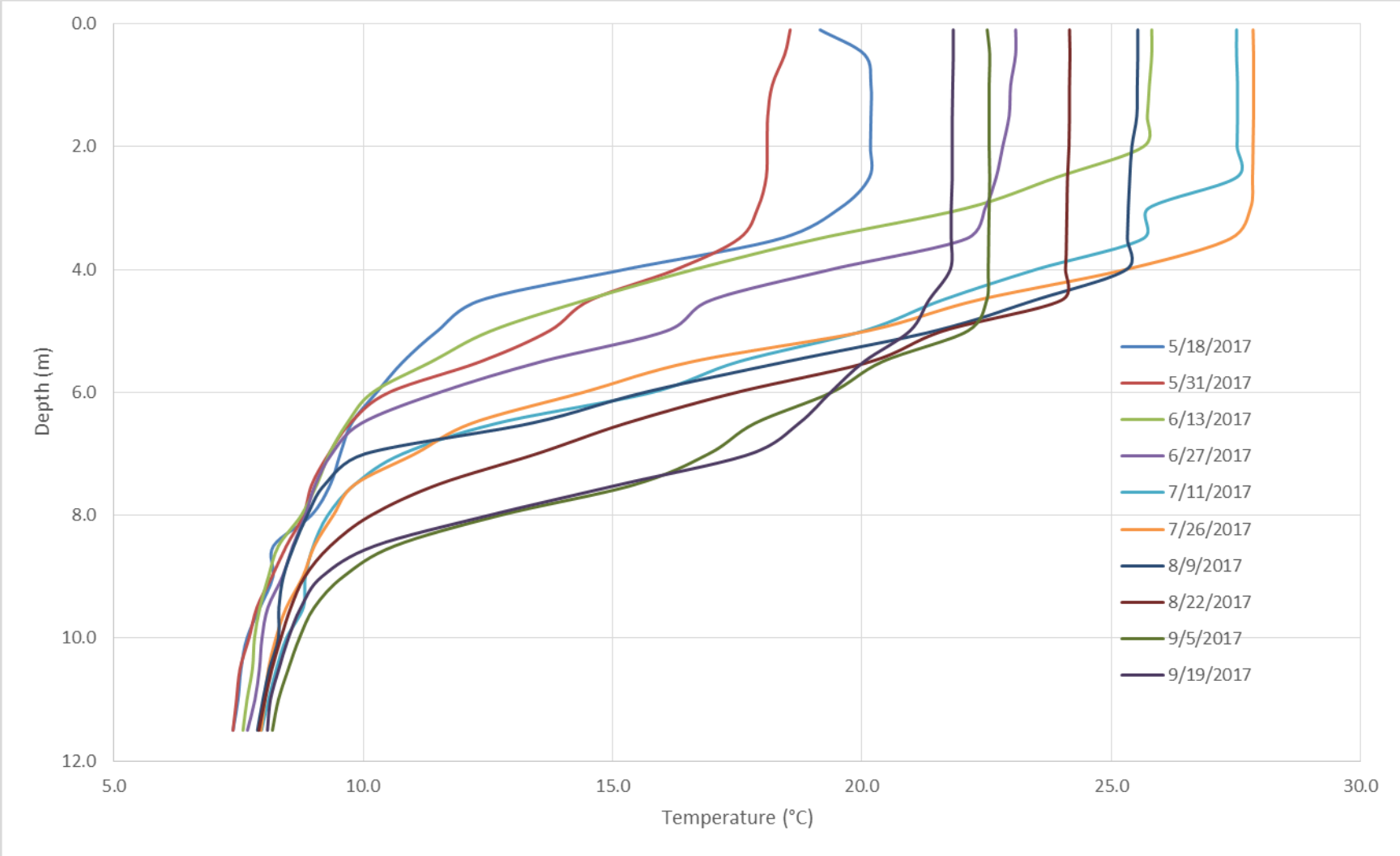


Figure 7. Temperature (°C) measured at approximately 0.5 m increments from the lake surface to the lake substrate in the south cell of Ada Hayden Lake, May through September 2017.

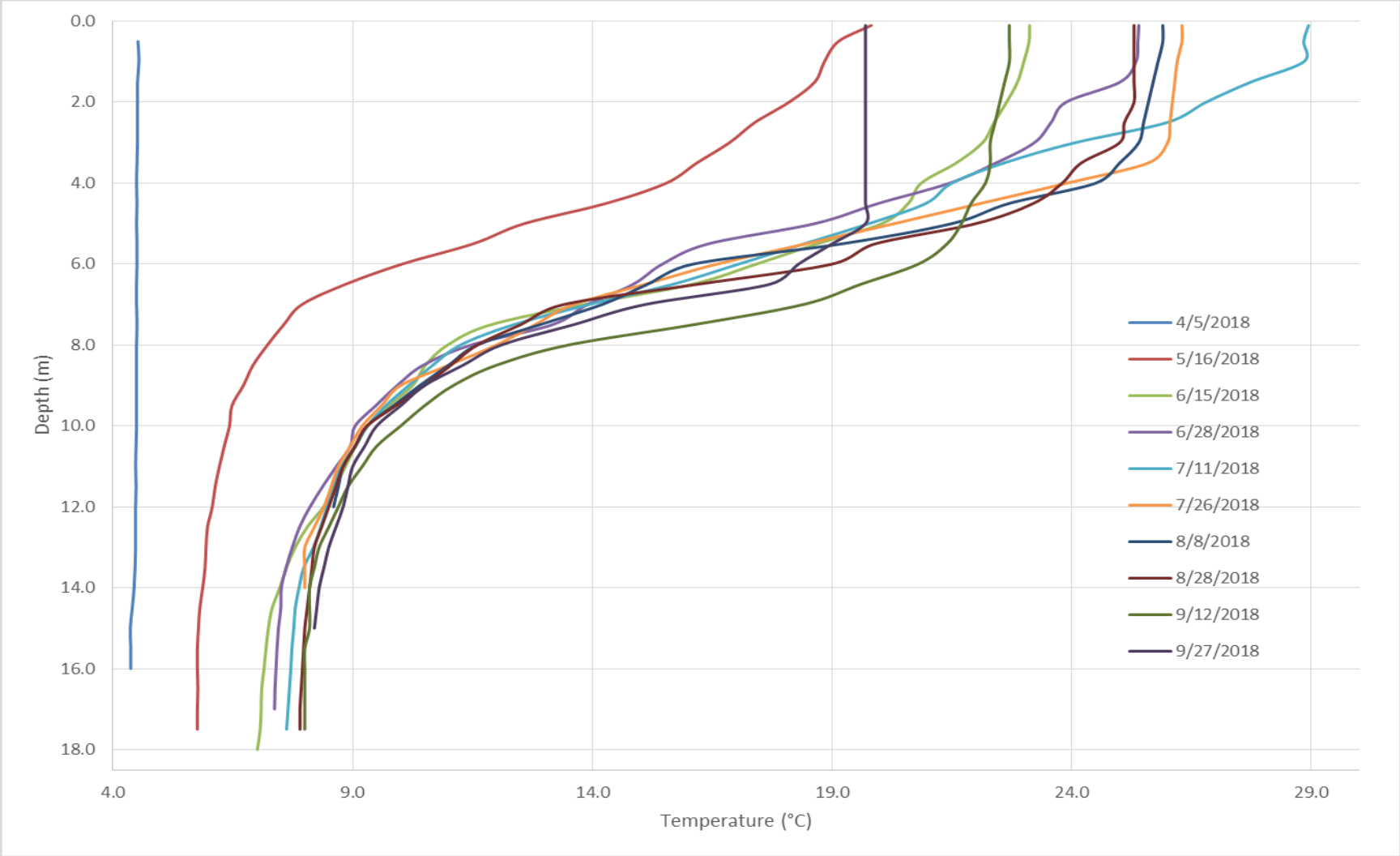


Figure 8. Temperature (°C) measured at approximately 0.5 m or 1.0 m increments from the lake surface to the lake substrate in the south cell of Ada Hayden Lake, April through September 2018.

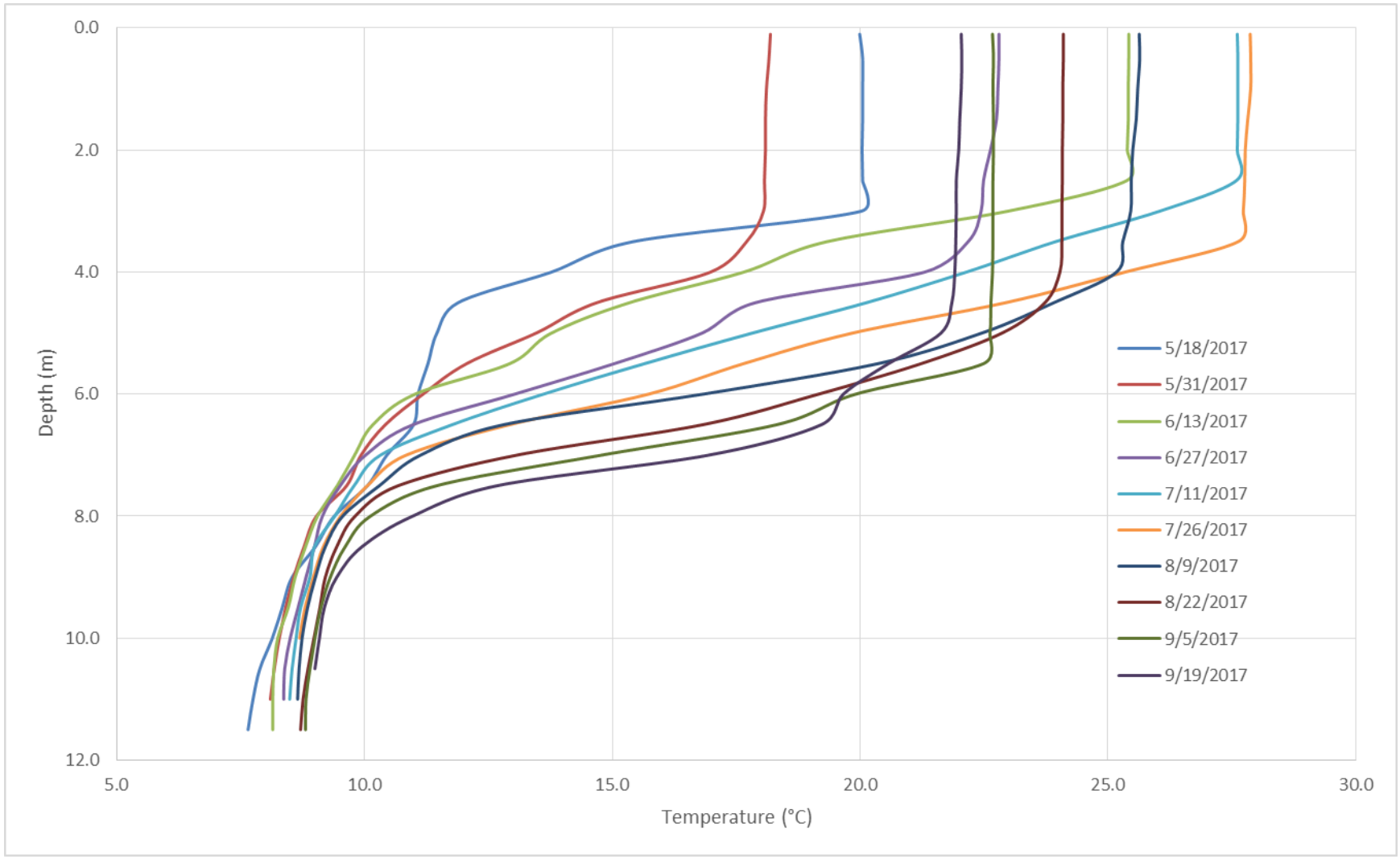


Figure 9. Temperature (°C) measured at approximately 0.5 m increments from the lake surface to the lake substrate in the north cell of Ada Hayden Lake, May through September 2017.

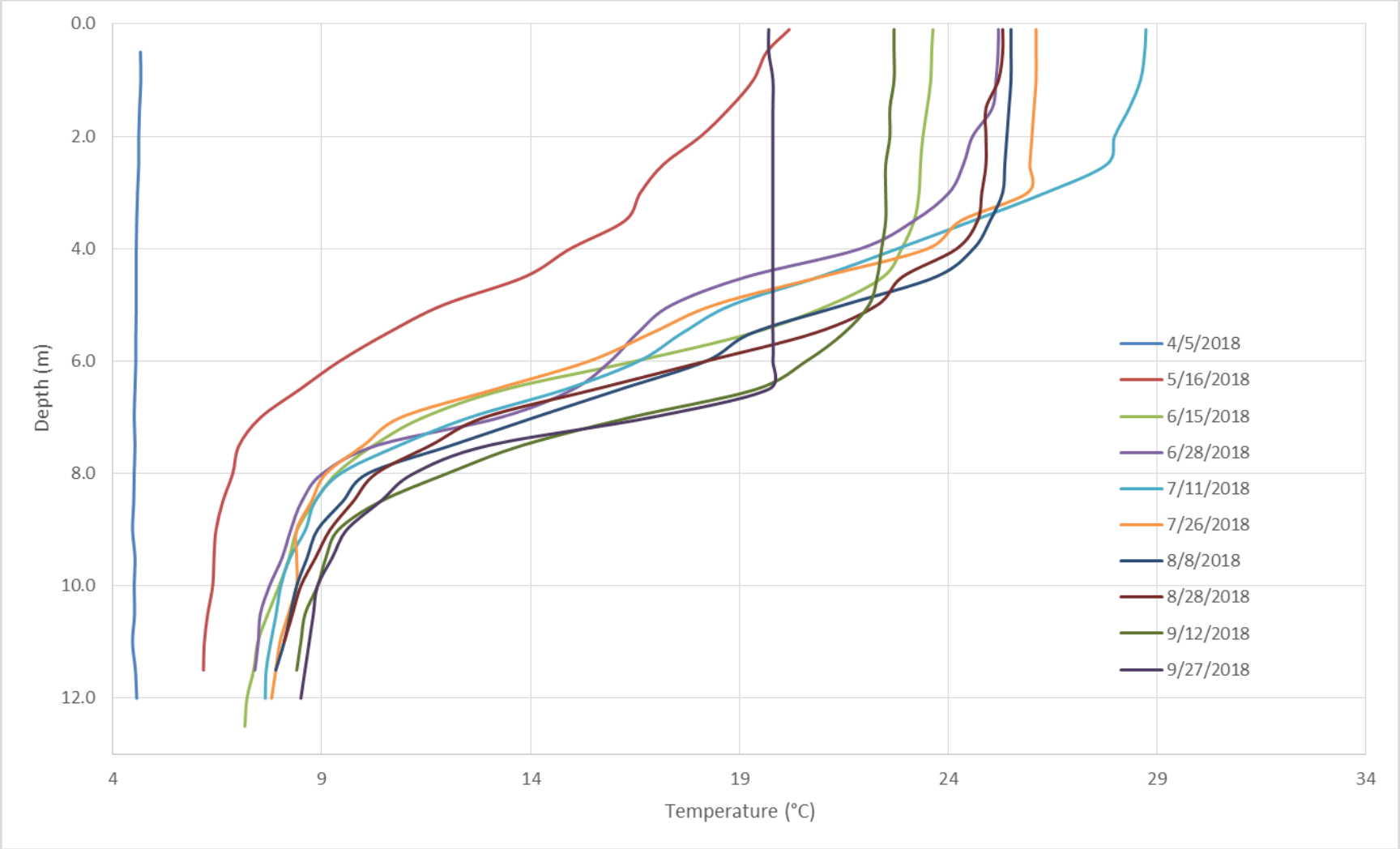
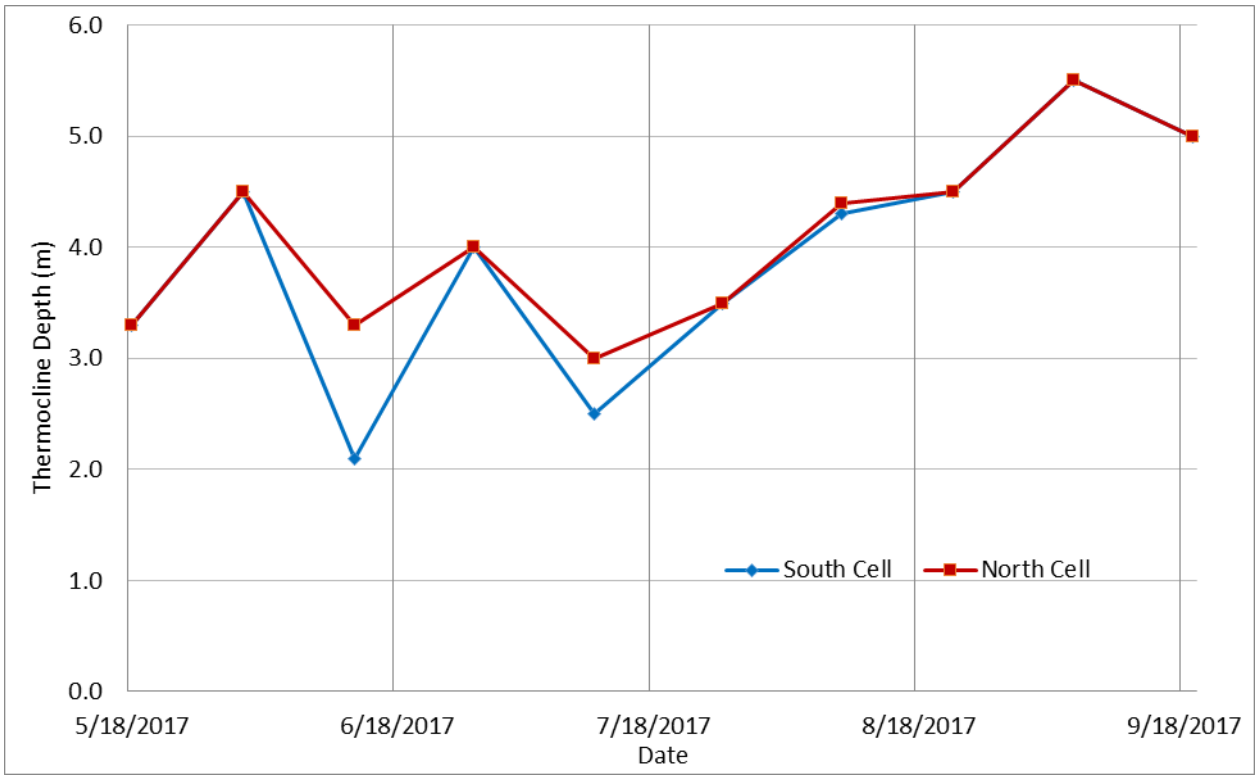


Figure 10. Temperature (°C) measured at approximately 0.5 m or 1.0 m increments from the lake surface to the lake substrate in the north cell of Ada Hayden Lake, April through September 2018



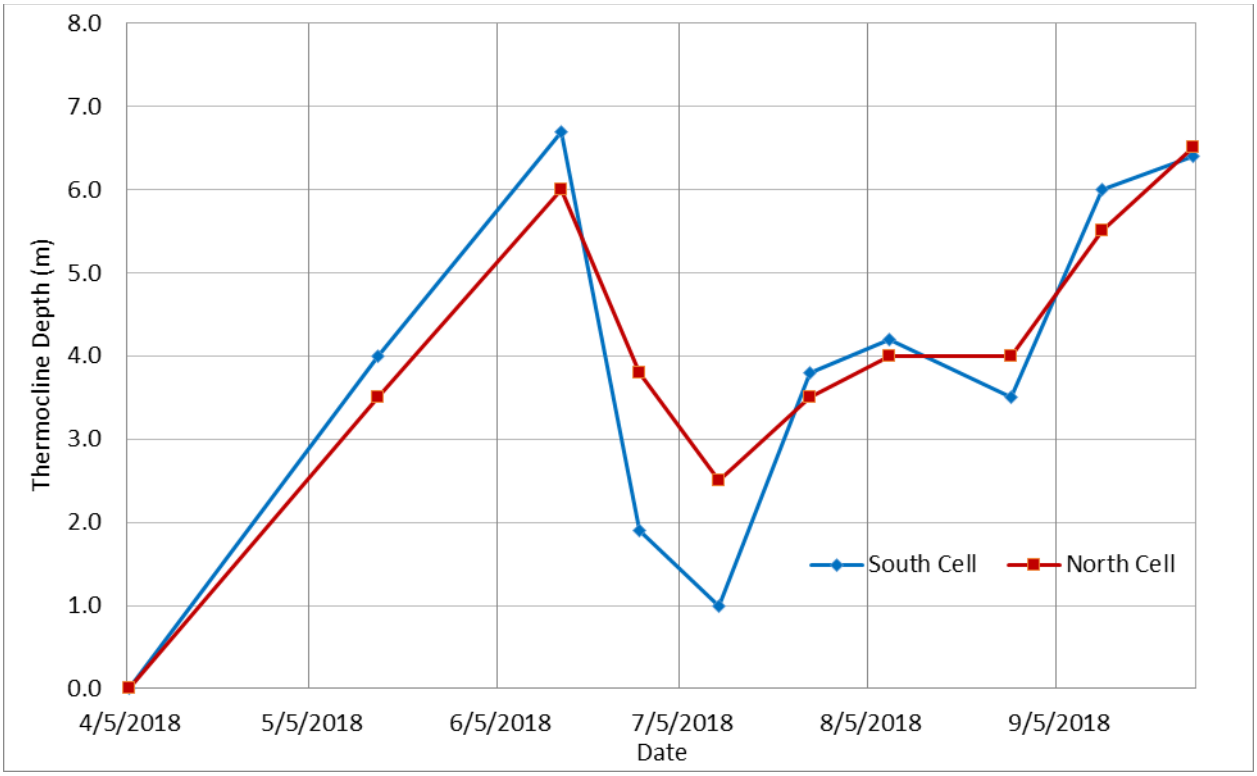


Figure 11. Thermocline depth (m) measured in the south and north cells of Ada Hayden Lake during 2017 and 2018.

Dissolved oxygen concentrations were greater than 8 mg/L above the thermocline on most visits, except on September 27, 2018 (Figure 12, Figure 13, Figure 14, Figure 15). On that date, dissolved oxygen was 7.7 mg/L at 0.5 m from the surface in the south cell and 7.0 mg/L at 0.5 m from the surface in the north cell. When a thermocline was observed, the dissolved oxygen level declined below the thermocline in the hypolimnion and was frequently below the quantitation limit (<0.1 mg/L). No thermocline was observed on April 5, 2018, and dissolved oxygen was greater than 12.0 mg/L from the surface to the lake bottom in both cells. Results for all depth profiles can be found in the Appendix (Tables 54 – 93 and Figures 26 – 65).

The phytoplankton community was dominated by cyanobacteria during both years and comprised up to 96.4% of the total algal biomass in some samples (Figure 16, Figure 17). There were a few notable exceptions, for example in 2017, Chrysosphyceae were 44.5% of the total algal biomass in the south cell and 34.0% of the total algal biomass in the north cell of the same sampling session. On April 5, 2018, diatoms comprised 50.0% of the total algal biomass in the south cell and 62.1% in the north cell. Cryptophyta were also more abundant in 2018 and comprised 94.3% of the algal biomass in the south cell on May 16, 2018. Average algal biomass was greater in 2017 than in 2018 in both cells (Figure 18, Figure 19). Average algal biomass in 2017 was greater in the south cell (19.9 mg/L) than the north cell (14.1 mg/L), while average algal biomass was similar in the south and north cells during 2018 (12.4 mg/L and 12.1 mg/L, respectively).

The zooplankton community in both cells was dominated by cladocerans, copepods, and rotifers during both years (Figure 20, Figure 21). In 2017, the south and north cell zooplankton communities were dominated by cladocerans and copepods in the spring, by copepods and rotifers during mid-summer, and mostly by copepods during late summer. In April 2018, the zooplankton communities in both cells were dominated by rotifers and copepods. Cladocerans comprised an increasing proportion of the community until early summer, and rotifers and copepods were dominant for the remainder of the 2018 sampling season.

In general, the total zooplankton biomass in both cells was greatest in the spring and early summer, decreased during mid-summer, and increased slightly in the fall (Figure 22, Figure 23). One exception to this trend was observed on June 28, 2018 in the south cell, when zooplankton biomass reached an uncharacteristically high maximum of 228.2 µg/L. Overall zooplankton biomass was greater in 2018 than in 2017. In the south cell, average zooplankton biomass was 54.6 µg/L in 2017 was 77.7 µg/L in 2018, and, average zooplankton biomass in the north cell was 41.7 µg/L in 2017 and 71.0 µg/L in 2018.

Wetland Inlet and Outlet Sampling

The wetland inlets and outlets were visited 12 times during 2017 and 15 times during 2018 (Table 4, Table 5). A total of 43 samples were collected in 2017 and 82 samples were collected in 2018. Samples were analyzed for the parameters listed in Table 2; total phosphorus and orthophosphate were added to the list of analyses in early July 2017. Results for all analyses can be found in the Appendix.

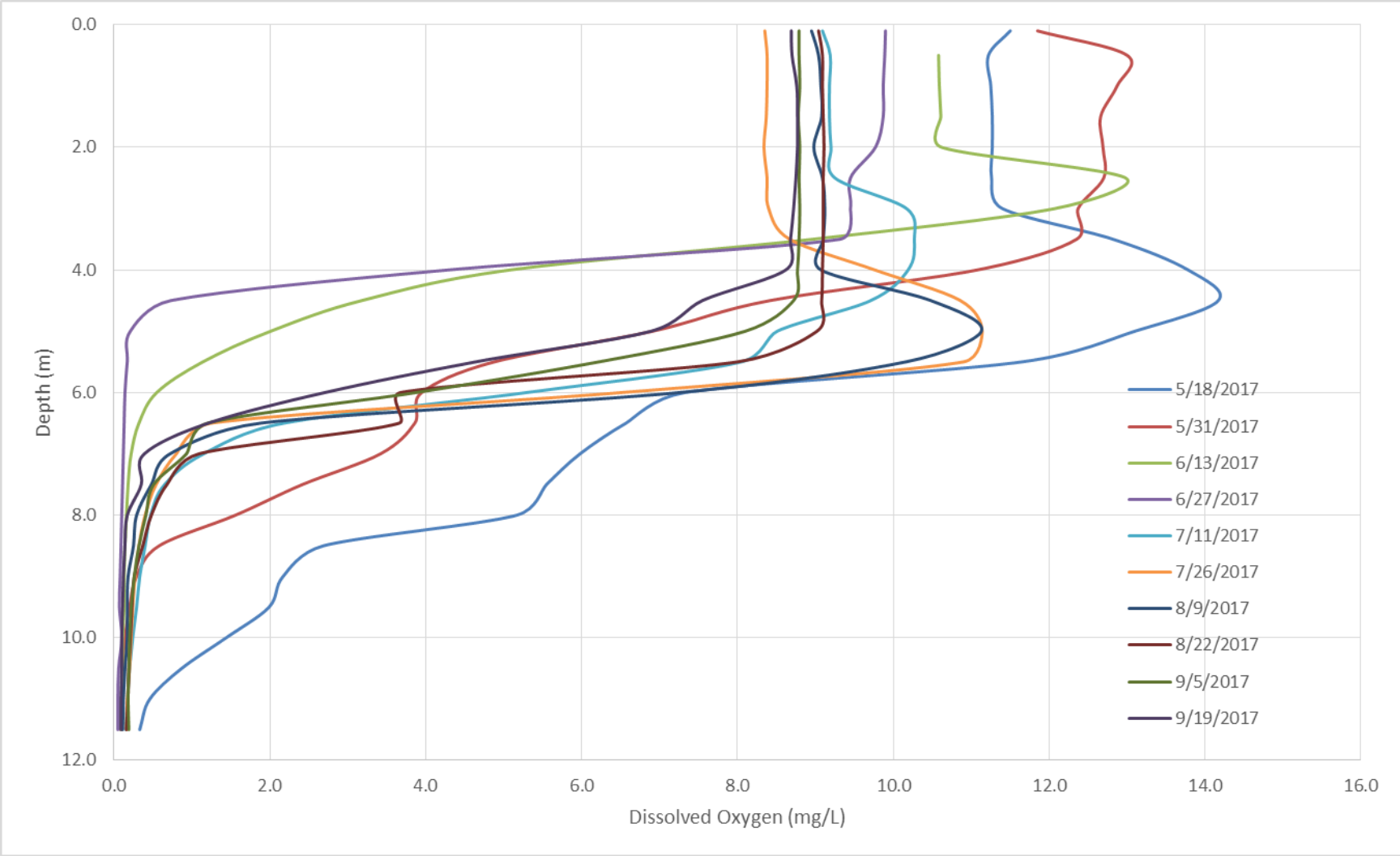


Figure 12. Dissolved oxygen (mg/L) measured at approximately 0.5 m increments from the lake surface to the lake substrate in the south cell of Ada Hayden Lake, May through September 2017.

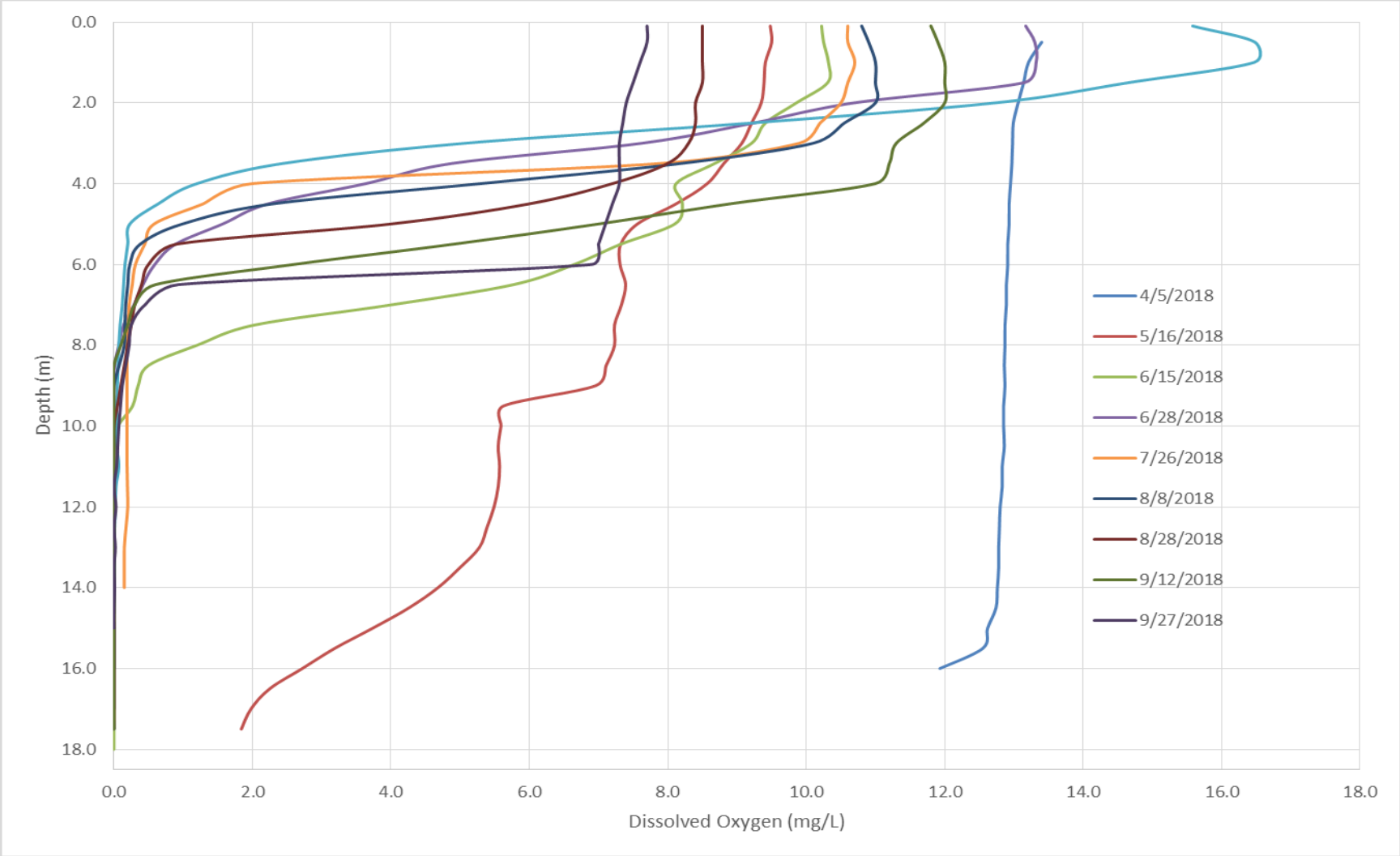


Figure 13. Dissolved oxygen (mg/L) measured at approximately 0.5 m increments from the lake surface to the lake substrate in the south cell of Ada Hayden Lake, April through September 2018.

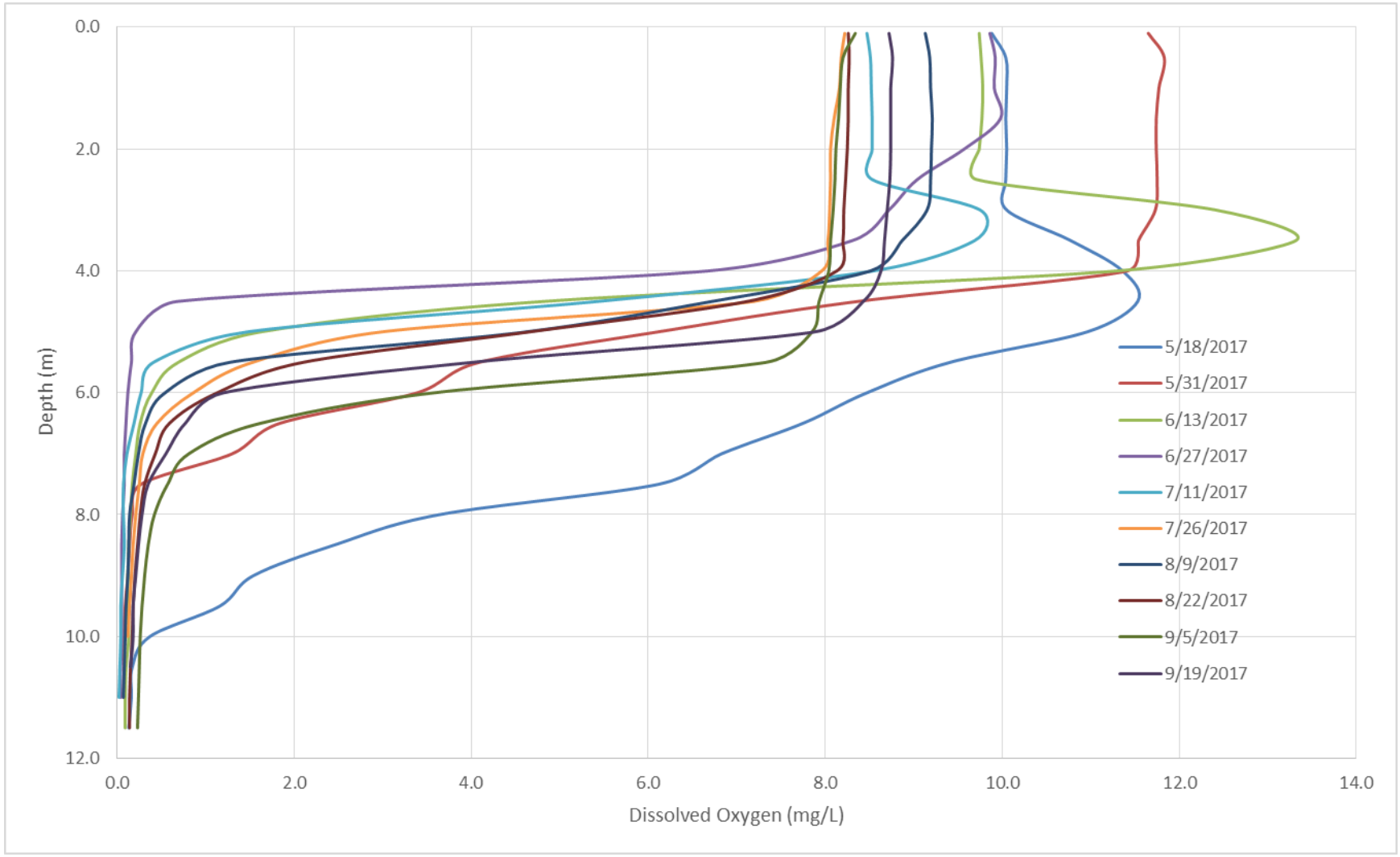


Figure 14. Dissolved oxygen (mg/L) measured at approximately 0.5 m increments from the lake surface to the lake substrate in the north cell of Ada Hayden Lake, May through September 2017.

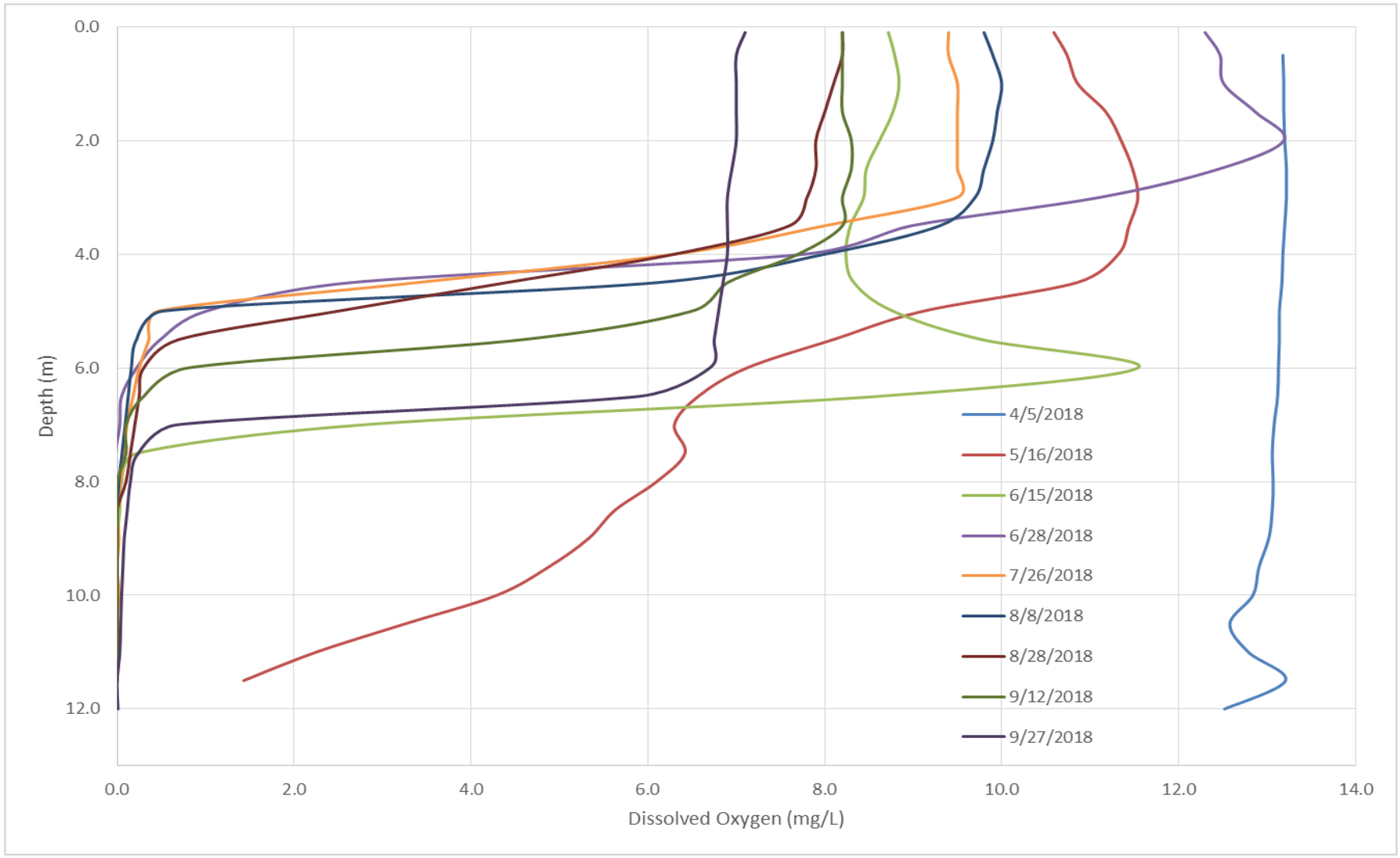
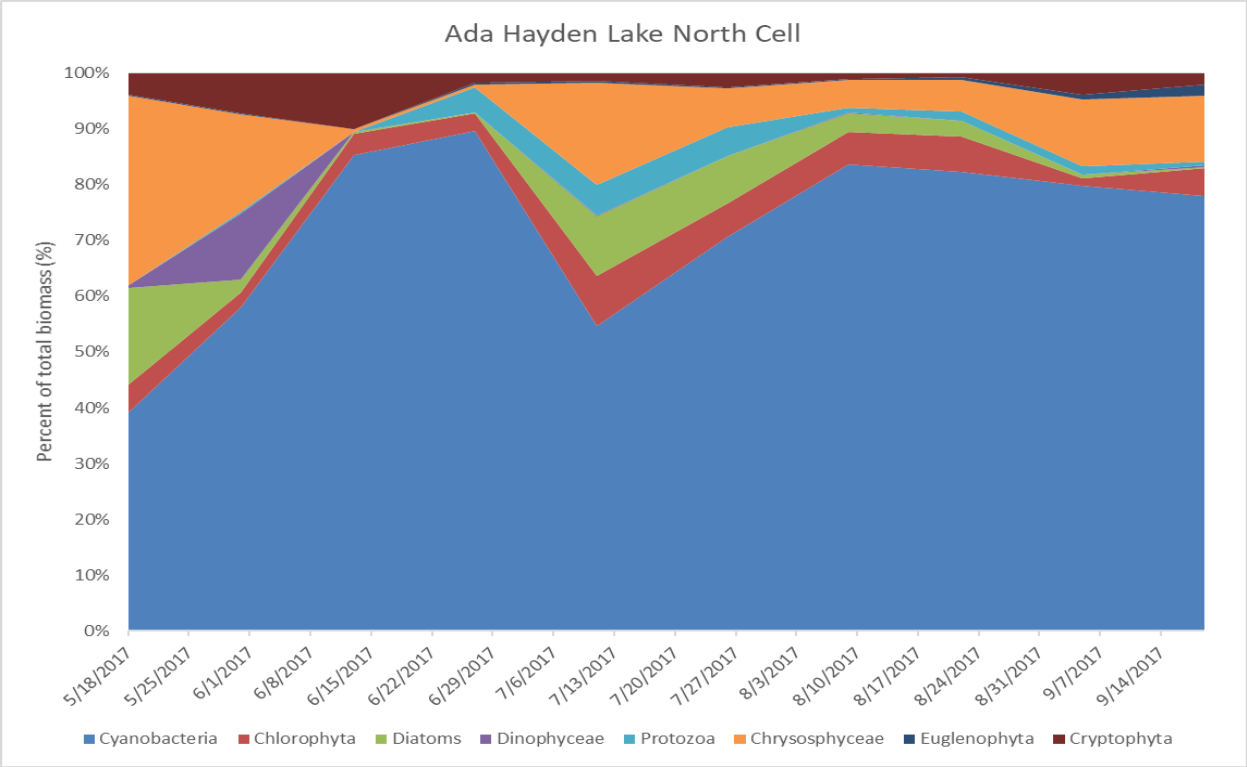


Figure 15. Dissolved oxygen (mg/L) measured at approximately 0.5 m or 1.0 m increments from the lake surface to the lake substrate in the north cell of Ada Hayden Lake, May through September 2018. There is no data for July 11, 2018, due to an equipment malfunction.



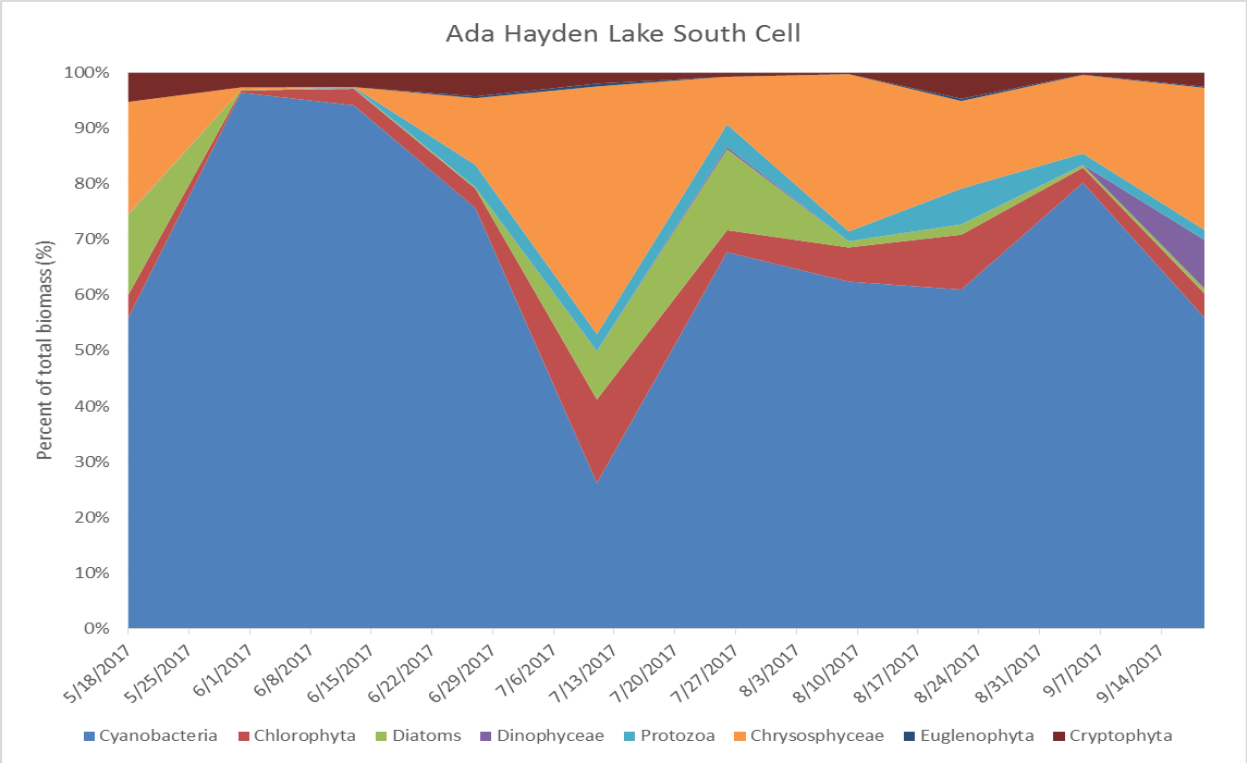
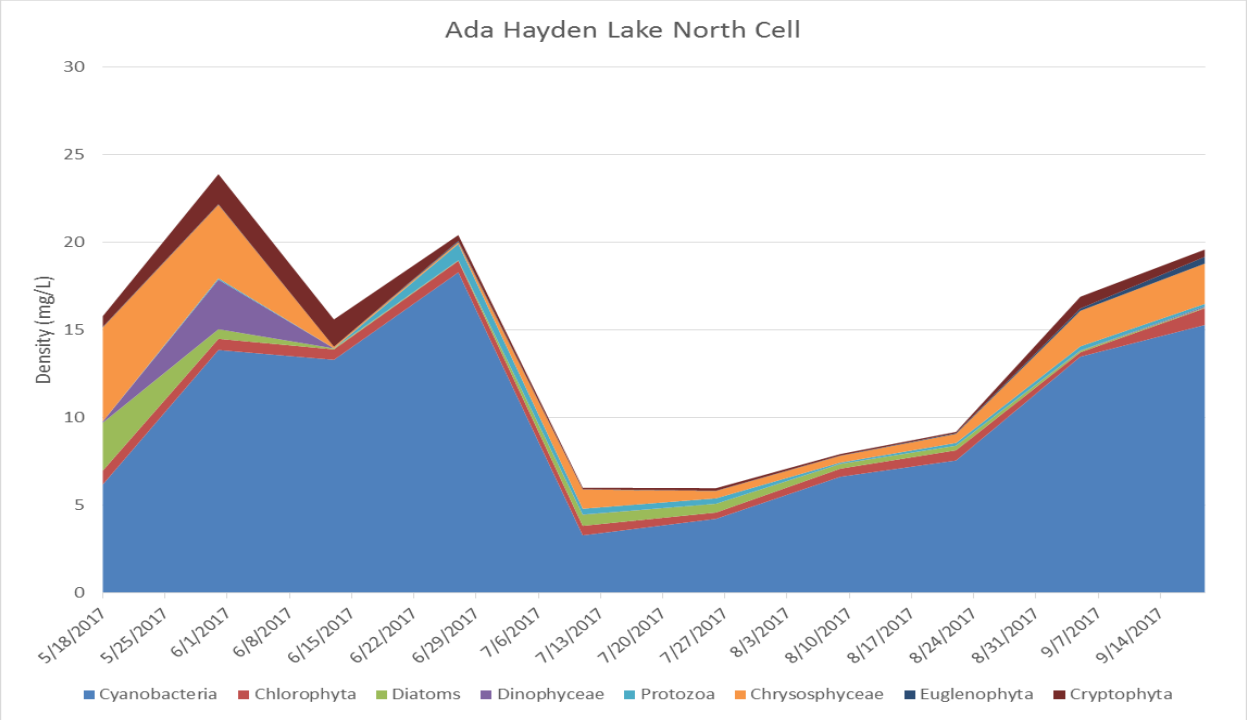


Figure 16. Percent of total wet mass (%) of phytoplankton found in the north and south cells of Ada Hayden Lake in 2017.



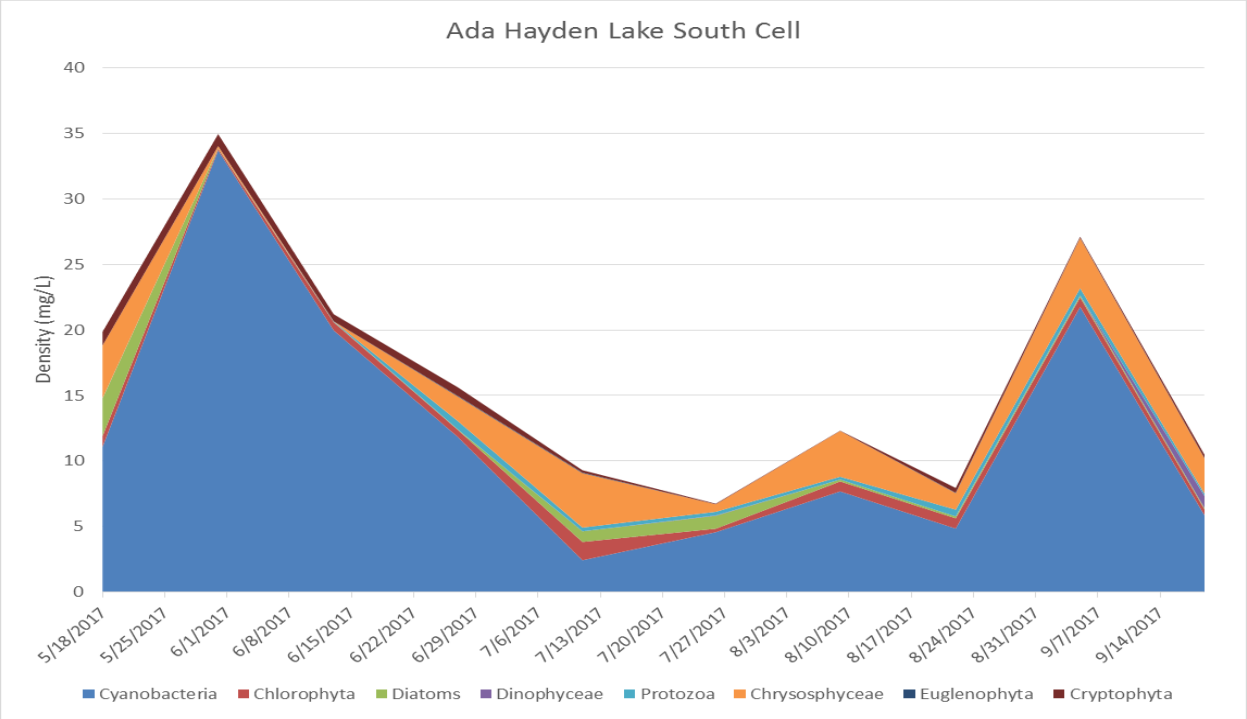
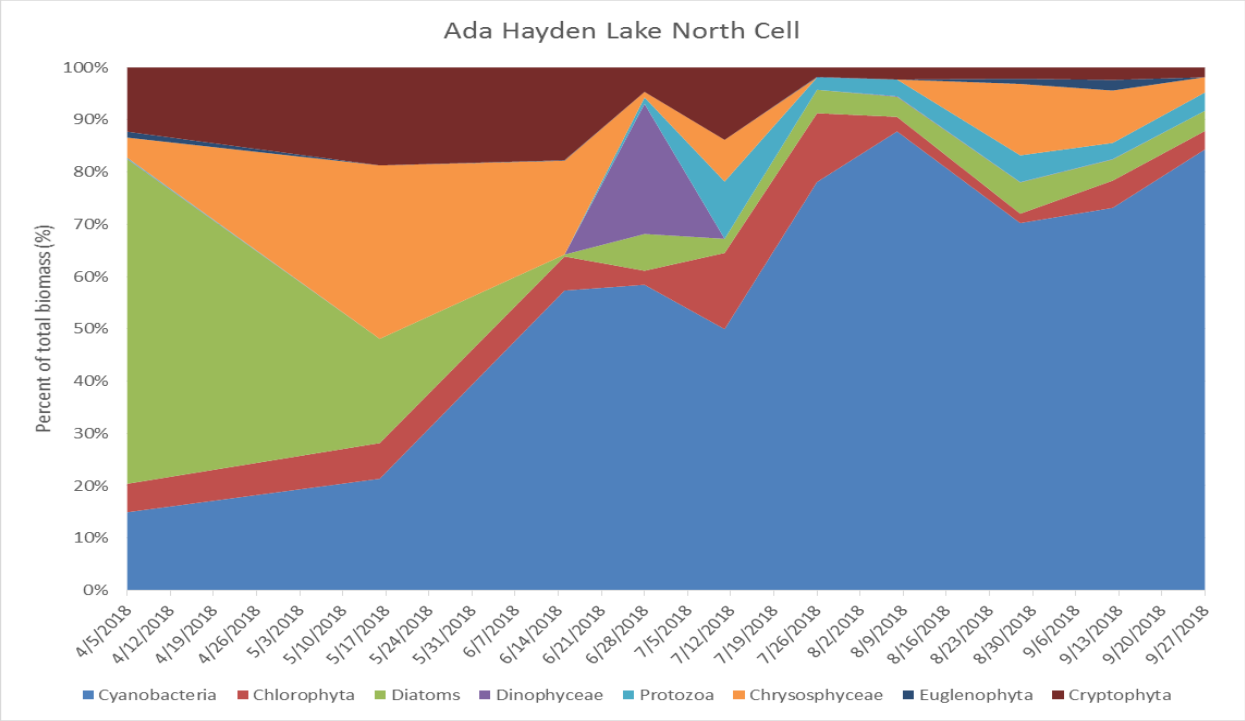


Figure 17. Total wet mass (mg/L) of phytoplankton found in the north and south cells of Ada Hayden Lake in 2017.



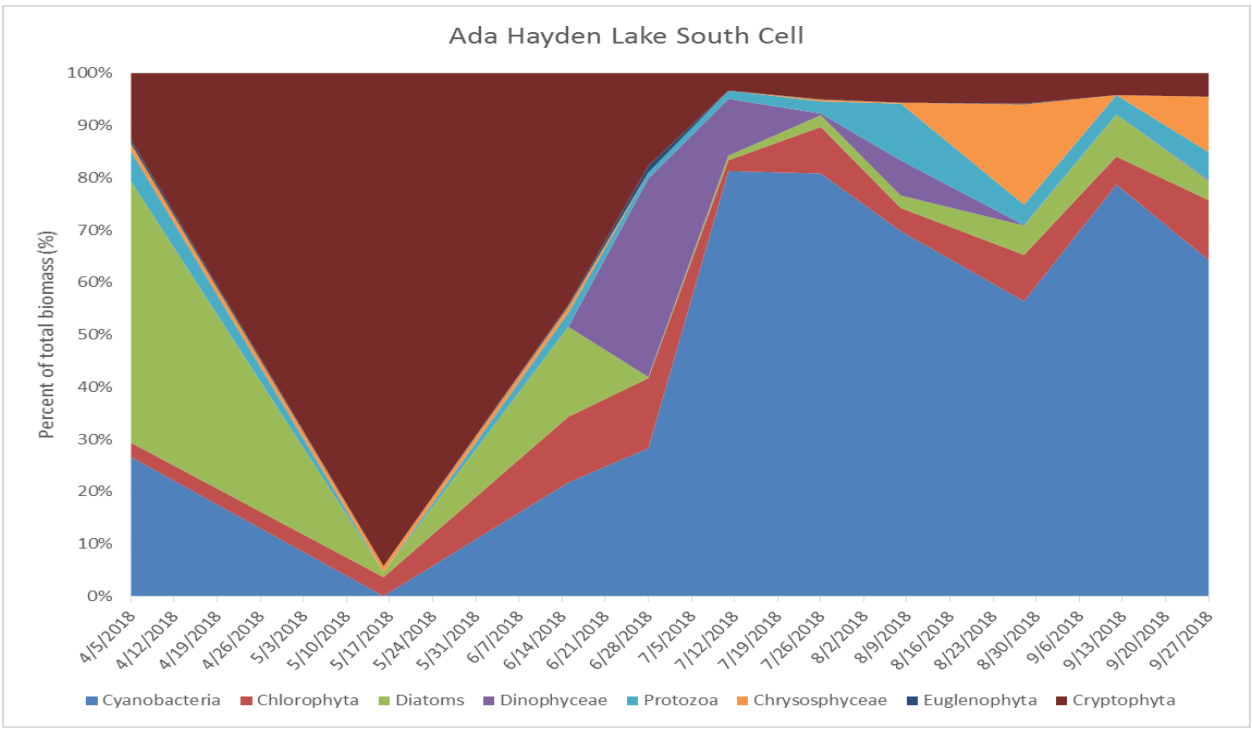
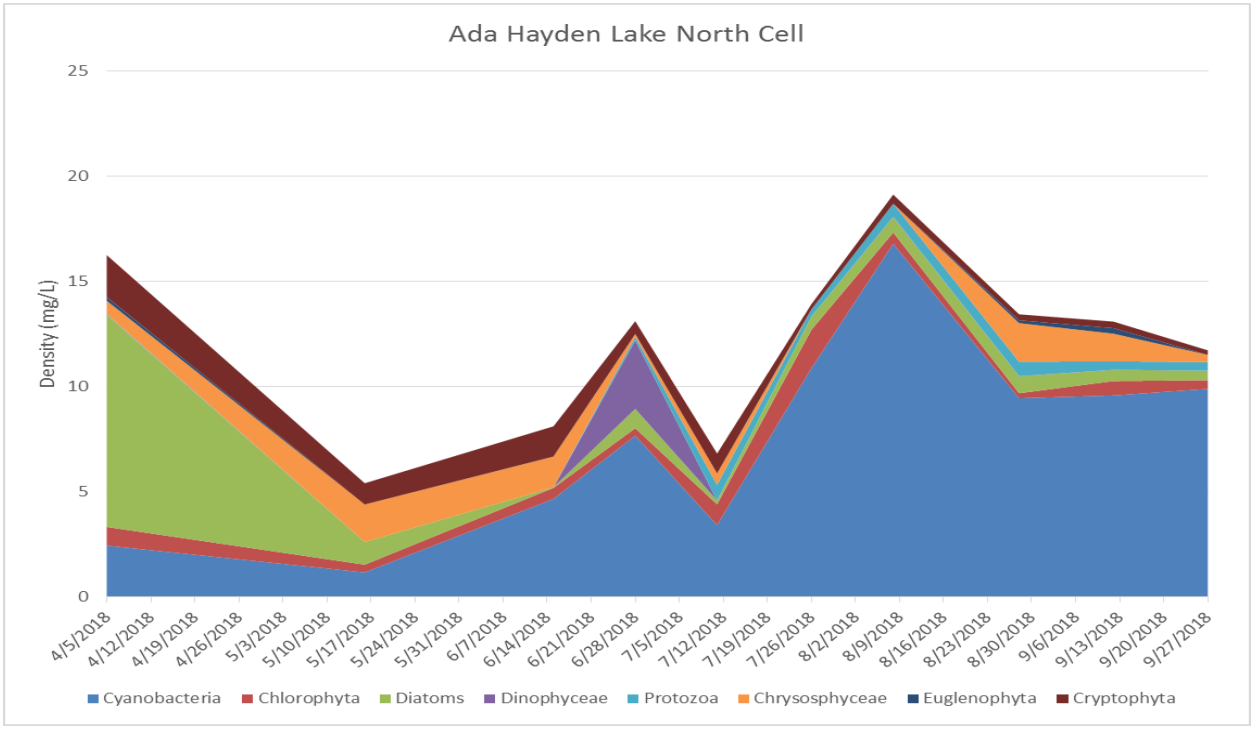


Figure 18. Percent of total wet mass (%) of phytoplankton found in the north and south cells of Ada Hayden Lake in 2018.



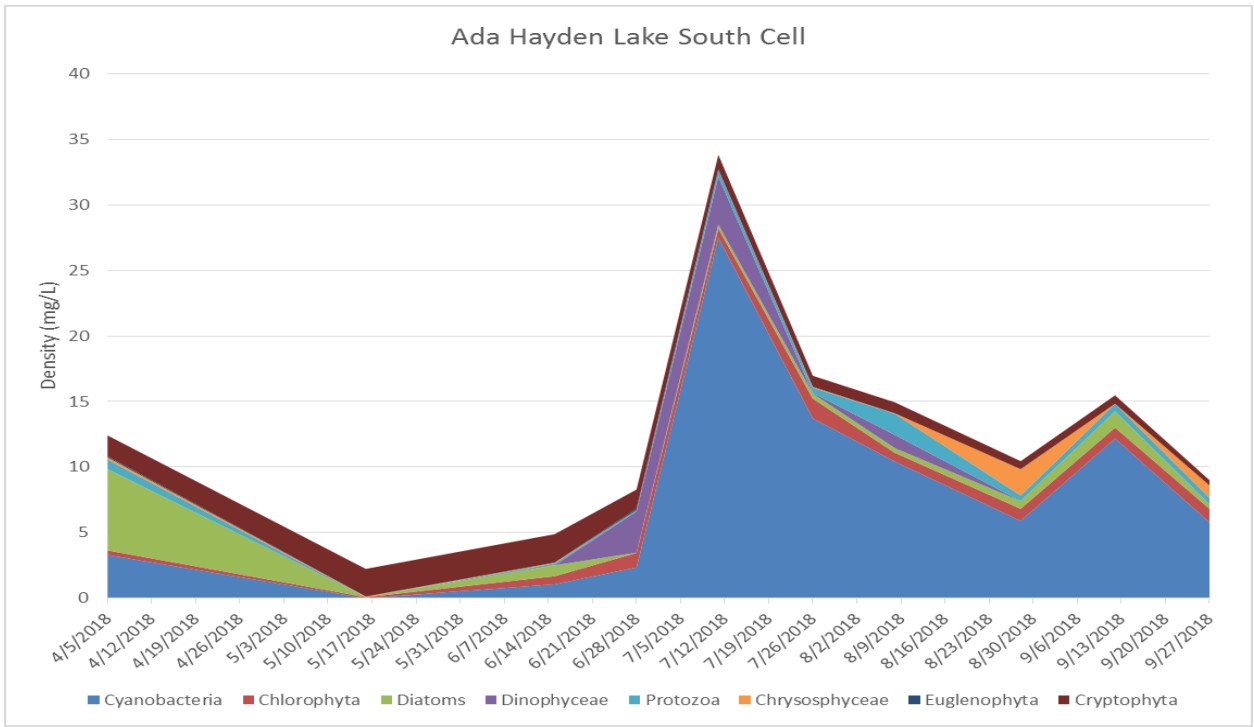


Figure 19. Total wet mass (mg/L) of phytoplankton found in the north and south cells of Ada Hayden Lake in 2018.

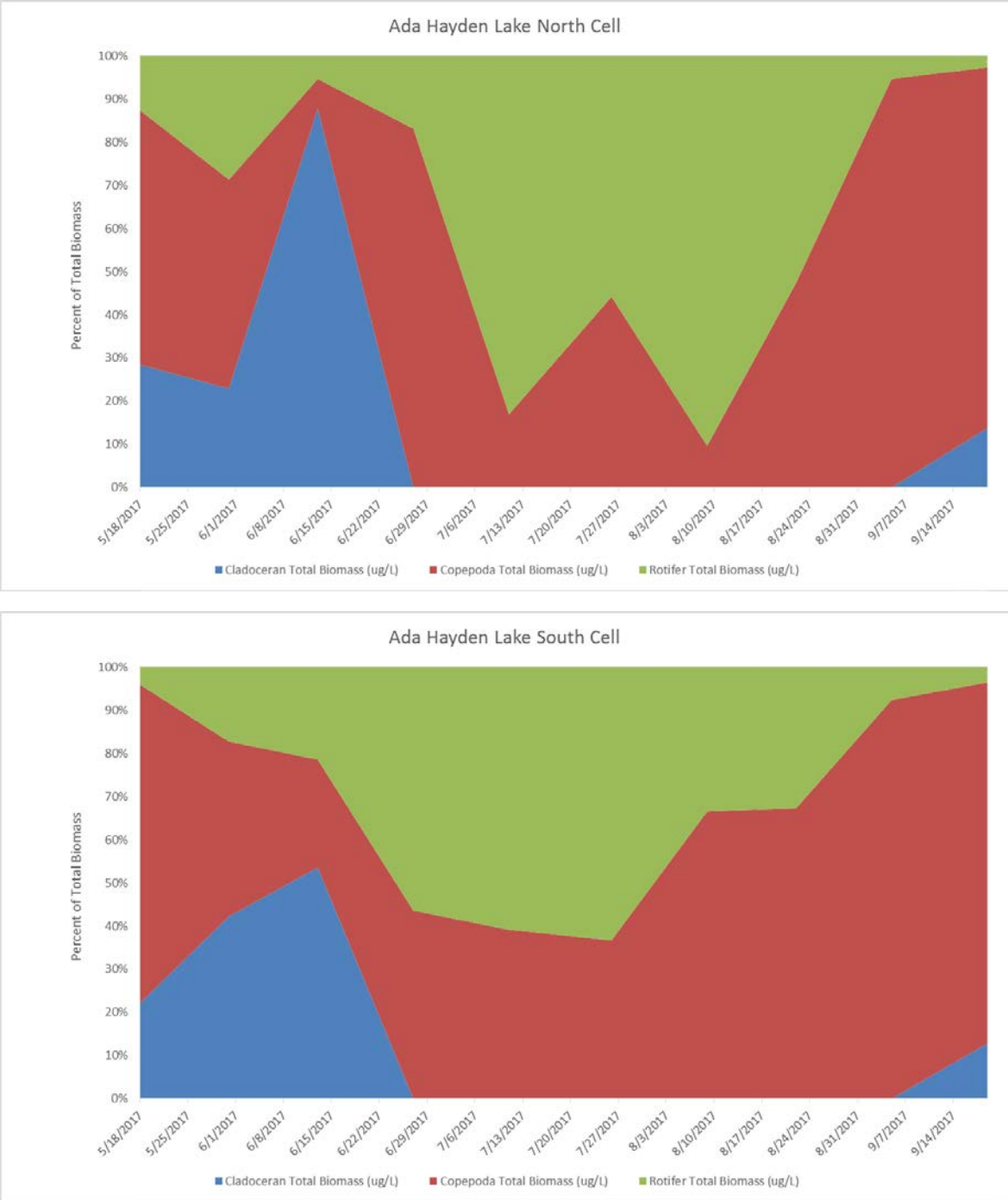
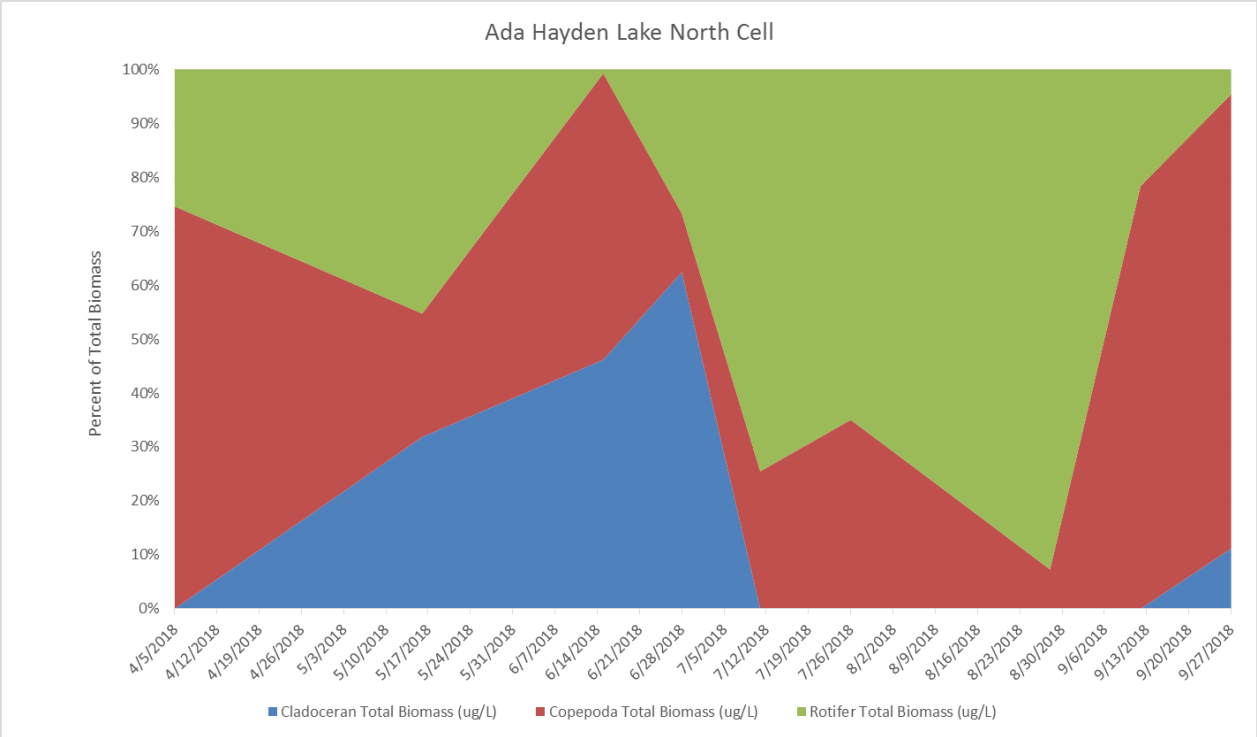


Figure 20. Percent of total biomass (%) of the three dominant groups of zooplankton found in the north and south cells of Ada Hayden Lake in 2017.



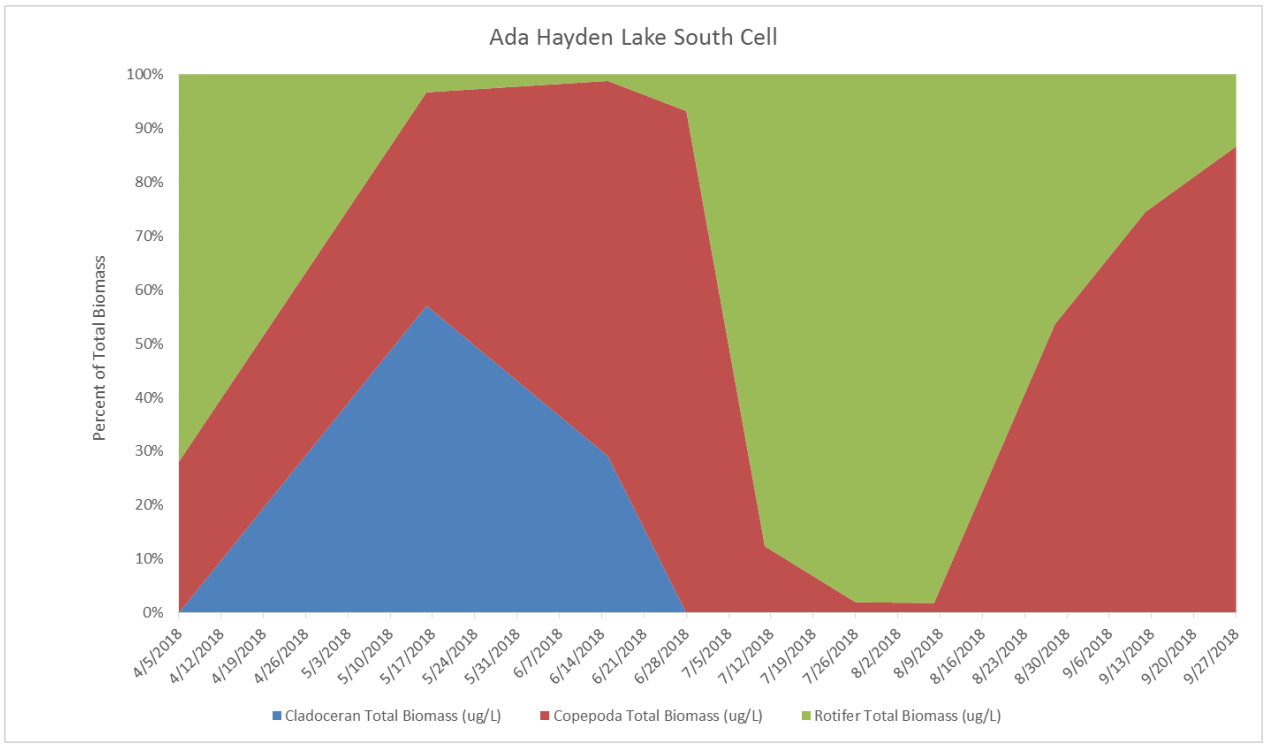


Figure 21. Percent of total biomass (%) of the three dominant groups of zooplankton found in the north and south cells of Ada Hayden Lake in 2018.

Figure 22. Total biomass (µg/L) of the three dominant groups of zooplankton found in the north and south cells of Ada Hayden Lake in 2017.

Figure 23. Percent of total biomass (%) of the three dominant groups of zooplankton found in the north and south cells of Ada Hayden Lake in 2017.

Wetland inlet and outlet sites frequently had little flow or were dry during the 2017 sampling season. In 2017, approximately 40% of possible wetland samples were not collected because the sites were dry when visited. According to the National Weather Service climate summary for Ames, Iowa, precipitation was 5.05 inches (23%) less than normal during the study period (www.nws.gov). Precipitation was 0.09 inches above normal in May, below normal during June, July, August, and September, and above average from October 1, 2017 to October 11, 2017.

More rainfall was received in the 2018 field season allowing 82 wetland inlet or outlet and lake outlet samples to be collected. Sites were found to be dry only about 9% of the time in 2018, compared to approximately 40% of the time in 2017. Twenty-eight wetland inlet or outlet samples were collected after rainfall events in 2018, while only 10 wetland inlet or outlet samples were collected after rainfall events in 2017. According to the National Weather Service climate summary for Ames, Iowa, approximately 180% more rain than normal was received during the 2018 study period. April 2018 was 63% dryer than normal, while June, August, and September were 153%, 72%, and 162% wetter than normal.

The north wetland inlet was sampled 23 times and was dry during four visits and the north wetland outlet was sampled 13 times and was dry during 14 visits over the two-year study period. Six samples were collected at the north wetland inlet and outlet after rainfall events. The average concentration of nitrate + nitrite nitrogen, TKN, total phosphorus, orthophosphate, turbidity, TSS, TVSS, specific conductivity, and *E. coli* was greater in inlet samples than outlet samples, while the average concentration of chlorophyll *a*, ammonia nitrogen, and TKN was greater in the outlet samples (Table 6). Average unionized ammonia concentration was less than the quantitation limit under all conditions.

During the two field seasons, the middle wetland inlet was sampled 24 times and the outlet was sampled 17 times. The inlet was dry three visits and the outlet was dry on 10 visits. Seven sets of samples were collected after rainfall events. The average concentration of nitrate + nitrite nitrogen, orthophosphate, specific conductivity, and *E. coli* were greater in inlet samples than outlet samples, while the average concentration of TKN, total phosphorus, turbidity, chlorophyll *a*, TSS, and TVSS were greater in the outlet samples than the inlet samples (Table 7). Average ammonia nitrogen and unionized ammonia concentrations were less than the detection limit in all inlet and outlet samples.

The south wetland inlet was sampled 26 times and was dry once; the south wetland outlet was sampled 22 times and was dry during five visits. Seven pairs of samples were collected from the south wetland inlet and outlet after rainfall events. The average concentration of nitrate + nitrite nitrogen, orthophosphate, specific conductivity, and *E. coli* were greater in the inlet samples than the outlet samples. The average concentration of ammonia nitrogen, TKN, total phosphorus, turbidity, chlorophyll *a*, TSS, and TVSS were greater in the outlet samples than the inlet samples (Table 8). Average unionized ammonia concentration was less than the quantitation limit in the inlet and outlet samples.

Table 6. Results for grab samples collected from the inlet and outlet of the north wetland at Ada Hayden Heritage Park. Averages were calculated for all samples, including samples collected after rainfall events, and samples collected during ambient weather conditions. Samples were collected from May through October of 2017 and April through September of 2018.

Parameter	Inlet All Samples	Outlet All Samples	Inlet Rainfall Event	Outlet Rainfall Event	Inlet Ambient Conditions	Outlet Ambient Conditions
Nitrate + Nitrite Nitrogen (mg/L)	8.4	3.2	10.5	4.0	7.8	2.8
Ammonia Nitrogen (mg/L)	<0.05	0.09	0.10	0.07	<0.05	0.10
Unionized Ammonia (mg/L)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
TKN (mg/L)	0.7	1.0	1.0	1.0	0.6	1.0
Total Nitrogen (mg/L)	9.1	4.2	11.5	5.0	8.4	3.8
Total Phosphorus (mg/L)	0.25	0.18	0.38	0.17	0.21	0.19
Orthophosphate (mg/L)	0.13	0.07	0.18	0.04	0.12	0.08
Turbidity (NTU)	20	15	51	15	12	15
Chlorophyll a (mg/L)*	5	29	6	21	4	34
Total Suspended Solids (mg/L)	56	14	141	15	32	14
Total Volatile Suspended Solids (mg/L)*	13	7	29	7	7	7
Specific Conductivity (umho/cm)	665	479	588	440	686	504
E. coli (MPN/100 mL)**	775	159	1027	582	717	71

*Analysis performed in 2018 only. **Geometric mean.

Table 7. Results for grab samples collected from the inlet and outlet of the middle wetland at Ada Hayden Heritage Park. Averages were calculated for all samples, including samples collected after rainfall events, and samples collected during ambient weather conditions. Samples were collected from May through October of 2017 and April through September of 2018.

Parameter	Inlet All Samples	Outlet All Samples	Inlet Rainfall Event	Outlet Rainfall Event	Inlet Ambient Conditions	Outlet Ambient Conditions
Nitrate + Nitrite Nitrogen (mg/L)	4.4	0.9	3.6	0.8	4.7	1.0
Ammonia Nitrogen (mg/L)	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Unionized Ammonia (mg/L)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
TKN (mg/L)	0.5	0.7	0.7	0.8	0.4	0.7
Total Nitrogen (mg/L)	4.9	1.6	4.3	1.6	5.1	1.7
Total Phosphorus (mg/L)	0.13	0.16	0.20	0.18	0.10	0.11
Orthophosphate (mg/L)	0.06	0.04	0.09	0.04	0.04	0.03
Turbidity (NTU)	5.1	11	11	16	2.5	7.2
Chlorophyll a (mg/L)*	6	32	8	33	5	31
Total Suspended Solids (mg/L)	8	12	17	16	4	9
Total Volatile Suspended Solids (mg/L)*	3.3	5.4	5.2	6.0	2.4	5.0
Specific Conductivity (umho/cm)	620	374	511	304	664	422
E. coli (MPN/100 mL)**	730	187	1744	618	510	81

*Analysis performed in 2018 only. **Geometric mean.

Table 8. Results for grab samples collected from the inlet and outlet of the south wetland at Ada Hayden Heritage Park. Averages were calculated for all samples, including samples collected after rainfall events, and samples collected during ambient weather conditions. Samples were collected from May through October of 2017 and April through September of 2018.

Parameter	Inlet All Samples	Outlet All Samples	Inlet Rainfall Event	Outlet Rainfall Event	Inlet Ambient Conditions	Outlet Ambient Conditions
Nitrate + Nitrite Nitrogen (mg/L)	4.0	1.0	4.7	0.9	3.7	1.0
Ammonia Nitrogen (mg/L)	<0.05	0.12	<0.05	0.21	<0.05	0.08
Unionized Ammonia (mg/L)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
TKN (mg/L)	0.3	1.1	0.4	1.0	0.3	1.1
Total Nitrogen (mg/L)	4.3	2.1	5.1	1.9	4.0	2.1
Total Phosphorus (mg/L)	0.12	0.19	0.10	0.20	0.13	0.19
Orthophosphate (mg/L)	0.05	0.02	0.05	0.03	0.05	<0.02
Turbidity (NTU)	2.0	29	4.1	32	1.4	27
Chlorophyll a (mg/L)*	<1	45	1	32	1	52
Total Suspended Solids (mg/L)	2	55	3	45	2	59
Total Volatile Suspended Solids (mg/L)*	2	19	2	17	2	20
Specific Conductivity (umho/cm)	853	414	813	286	868	474
E. coli (MPN/100 mL)**	1426	403	864	1485	1715	210

*Analysis performed in 2018 only. **Geometric mean

Lake Outlet Sampling

In 2017, six samples were collected at the lake outlet while two samples could not be collected because the lake was not overflowing the spillway causing the outlet to be dry (Table 4). The lake outlet was sampled nine times and was dry once during 2018 (Table 5). In 2017, the instantaneous discharge declined from 7 cfs to <1 cfs after the first collection on May 18, 2017 and remained at <1 cfs or was dry for the remainder of the season (Appendix: Table 50).

Instantaneous discharge was greater and more variable in 2018 than 2017 (Appendix: Table 52). Average discharge was 1.6 cfs in 2017 and 10.9 cfs in 2018. The results for all analyses performed on the lake outlet samples can be found in the Appendix.

Near-Bottom Lake Samples

As part of the work plan, samples were collected May through September with a request for a sample near the lake bottom before thermal stratification in the spring and after lake turnover in the fall. When the lake was first sampled in May of 2017 both cells of the lake were already thermally stratified and remained stratified through the last sampling visit in October of 2017, therefore the near bottom samples were not collected. The lake was sampled on April 5, 2018 before it was stratified, and samples were collected from both cells near the lake bottom. The samples were analyzed for total phosphorus and orthophosphate. Total phosphorus was 0.06 mg/L in the south cell and 0.05 mg/L in the north cell. Orthophosphate was <0.02 mg/L in both cells. The lake remained stratified for the remainder of the 2018 sampling season, therefore it was not possible to collect another unstratified set of samples near the lake substrate.

Discussion

Average concentrations for many parameters were similar in the north and south cells of the lake, with some exceptions, during 2017. Average nitrate + nitrite nitrogen, TKN, TSS, and turbidity were greater in the south cell than the north cell. Average ammonia nitrogen was also higher in the south cell, but this was due to one occurrence when the concentration was 0.08 mg/L. Ammonia nitrogen was less than the quantitation limit in all other samples in both cells. Algal and zooplankton biomass and average chlorophyll concentration were also greater in the south cell, while Secchi disk transparency was slightly less in the south cell. These results suggest that the south cell may be more productive than the north cell.

A similar trend was seen in 2018 with the mean concentrations of several parameters greater in the south cell than the north cell. Mean ammonia nitrogen, nitrate + nitrite nitrogen, and TKN concentration were all greater in the south cell than the north cell. Ammonia nitrogen was found during the first three visits in 2018 and was less than the detection limit for the rest of the year. Average turbidity, TSS, TVSS were also slightly greater in the south cell, and chlorophyll *a* concentrations in the south cell were almost double the mean concentration in the north cell (20.4 mg/L and 12.5 mg/L, respectively).

Both cells of Ada Hayden Lake developed strong thermoclines and the depth of the thermoclines generally increased throughout the sampling periods, which is typical of a eutrophic lake. Thermoclines are generally not present during ice melt and early spring when water temperature, and thus density, are relatively uniform throughout the water column. Temperature differences between the hypolimnion (cooler, lower layer of water) and epilimnion (upper layer) gradually increase stratification throughout the summer and then decrease once again, as cooler weather returns in the fall. This pattern was observed in both lake cells for each year. Both sampling seasons were completed before stratification had dissipated and fall turnover occurred.

Much of the water below the thermocline is deeper than light can penetrate, therefore algae is not able to produce oxygen. A decline in oxygen concentration below the thermocline is common in eutrophic lakes (Carlson and Simpson 1996). Dissolved oxygen levels were depleted below the thermoclines in the hypolimnion and were often near or below the quantitation limit in both cells (<0.1 mg/L).

In 2017, TVSS comprised approximately 82% of the solids in the south cell and 69% of the suspended solids in the north cell. In 2018 average TVSS comprised approximately 76% of the suspended solids in the south cell and 81% of the suspended solids in the north cell. Since TVSS represents the organic portion of the suspended solids, this indicates that the source of much of the suspended solids may have been from algae and zooplankton. One exception is for the sample collected on June 15, 2018. The TSS concentration measured on this date was the highest observed during the two-year study period, but the TVSS only comprised 42% of the TSS. This indicates a greater than usual amount of inorganic solids in the water column. A significant amount of rainfall was received during the month of June 2018, including 4.25 inches on June 14, 2018, which may have contributed to an increased amount of inorganic solids in the water column.

In both years, the phytoplankton community in both cells was dominated by cyanobacteria (blue green algae) for most of the field season. Concentrations of three algal toxins, cylindrospermopsin, anatoxin-a, and saxitoxin were below the quantitation limit in all samples collected in 2017 and 2018. Microcystin concentrations were above the quantitation limit in three samples collected from the south cell in 2017 but were below quantitation limits in every sample analyzed from the north cell in 2017. Microcystin concentrations were highest in the spring of 2017 when algal biomass was the greatest. In 2018, microcystin concentrations were above the quantitation limit in all nine samples collected from the south cell and in eight of the nine samples collected from the north cell. Average microcystin concentration in both lake cells was higher in 2018 than 2017: 0.15 µg/L in 2017 and 0.28 µg/L in 2018 in the south cell and <0.15 µg/L in 2017 and 0.25 µg/L in 2018 in the north cell.

During both years, microcystin concentrations were less than the Iowa warning level (≥ 20 µg/L) and the 10-day drinking water health advisory for school age children and adults (1.6 µg/L, USEPA 2017). Microcystin concentrations were greater than the 10-day drinking water health advisory for bottle-fed infants and pre-school children (0.3 µg/L, USEPA 2017) twice during 2017 and six times in 2018. Microcystin concentrations less than 10 µg/L pose a low probability of acute health effects (USEPA 2017).

Phytoplankton biomass and community composition varied throughout the sampling season and appeared to be influenced by several factors, including zooplankton density, total phosphorus concentration, and total nitrogen concentration (nitrate + nitrite nitrogen and TKN). In 2017 nitrogen and phosphorus, important phytoplankton nutrients, were at their highest concentrations in the spring and early summer when phytoplankton was abundant. Zooplankton biomass was also at its highest at that time and zooplankton grazing may have helped shift the phytoplankton community towards larger-sized cyanobacteria. As the summer progressed, the nitrate + nitrite nitrogen concentrations in both cells declined to less than the detection limit and a decline in phytoplankton biomass soon followed. Zooplankton biomass began to decline by mid-June in the south cell and early July in the north cell.

The lake cells were sampled more than a month earlier in 2018. The initial phytoplankton community was dominated by diatoms, especially in the north cell. More Cryptophyta were observed in early 2018 and they comprised 94.3% of the algal biomass in the south cell in May 2018. Cyanobacteria comprised much of the algal community for the remainder of the 2018 sampling season. Nutrient levels in the lake cells did not follow the same pattern in 2018 as in 2017, especially in the south cell. Average total nitrogen concentration was higher in the south cell during 2018, and nitrate + nitrite nitrogen concentrations were above the quantitation limit until the end of July in 2018 as opposed to the end of May in 2017. This may have influenced the algal and zooplankton communities, causing their biomass to increase in June.

Average algal biomass was greater in 2017 than 2018, while average zooplankton biomass was greater in 2018. Mean algal biomass was 14.1 mg/L in 2017 and 12.1 mg/L in 2018 in the north cell and was 19.9 mg/L in 2017 and 12.8 mg/L in 2018 in the south cell. Mean zooplankton biomass was 41.7 µg/L in 2017 and 71.0 µg/L in 2018 in the north cell and 54.7 µg/L in 2017 and 77.7 µg/L in 2018 in the south cell.

In 2017, chlorophyll *a* concentration was the greatest during May and June in both cells, declined during July, and remained less than the quantitation limit during the rest of the sampling season. The chlorophyll *a* concentration in the north cell followed a similar trend in 2018 and were highest during April, declined during May 2018, and remained low for the remainder of the 2018 field season.

The chlorophyll *a* concentration in the south cell did not follow the same trend in 2018. Chlorophyll *a* concentration declined in May 2018, and then rose again during June and July, peaking on July 11, 2018. Chlorophyll *a* concentration remained higher for the remainder of the 2018 field season compared with the 2017 field season. Chlorophyll *a* concentration in the south cell during 2018 were greater than the concentrations during 2017 approximately 80% of the time.

The zooplankton community was dominated by cladocerans, copepods, and rotifers during both years. Copepods made up the greatest proportion of the biomass both years and in both cells comprising 53% to 61% of the total biomass. Cladocerans ranged from 10% to 27% of the total biomass and rotifers 14% to 37% of the total biomass in both cells. Average zooplankton biomass was greater in the south cell in both years and was greater in 2018 than in 2017 in both cells. The zooplankton biomass was usually greatest in the spring, declined during mid-summer, and increased during the late summer, although the zooplankton biomass in the south cell did increase significantly in June 2018. The phytoplankton density also increased in June of 2018, possibly in response to increased water and nutrient delivery to the south cell due to heavy rainfall in May and June.

The lake cells became increasingly nutrient limited as the summers progressed, especially during 2017. Examination of the trophic state indices indicated the lake cells alternated between periods of phosphorus and nitrogen limitations in 2017, though this effect was less pronounced in 2018. Some cyanobacteria have an advantage over other forms of algae when nutrient levels are low because they can use dissolved atmospheric nitrogen and low concentrations of orthophosphate and ammonia nitrogen (Goldman and Horne 1983). This may explain why cyanobacteria were the dominant type of phytoplankton in both cells, especially when nutrient concentrations were low. Greater zooplankton density in 2018 and therefore greater zooplankton grazing may have helped shift the phytoplankton community structure towards larger algae, such as cyanobacteria.

Eutrophic lakes are characterized by high nutrient content, high primary production, and variable surface and benthic oxygen concentrations (Goldman and Horne 1983). This characterization can be further separated into three trophic states: mesotrophic, eutrophic, and hypereutrophic (Balmer and Kendall 2016, Table 9). According to the Iowa DNR, mesotrophic lakes have intermediate levels of nutrients and algal productivity, eutrophic lakes high levels of nutrients and frequent algal blooms, while hypereutrophic lakes have extremely high levels of nutrients,

Table 9. Ranges of chlorophyll *a* concentration, total phosphorus concentration, Secchi transparency depth, and trophic state index (TSI) values for mesotrophic, eutrophic, and hypereutrophic lakes. Adapted from Balmer and Kendall (2016).

Trophic State	Chlorophyll *a* (µg/L)	Total Phosphorus (µg/L)	Secchi Depth (m)	TSI
Mesotrophic	2.6 - 20	12 - 24	2 - 4	40 - 50
Eutrophic	21 – 56	25 – 96	0.5 – 2	51- 70
Hypereutrophic	57+	97+	<0.5	71+

frequent algal blooms, low water quality, and low oxygen concentration (Balmer and Kendall 2016).

Carlson's trophic state index (TSI) is a calculation that allows the comparison of the trophic state of different lakes using a single parameter index, based on the concentration of chlorophyll *a* (TSI(CHL)), total phosphorus (TSI(TP)), or Secchi depth (TSI(SD) (Carlson 1977). The Iowa DNR uses TSI(SD) and TSI(CHL) to help determine the trophic state of Iowa lakes and considers lakes with a TSI value of 40 to 50 to be mesotrophic, 51 to 70 eutrophic, and 71 and greater hypereutrophic (Balmer and Kendall 2016).

TSI(CHL), TSI(SD), and TSI(TP) values were calculated for Ada Hayden Lake (Table 10 and Table 11). Over the two-year study period, 71% of all TSI scores were in the eutrophic range, 24% were in the mesotrophic range, and 5% were in the hypereutrophic range. All the hypereutrophic scores were for TSI(TP) and were found only in 2017. During 2017, 32% of the TSI scores were in the mesotrophic range, 58% were in the eutrophic range, and 10% were in the hypereutrophic range. Seventeen percent of all TSI scores were in the mesotrophic range in 2018, 83% were in the eutrophic range, and no TSI scores were in the hypereutrophic range in 2018. All average TSI(CHL), TSI(SD), and TSI(TP) for 2017 and 2018 within the eutrophic range.

Carlson and Simpson (1996) described possible relationships between TSI(CHL), TSI(SD), and TSI(TP). For example, if TSI(CHL) is similar to TSI(SD), light attenuation in the water column is dominated by algae and the lake may be phosphorus limited. This was observed on three occasions in the south cell, suggesting that at times algae was responsible for most of the light absorption in the water column and the south cell may have been phosphorus limited (Figure 24, Figure 25). During those same periods, orthophosphate concentrations were less than the quantitation limit (<0.02 mg/L) and total phosphorus was less than the quantitation limit on two of the dates.

If the TSI(SD) and TSI(CHL) are similar but TSI(TP) is less, this may indicate the lake is increasingly phosphorus limited. This occurred on June 27, 2017 in the south cell, when the TSI(TP) was more than 20 units less than the TSI(SD) an TSI(CHL). This is corroborated by a decline in the total phosphorus to less than the quantitation limit (<0.02 mg/L) for the depth integrated sample collected on that day. This also occurred on August 8, 2018, but the difference between the TSI(SD) or TSI(CHL) and the TSI(TP) was not as large as in 2017.

A TSI(TP) greater than the TSI(SD) and TSI(CHL) may indicate that the lake is limited by something other than phosphorus, such as nitrogen or zooplankton grazing (Carlson and Simpson 1996). A zooplankton grazing effect may have been observed in the south cell on May 18, 2017, when TSI(TP) was greater than TSI(SD) and TSI(CHL), zooplankton density was the greatest during the entire sampling season, and the sum of TKN and nitrate + nitrite nitrogen was at the second highest concentration of the season (0.85 mg/L).

The TSI(TP) was also greater than the TSI(SD) and TSI(CHL) on July 26, 2017 and August 9, 2017 and on September 19, 2017. The nitrate + nitrite nitrogen was <0.1 mg/L and the

Table 10. Trophic state index (TSI) values for the south and north cells of Ada Hayden Lake, May through September 2017. TSI values were calculated for chlorophyll *a* concentration (TSI(CHL)), Secchi transparency depth (TSI(SD)), and total phosphorus concentration (TSI(TP)).

Date Collected	South Cell TSI(CHL)	North Cell TSI(CHL)	South Cell TSI(SD)	North Cell TSI(SD)	South Cell TSI(TP)	North Cell TSI(TP)
5/18/2017	59.5	55.0	56.2	53.2	71.9	71.9
5/31/2017	68.8	62.6	60.7	56.2	63.2	69.0
6/13/2017	62.6	60.0	56.2	53.2	65.4	65.4
6/27/2017	58.4	60.0	58.0	57.4	37.4	37.4
7/11/2017	48.2	44.2	51.5	51.9	60.6	60.6
7/26/2017	46.4	46.4	51.5	53.2	75.4	75.4
8/9/2017	46.4	49.7	50.8	52.4	57.3	53.2
8/22/2017	49.7	51.0	52.4	49.3	47.3	47.3
9/5/2017	49.7	49.7	48.6	51.5	53.2	60.6
9/19/2017	48.2	52.2	48.6	50.8	77.3	76.4
Average	53.8	53.1	53.5	52.9	60.9	61.7
Minimum	46.4	44.2	48.6	49.3	37.4	37.4
Maximum	68.8	62.6	60.7	57.4	77.3	76.4

Table 11. Trophic state index (TSI) values for integrated depth samples collected at of the south and north cells of Ada Hayden Lake, April through September 2018. TSI values were calculated for chlorophyll *a* concentration (TSI(CHL)), Secchi transparency depth (TSI(SD)), and total phosphorus concentration (TSI(TP)).

Date Collected	South Cell TSI(CHL)	North Cell TSI(CHL)	South Cell TSI(SD)	North Cell TSI(SD)	South Cell TSI(TP)	North Cell TSI(TP)
4/5/2018	63.3	67.9	54.2	56.2	63.2	60.6
5/16/2018	44.2	54.1	33.7	49.3	50.6	63.2
6/15/2018	59.5	49.7	65.1	50.0	69.0	60.6
6/28/2018	60.5	53.2	57.4	53.2	65.4	57.3
7/11/2018	69.0	48.2	56.2	48.0	63.2	60.6
7/26/2018	63.6	54.1	57.4	56.2	57.3	53.2
8/8/2018	57.8	55.0	57.4	56.2	53.2	47.3
8/28/2018	51.0	52.2	51.5	51.5	53.2	57.3
9/12/2018	57.8	48.2	57.4	51.5	57.3	53.2
9/27/2018	55.8	51.0	55.2	54.2	57.3	53.2
Average	58.2	53.4	54.5	52.6	59.0	56.6
Minimum	44.2	48.2	33.7	48.0	50.6	47.3
Maximum	69.0	67.9	65.1	56.2	69.0	63.2

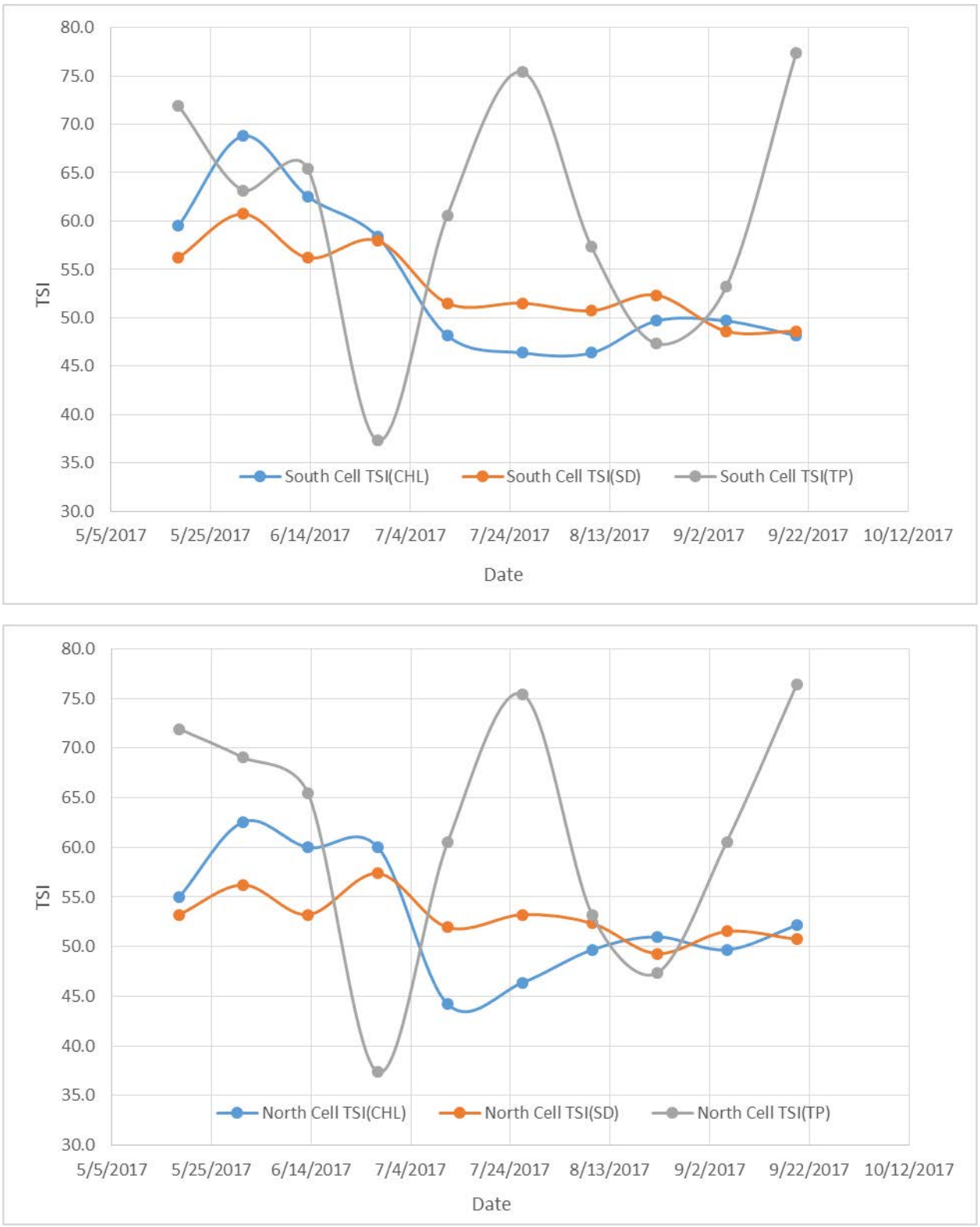


Figure 24. Carlson's trophic state index (TSI) for Secchi disk transparency (TSI(SD)), chlorophyll *a* (TSI(CHL)), and total phosphorus (TSI(TP)) for south and north cells of Ada Hayden Lake from May through September 2017.

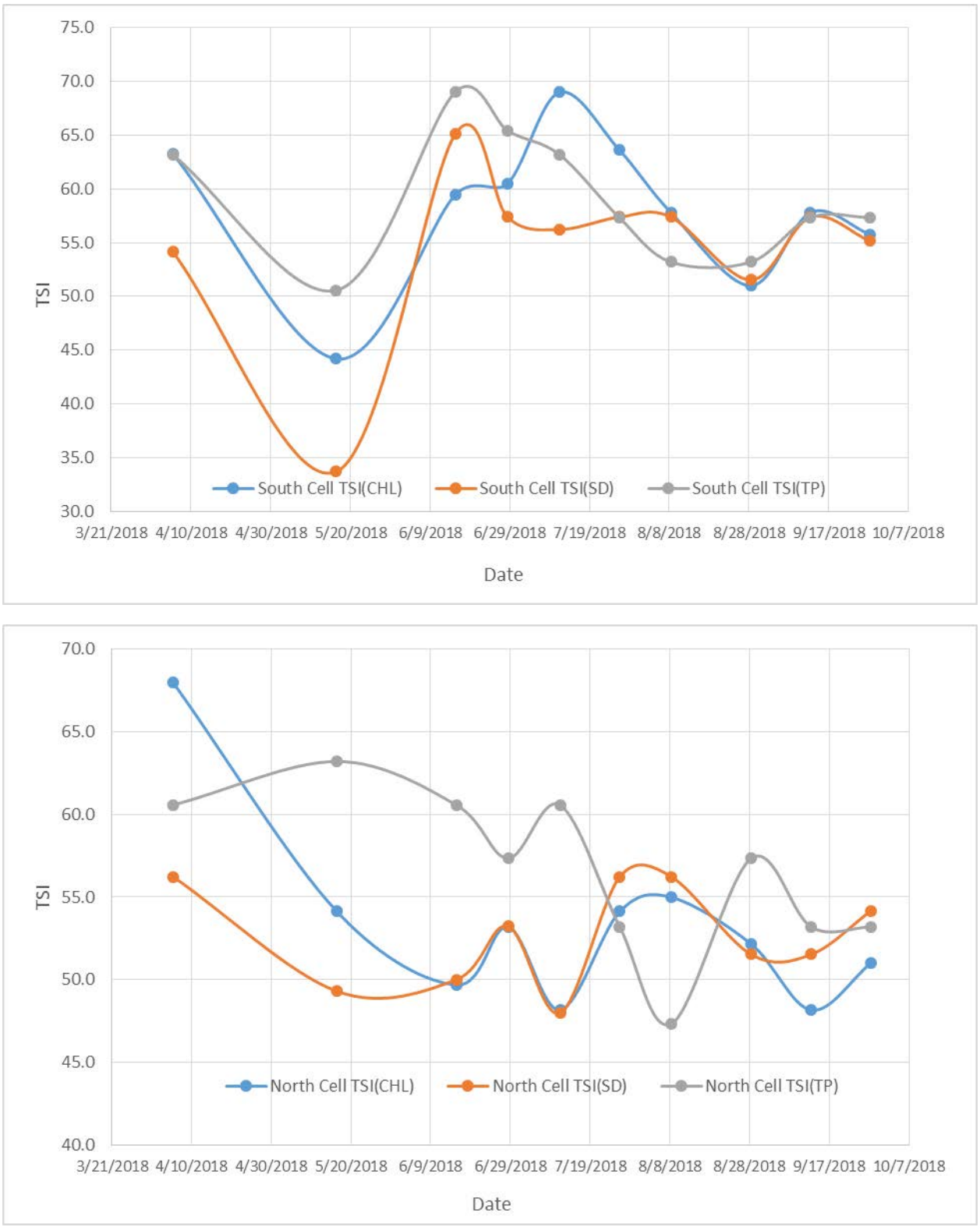


Figure 25. Carlson's Trophic state index (TSI) for Secchi depth transparency (TSI(SD)), chlorophyll *a* (TSI(CHL)), and total phosphorus (TSI(TP)) for south and north cells of Ada Hayden Lake from May through September 2018.

zooplankton density was low on these dates, indicating that the south cell may have been nitrogen limited at those times.

In 2018, a zooplankton grazing effect may have been seen on May 16, 2018, June 15, 2018, June 28, 2018, and July 11, 2018 in the south cell. TSI(TP) was greater than the TSI(SD) and TSI(CHL) on these dates, nitrogen was still available, and zooplankton densities were at their highest levels of the sampling season. TSI(TP) was greater than the TSI(SD) and the TSI(CHL) on August 28, 2018, but since zooplankton density was low and nitrate-nitrite nitrogen was below the quantitation limit, it is possible that the lake was nitrogen limited at that time.

Similar trends were seen in the north cell; TSI(SD) was similar to TSI(CHL) on August 9, 2017 and August 22, 2017, suggesting that light attenuation was due to algae and the north cell was possibly phosphorus limited at that time. During this time, total phosphorus concentration dropped from 0.14 mg/L on July 26, 2017 to 0.03 mg/L on August 9, 2017 and 0.02 mg/L on August 22, 2017. Similar results were found on August 28, 2018, September 12, 2018, and September 27, 2018.

The TSI(TP) was approximately 20 units less than the TSI(CHL) and TSI(SD) on June 27, 2017, suggesting that the north cell was becoming increasingly phosphorus limited. Total phosphorus concentrations had been declining in the north cell since the beginning of the sampling season and declined to less than the quantitation limit on June 27, 2017. On August 8, 2018, the TSI(TP) was approximately 10 units less than the TSI(CHL) and TSI(SD), total phosphorus was 0.02 mg/L, and orthophosphate was <0.02 mg/L, implying the north cell may have been phosphorus limited at that time.

In the north cell, TSI(TP) was higher than TSI(CHL) and TSI(SD) on May 18, 2017, July 26, 2017, September 5, 2017, and September 19, 2017. On May 18, 2017, this difference might have been due to zooplankton grazing since the zooplankton density was high and the nitrate + nitrite nitrogen and TKN were at their second highest concentrations for the season (0.11 mg/L and 0.4 mg/L, respectively). On July 26, 2017, the zooplankton density had declined substantially and the nitrate + nitrite nitrogen concentrations were at the lowest of the season (<0.1 mg/L and 0.2 mg/L, respectively), indicating the north cell may have been nitrogen limited at this time. Although the zooplankton density increased during the later portion of the sampling season, the amount of nitrate + nitrate nitrogen and TKN declined, indicated the north cell was nitrogen limited.

TSI(TP) was higher than the TSI(CHL) and TSI(SD) on May 16, 2018, and June 15, 2018, in the north cell. Zooplankton density was high and nitrate + nitrite nitrogen was less than the quantitation limit on May 16, 2018, indicating that the north cell may have been nitrogen limited at the time. On June 15, 2018, zooplankton density increased and nitrate + nitrite nitrogen was available, suggesting a zooplankton grazing effect.

In both cells, TSI(CHL) was greater than the TSI(SD) during late May and early June of 2017, suggesting that large particulates, such as large blue-green algae, were dominant (Figure 24).

This corresponds with the higher concentrations of chlorophyll *a* and greater amounts of blue-green algae seen in the phytoplankton samples during this period. A similar condition was not observed in 2018.

Differences in water quality between the water entering and leaving the wetlands may help determine if the wetlands help reduce the amount of nutrients and sediment delivered to the lake. Results for the 2017 and 2018 wetland samples were combined and averages were calculated. In addition, the wetland inlet and outlet results were divided into two groups: a post-rainfall group (rainfall event) and an ambient conditions group. The post-rainfall samples were collected during or after rainfall events. Most ambient wetland samples were collected concurrent with the lake samples, which were usually collected during dry weather. Means were calculated for both groups.

The north wetland reduced the total nitrogen concentration of water entering the south cell by 54% overall (Table 6). This reduction was similar during ambient conditions (55%) and after rainfall events (57%). The nitrate + nitrite nitrogen concentration was reduced by 62% overall, 62% after rainfall events and by 74% during ambient conditions.

Low concentrations of ammonia nitrogen were seen in the north wetland outlet samples. Average ammonia nitrogen concentration in the wetland outlet was 0.09 mg/L overall, 0.10 mg/L during ambient conditions, and 0.07 mg/L after rainfall events. Average ammonia nitrogen concentration in the north wetland inlet was less than the detection limit overall and during ambient conditions but increased to 0.10 mg/L after rainfall events. Average unionized ammonia was less than the detection limit during ambient conditions, after rainfall events, and overall.

Total phosphorus concentration was reduced by 28% overall in water discharged from the north wetland outlet. While the concentration of total phosphorus was reduced by only 10% during ambient conditions, total phosphorus was 55% less in the north wetland outlet samples collected after rainfall events. Orthophosphate was 46% less in north wetland outlet samples overall, 33% less during ambient conditions, and 78% less after rainfall events.

The overall average amount of turbidity and TSS were reduced by 25% and 75% in the north wetland outlet samples. After rainfall events turbidity was 71% less in the outlet samples, but turbidity increased by 125% during ambient conditions. While this percent increase is substantial, the average turbidity during ambient conditions of inlet samples was 12 NTU and 15 NTU at the outlet. TSS was 89% less in outlet samples after rainfall events and 57% less during ambient conditions.

The average concentration of total nitrogen was reduced by 67% in the middle wetland outlet samples (Table 7). A similar percent reduction was observed during ambient conditions and after rainfall events. The concentration of nitrate + nitrite nitrogen was 78% to 80% less in the middle wetland outlet. Average ammonia nitrogen concentration and unionized ammonia nitrogen concentration were less than the detection limit during ambient conditions, after rainfall events, and overall.

Average total phosphorus concentration in the middle wetland outlet samples increased slightly during ambient conditions and overall (110% and 123%) and decreased slightly after rainfall events (10%). Average orthophosphate concentration was less in the middle wetland outlet samples than the middle wetland inlet samples collected during ambient conditions, after rainfall events, and overall (25%, 66%, and 33%, respectively).

Water discharged from the middle wetland was more turbid and had more TSS than water flowing into the middle wetland, under most conditions. Turbidity increased by 145% to 288% in the middle wetland outlet samples. Although this percent increase appears large, the average turbidity results were low (range 2.5 NTU to 16 NTU) and the water discharged from the middle wetland was generally clear. The average TSS concentration was also greater during ambient conditions and overall, but concentrations were also low (range 4 mg/L to 17 mg/L).

At the south wetland outlet, average total nitrogen concentration was reduced by 47% during ambient conditions, 63% after rainfall events, and 51% overall (Table 8). Nitrate + nitrite was reduced by 73% to 81% at the middle wetland outlet. The average concentration of ammonia nitrogen was greater in south wetland outlet samples than the south wetland inlet samples during ambient conditions, after rainfall events, and overall. Average ammonia nitrogen in south wetland inlet samples was less than the detection limit under all conditions. Average unionized ammonia nitrogen was less than the detection limit under all conditions.

Average total phosphorus increased in the south wetland outlet samples while the orthophosphate concentration decreased. Average total phosphorus increased by 146% to 200% and orthophosphate concentrations decreased by 40% to 80%. Average orthophosphate was less than the detection limit in the south wetland outlet samples collected during ambient conditions.

Average turbidity and TSS concentrations were greater in samples collected from the south wetland outlet than the south wetland inlet. Overall, average turbidity increased from 2.0 NTU at the inlet to 29 NTU at the outlet; similar increases were seen during ambient conditions and after rainfall events. Average TSS increased from 2 mg/L at the inlet to 55 mg/L overall and similar increases were seen under ambient conditions and after rainfall events. Overall average turbidity and TSS concentrations were greater at the south wetland outlet than the middle or north wetland outlet.

Some of the increases in turbidity and TSS concentrations at the middle and south wetland outlets may be due to an increase in algae production in these wetlands, as reflected by the increased concentration of chlorophyll *a* in wetland outlet samples. The water flowing into the wetlands contained nutrients, which supported algae growth; the algae was discharged from the wetland outlets causing an increase in turbidity, TSS, and chlorophyll *a* concentration. Overall, mean TVSS comprised 45% of the solids at the middle wetland outlet and 35% at the south wetland outlet. Since TVSS is the organic portion of the total suspended solids, this indicates that a large proportion of the solids discharged from the middle and south wetlands may have been algae.

The average amount of *E. coli* discharged from the wetlands was usually less than the amount entering the wetlands; these reductions ranged from 72% to 79% overall. The exception was at

the south wetland outlet after rainfall events, where the average amount of *E. coli* discharged was 172% greater than the amount entering the south wetland. The south wetland discharged more *E coli* after rainfall events than the entered the south wetland (1,485 MPN/100 mL and 864 MPN/100 mL, respectively). The mean *E. coli* at the south wetland outlet after rainfall events (1,485 MPN/100 mL) was also greater than the average amount of *E. coli* observed at any of the outlets during any conditions. At the north and middle wetlands, the mean amount of *E. coli* increased at the inlets and outlets after rainfall events. In contrast, the mean amount of *E. coli* decreased at the south wetland inlet after rainfall events.

The wetland results discussed above do not reflect the total amount of nutrients and solids delivered to the lake over the study period. For example, while the concentration of total nitrogen in outlet samples might be less after rainfall events than during ambient conditions, the total amount of water discharged is likely greater after rainfall events, therefore more total nitrogen is delivered to the lake after rainfall events. While instantaneous discharge was measured when wetland samples were collected, discharge was not measured continuously. Continuous discharge information is needed to calculate the total load of nutrients and solids to the lake. Continuous discharge information could not be obtained because of the limits of this study and physical limitations encountered at the sites. Site morphology, lack of variability in discharge and level during most conditions, and the difficulty in measuring discharge safely during high flow conditions made the calculation of continuous discharge problematic. Any continuous discharge information would have been inaccurate, therefore total loads of nutrients and solids calculated using this data would have also been inaccurate.

The results of the lake outlet analyses demonstrated that the results of the lake outlet samples were similar to the results from the south cell. On several occasions, differences were observed between the lake outlet and south cell samples, notably the amount of *E. coli* in the lake outlet samples being greater than the amount of *E. coli* in the south cell on the same day. Although the lake outlet discharges water from the south cell, the two sampling locations are approximately 1,500 feet apart and the grab samples of the lake outlet could be affected by wildlife, such as waterfowl, near the outlet structure.

In addition to the work performed by the State Hygienic Laboratory during 2017 and 2018, the Iowa State University Limnology Laboratory sampled Ada Hayden Lake from May through September during the years of 2001-2006, 2009, and 2010 (Downing et. al. 2010). The yearly seasonal averages for several parameters were compared to observe any changes over time in each cell (Table 12, Table 13). Determinations of trends were made conservatively because there were a limited number of data points and differences in analytical methods between the two laboratories.

A simple regression was performed for each parameter and an R-squared (R^2) was calculated. R-squared values can be between 0 and 1; the larger the R-squared value the better the regression model fits the observations. While some parameters appeared to trend up or down over time, the R^2 values for most regressions were small, indicating a weak relationship between the parameter and time. One exception was average TVSS in the north cell, which increased over time (R^2 = 0.76). TVSS also appeared to increase over time in the south cell (R^2 = 0.79). Concentrations of

most parameters measured in the lake were not substantially higher or lower but relatively similar to results reported by Iowa State University in previous years (Downing et. al. 2010). Overall, the results of the 2017 and 2018 sampling indicate that Ada Hayden Lake is a “healthy” lake, especially as it relates to nutrient concentrations.

Table 12. Seasonal averages and R-squared (R^2) values for several parameters measured in the north cell of Ada Hayden Lake. Samples were collected from April through September. Results for 2001 through 2010 were collected by the Iowa State University Limnology Laboratory and represent averages for the upper 5 m of the water column (Downing et. al. 2010). Results for 2017 and 2018 were collected by the State Hygienic Laboratory from above the thermocline using a 2 m integrated depth sampler.

Parameter	2001	2002	2003	2004	2005	2006	2009	2010	2017	2018	R^2
Specific Conductivity (umho/cm)	448	448	453	449	439	457	460	400	417	403	0.54
Turbidity (NTU)	-	4.40	2.54	2.90	4.43	7.1	3.2	1.5	1.9	1.5	0.30
Total Phosphorus (µg/L)	28	19	13	20	20	62	20	20	70	40	0.32
Orthophosphate (µg/L)	-	3	1	1	1	37	0.1	0.1	<20	<20	0.02
Ammonia Nitrogen (µg/L)	143	113	95	81	178	372	11	24.7	<50	<50	0.21
Nitrate + Nitrite Nitrogen (mg/L)	0.16	0.19	0.08	0.69	0.24	0.10	0.77	0.1	<0.10	<0.10	0.04
Total Fixed Suspended Solids (mg/L)	1.3	1.5	1.6	1.9	1.6	4.7	-	-	1.1	1.1	0.05
Total Volatile Suspended Solids (mg/L)	1.1	1.5	1.5	1.6	3.0	3.2	-	-	3.9	3.8	0.76
Total Suspended Solids (mg/L)	2.4	2.9	2.5	3.4	3.7	6.9	4.4	3.4	4.4	4.7	0.20
Chlorophyll *a* (µg/L)	9.9	16.2	2.8	9.3	8.5	5.4	-	-	11.8	12.5	0.09
Secchi disk transparency (m)	2.8	2.8	2.3	2.1	2.1	2.4	1.9	2.8	1.7	1.7	0.48

Table 13. Seasonal averages and R-squared (R^2) values for several parameters measured in the south cell of Ada Hayden Lake. Samples were collected from April through September. Results for 2001 through 2010 were collected by the Iowa State University Limnology Laboratory and represent averages for the upper 5 m of the water column (Downing et. al. 2010). Results for 2017 and 2018 were collected by the State Hygienic Laboratory from above the thermocline using a 2 m integrated depth sampler.

Parameter	2001	2002	2003	2004	2005	2006	2009	2010	2017	2018	R^2
Specific Conductivity (umho/cm)	388	395	440	457	409	440	430	400	402	374	0.15
Turbidity (NTU)	-	10.7	3.69	3.65	6.51	3.8	2.65	1.7	2.8	3.2	0.29
Total Phosphorus (µg/L)	29	24	24	23	20	37.1	23	23	70	50	0.60
Orthophosphate (µg/L)	-	4	1	2	2	16.4	0.05	0.1	<20	<20	0.15
Ammonia Nitrogen (µg/L)	155	187	149	109	150	307	8	30.6	80	80	0.23
Nitrate + Nitrite Nitrogen (mg/L)	2.39	2.12	3.11	2.2	0.32	0.1	0.43	0.4	0.13	0.33	0.49
Total Fixed Suspended Solids (mg/L)	1.6	2.3	2.2	1.4	1.7	3.1	-	-	0.7	0.7	0.26
Total Volatile Suspended Solids (mg/L)	1.6	2.9	1.8	1.5	2.7	2.5	-	-	3.9	4.8	0.79
Total Suspended Solids (mg/L)	3.1	4.8	3.8	3	4.2	4.9	5.14	4.7	4.7	6.3	0.52
Chlorophyll *a* (µg/L)	23.2	56.1	8	8.2	12.3	5.7	-	-	14.7	20.4	0.03
Secchi disk transparency (m)	2.4	1.8	1.6	2.2	2.4	2.7	1.9	2.1	1.6	1.8	0.17

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Appendix – Additional Tables and Figures

Table 14. Ammonia nitrogen (mg/L), unionized ammonia (mg/L), nitrate + nitrite nitrogen (NOx-N, mg/L), and total Kjeldahl nitrogen (TKN, mg/L) in depth integrated samples collected from the south and north cells of Ada Hayden Lake, May through September 2017.

Date Collected	South Cell Ammonia N (mg/L)	North Cell Ammonia N (mg/L)	South Cell Unionized Ammonia (mg/L)	North Cell Unionized Ammonia (mg/L)	South Cell NOx-N (mg/L)	North Cell NOx-N (mg/L)	South Cell TKN (mg/L)	North Cell TKN (mg/L)
5/18/2017	<0.05	<0.05	<0.01	<0.01	0.45	0.31	0.4	0.4
5/31/2017	<0.05	<0.05	<0.01	<0.01	0.40	0.11	0.7	0.4
6/13/2017	<0.05	<0.05	<0.01	<0.01	<0.1	<0.1	0.8	0.7
6/27/2017	<0.05	<0.05	<0.01	<0.01	<0.1	<0.1	0.6	0.5
7/11/2017	<0.05	<0.05	<0.01	<0.01	<0.1	<0.1	0.6	0.4
7/26/2017	<0.05	<0.05	<0.01	<0.01	<0.1	<0.1	0.2	0.2
8/9/2017	0.09	<0.05	<0.01	<0.01	<0.1	<0.1	0.4	0.4
8/22/2017	<0.05	<0.05	<0.01	<0.01	<0.1	<0.1	0.5	0.6
9/5/2017	<0.05	<0.05	<0.01	<0.01	<0.1	<0.1	0.5	0.3
9/19/2017	<0.10	<0.05	<0.01	<0.01	<0.1	<0.1	<0.1	<0.1
Average	0.08	<0.05	<0.01	<0.01	0.13	<0.1	0.5	0.4
Minimum	<0.05	<0.05	<0.01	<0.01	<0.1	<0.1	<0.1	<0.1
Maximum	0.09	<0.05	<0.01	<0.01	0.45	0.31	0.8	0.7

Table 15. Total suspended solids (TSS, mg/L), total fixed suspended solids (TFSS, mg/L), total volatile suspended solids (TVSS, mg/L), and total alkalinity (mg/L) in depth integrated samples collected from the south and north cells of Ada Hayden Lake, May through September 2017.

Date Collected	South Cell TSS (mg/L)	North Cell TSS (mg/L)	South Cell TFSS (mg/L)	North Cell TFSS (mg/L)	South Cell TVSS (mg/L)	North Cell TVSS (mg/L)	South Cell Total Alkalinity (mg/L)	North Cell Total Alkalinity (mg/L)
5/18/2017	6	6	1	2	4	4	180	190
5/31/2017	9	6	1	2	8	4	170	190
6/13/2017	7	5	<1	1	6	4	140	170
6/27/2017	5	5	<1	<1	4	5	140	160
7/11/2017	3	4	<1	1	3	3	140	160
7/26/2017	3	3	<1	<1	2	2	140	160
8/9/2017	3	4	<1	<1	3	3	140	160
8/22/2017	4	3	1	<1	3	3	140	160
9/5/2017	4	3	<1	<1	3	3	150	170
9/19/2017	3	5	<1	2	3	3	150	160
Average	4.7	4.4	0.7	1.1	3.9	3.4	149	168
Minimum	3.0	3.0	<1	<1	2.0	2.0	140	160
Maximum	9.0	6.0	1.0	2.0	8.0	5.0	180	190

Table 16. Chlorophyll *a* (mg/L), total phosphorus (mg/L), orthophosphate (mg/L), and *E. coli* (MPN/100 mL) in depth integrated samples collected from the south and north cells of Ada Hayden Lake, May through September 2017. The average *E. coli* per cell was not calculated since it may not provide the true mean because of the non-linear growth rate of bacteria.

Date Collected	South Cell Chlorophyll *a* (µg/L)	North Cell Chlorophyll *a* (µg/L)	South Cell Total Phosphorus (mg/L)	North Cell Total Phosphorus (mg/L)	South Cell Ortho-phosphate (mg/L)	North Cell Ortho-phosphate (mg/L)	South Cell *E. coli* (MPN/100 mL)	North Cell *E. coli* (MPN/100 mL)
5/18/2017	19	12	0.11	0.11	<0.02	<0.02	<10	20
5/31/2017	49	26	0.06	0.09	<0.02	<0.02	<10	<10
6/13/2017	26	20	0.07	0.07	<0.02	<0.02	<10	<10
6/27/2017	17	20	<0.02	<0.02	<0.02	<0.02	<10	<10
7/11/2017	6	4	<0.10	<0.10	<0.02	<0.02	<10	10
7/26/2017	5	5	0.14	0.14	<0.02	<0.02	<10	<10
8/9/2017	5	7	0.04	0.03	<0.02	<0.02	<10	<10
8/22/2017	7	8	0.02	0.02	<0.02	<0.02	31	<10
9/5/2017	7	7	0.03	0.05	<0.02	<0.02	<10	<10
9/19/2017	6	9	0.16	0.15	<0.02	<0.02	<10	<10
Average	14.7	11.8	0.07	0.07	<0.02	<0.02	<10*	<10*
Minimum	5	4	<0.02	<0.02	<0.02	<0.02	<10	<10
Maximum	49	26	0.16	0.15	<0.02	<0.02	31	20

*geometric mean

Table 17. Microcystin (µg/L), cylindrospermopsin (µg/L), anatoxin-a (µg/L), and saxitoxin (µg/L) in depth integrated samples collected from the south and north cells of Ada Hayden Lake, May through September 2017.

Date Collected	South Cell Microcystin (µg/L)	North Cell Microcystin (µg/L)	South Cell Cylindro-spermopsin (µg/L)	North Cell Cylindro-spermopsin (µg/L)	South Cell Anatoxin-a (µg/L)	North Cell Anatoxin-a (µg/L)	South Cell Saxitoxin (µg/L)	North Cell Saxitoxin (µg/L)
5/18/2017	0.18	<0.15	<0.05	<0.05	<0.16	<0.16	<0.022	<0.022
5/31/2017	0.46	<0.15	<0.05	<0.05	<0.16	<0.16	<0.022	<0.022
6/13/2017	<0.15	<0.15	<0.05	<0.05	<0.16	<0.16	<0.022	<0.022
6/27/2017	0.38	<0.15	<0.05	<0.05	<0.16	<0.16	<0.022	<0.022
7/11/2017	<0.15	<0.15	<0.05	<0.05	<0.16	<0.16	<0.022	<0.022
7/26/2017	<0.15	<0.15	<0.05	<0.05	<0.16	<0.16	<0.022	<0.022
8/9/2017	<0.15	<0.15	<0.05	<0.05	<0.16	<0.16	<0.022	<0.022
8/22/2017	<0.15	<0.15	<0.05	<0.05	<0.16	<0.16	<0.022	<0.022
9/5/2017	<0.15	<0.15	<0.05	<0.05	<0.16	<0.16	<0.022	<0.022
9/19/2017	<0.15	<0.15	<0.05	<0.05	-	-	-	-
9/26/2017	-	-	-	-	<0.16	<0.16	<0.022	<0.022
Average	0.15	<0.15	<0.05	<0.05	<0.16	<0.16	<0.022	<0.022
Minimum	0.08	<0.15	<0.05	<0.05	<0.16	<0.16	<0.022	<0.022
Maximum	0.46	<0.15	<0.05	<0.05	<0.16	<0.16	<0.022	<0.022

Table 18. Dissolved oxygen (mg/L), pH (no units), temperature (°C), and turbidity (NTU) measured at the south and north cells of Ada Hayden Lake, May through September 2017. Measurements were made at approximately 0.5 m below the surface.

Date Collected	South Cell Dissolved Oxygen (mg/L)	North Cell Dissolved Oxygen (mg/L)	South Cell pH (no units)	North Cell pH (no units)	South Cell Temperature (°C)	North Cell Temperature (°C)	South Cell Turbidity (NTU)	North Cell Turbidity (NTU)
5/18/2017	11.2	10.0	8.5	8.0	20.1	20.1	4.9	2.7
5/31/2017	13.0	11.8	8.4	7.8	18.5	18.2	10.0	3.9
6/13/2017	10.6	9.8	8.2	8.3	25.8	25.4	5.6	3.3
6/27/2017	9.9	9.9	8.5	8.1	23.1	22.8	3.6	4.1
7/11/2017	9.2	8.5	8.7	8.5	27.5	27.6	<1	<1
7/26/2017	8.4	8.2	8.6	8.5	27.9	27.9	1.8	2.0
8/9/2017	9.0	9.2	8.6	8.5	25.5	25.6	<1	<1
8/22/2017	9.1	8.3	8.5	8.5	24.2	24.1	<1	<1
9/5/2017	8.8	8.2	8.4	8.4	22.6	22.7	<1	<1
9/19/2017	8.7	8.8	8.3	8.4	21.8	22.1	<1	1.1
Average	9.8	9.3	8.5	8.3	23.7	23.7	2.8	1.9
Minimum	8.4	8.2	8.2	7.8	18.5	18.2	<1	<1
Maximum	13.0	11.8	8.7	8.5	27.9	27.9	10.0	4.1

Table 19. Secchi disk transparency (Secchi depth, m), thermocline depth (m), total depth (m), and specific conductivity (umho/cm) measured at the south and north cells of Ada Hayden Lake, May through September 2017. Specific conductivity was measured at approximately 0.5 m below the surface.

Date Collected	South Cell Secchi Depth (m)	North Cell Secchi Depth (m)	South Cell Thermocline Depth (m)	North Cell Thermocline Depth (m)	South Cell Total Depth (m)	North Cell Total Depth (m)	South Cell Specific Conductivity (umho/cm)	North Cell Specific Conductivity (umho/cm)
5/18/2017	1.3	1.6	3.3	3.3	17.2	11.5	440	450
5/31/2017	1.0	1.3	4.5	4.5	17.7	11.0	430	440
6/13/2017	1.3	1.6	2.1	3.3	17.1	11.8	390	410
6/27/2017	1.2	1.2	4.0	4.0	16.7	11.3	390	410
7/11/2017	1.8	1.8	2.5	3.0	17.1	11.2	400	420
7/26/2017	1.8	1.6	3.5	3.5	17.5	11.7	390	400
8/9/2017	1.9	1.7	4.3	4.4	17.5	11.3	390	400
8/22/2017	1.7	2.1	4.5	4.5	17.4	11.5	390	410
9/5/2017	2.2	1.8	5.5	5.5	16.7	11.4	400	420
9/19/2017	2.2	1.9	5.0	5.0	17.3	10.7	400	410
Average	1.6	1.7	3.9	4.1	17.2	11.3	402	417
Minimum	1.0	1.2	2.1	3.0	16.7	10.7	390	400
Maximum	2.2	2.1	5.5	5.5	17.7	11.8	440	450

Table 20. Ammonia nitrogen (mg/L), unionized ammonia (mg/L), nitrate + nitrite nitrogen (NOx-N, mg/L), and total Kjeldahl nitrogen (TKN, mg/L) in depth integrated samples collected at of the south and north cells of Ada Hayden Lake, April through September 2018.

Date Collected	South Cell Ammonia N (mg/L)	North Cell Ammonia N (mg/L)	South Cell Unionized Ammonia (mg/L)	North Cell Unionized Ammonia (mg/L)	South Cell NOx-N (mg/L)	North Cell NOx-N (mg/L)	South Cell TKN (mg/L)	North Cell TKN (mg/L)
4/5/2018	0.42	0.13	<0.01	<0.01	0.11	0.13	1.2	1.0
5/16/2018	0.13	<0.05	<0.01	<0.01	0.21	<0.1	1.5	0.6
6/15/2018	0.08	<0.05	<0.01	<0.01	0.40	0.24	0.9	0.6
6/28/2018	<0.05	<0.05	<0.01	<0.01	1.2	<0.1	0.7	0.6
7/11/2018	<0.05	<0.05	<0.01	<0.01	0.85	<0.1	1.3	0.7
7/26/2018	<0.05	<0.05	<0.01	<0.01	0.28	<0.1	0.8	0.5
8/8/2018	<0.05	<0.05	<0.01	<0.01	<0.1	<0.1	0.5	0.6
8/28/2018	<0.05	<0.05	<0.01	<0.01	<0.1	<0.1	0.6	0.5
9/12/2018	<0.05	<0.05	<0.01	<0.01	<0.1	<0.1	0.5	0.4
9/27/2018	<0.05	<0.05	<0.01	<0.01	<0.1	<0.1	0.6	0.5
Average	0.08	<0.05	<0.01	<0.01	0.33	<0.1	0.9	0.6
Minimum	<0.05	<0.05	<0.01	<0.01	<0.1	<0.1	0.5	0.4
Maximum	0.42	0.13	<0.01	<0.01	1.2	0.24	1.5	1.0

Table 21. Total suspended solids (TSS, mg/L), total fixed suspended solids (TFSS, mg/L), total volatile suspended solids (TVSS, mg/L), and total alkalinity (mg/L) in depth integrated samples collected at of the south and north cells of Ada Hayden Lake, April through September 2018.

Date Collected	South Cell TSS (m)	North Cell TSS (m)	South Cell TFSS (m)	North Cell TFSS (m)	South Cell TVSS (m)	North Cell TVSS (m)	South Cell Total Alkalinity (mg/L)	North Cell Total Alkalinity (mg/L)
4/5/2018	6	9	2	4	4	5	180	200
5/16/2018	2	4	<1	<1	1	4	160	180
6/15/2018	12	4	7	2	5	3	140	160
6/28/2018	6	6	1	1	5	4	140	140
7/11/2018	11	4	1	1	10	3	120	140
7/26/2018	8	4	1	<1	6	4	130	150
8/8/2018	5	5	<1	<1	5	5	120	140
8/28/2018	3	4	<1	<1	3	3	130	140
9/12/2018	6	3	<1	<1	5	3	140	160
9/27/2018	4	4	<1	<1	4	4	150	170
Average	6.3	4.7	1	1	5	4	141	158
Minimum	2	3	<1	<1	1	3	120	140
Maximum	12	9	7	4	10	5	180	200

Table 22. Chlorophyll *a* (mg/L), total phosphorus (mg/L), orthophosphate (mg/L), and *E. coli* (MP/100 mL) in depth integrated samples collected at of the south and north cells of Ada Hayden Lake, April through September 2018.

Date Collected	South Cell Chlorophyll *a* (mg/L)	North Cell Chlorophyll *a* (mg/L)	South Cell Total Phosphorus (mg/L)	North Cell Total Phosphorus (mg/L)	South Cell Ortho-phosphate (mg/L)	North Cell Ortho-phosphate (mg/L)	South Cell *E. coli* (MP/100 mL)	North Cell *E. coli* (MP/100 mL)
4/5/2018	28	45	0.06	0.05	<0.02	<0.02	<10	<10
5/16/2018	4	11	<0.05	0.06	<0.02	<0.02	<10	<10
6/15/2018	19	7	0.09	0.05	<0.02	<0.02	310	52
6/28/2018	21	10	0.07	0.04	<0.02	<0.02	10	10
7/11/2018	50	6	0.06	0.05	<0.02	<0.02	<10	<10
7/26/2018	29	11	0.04	0.03	<0.02	<0.02	<10	<10
8/8/2018	16	12	0.03	0.02	<0.02	<0.02	<10	74
8/28/2018	8	9	0.03	0.04	<0.02	<0.02	<10	<10
9/12/2018	16	6	0.04	0.03	<0.02	<0.02	<10	<10
9/27/2018	13	8	0.04	0.03	<0.02	<0.02	10	10
Average	20.4	12.5	0.05	0.04	<0.02	<0.02	<10*	<10*
Minimum	4	6	0.03	0.02	<0.02	<0.02	<10	<10
Maximum	50	45	0.09	0.06	<0.02	<0.02	310	74

*geometric mean

Table 23. Microcystin (µg/L), cylindrospermopsin (µg/L), anatoxin-a (µg/L), and saxitoxins (µg/L) in depth integrated samples collected at of the south and north cells of Ada Hayden Lake, April through September 2018.

Date Collected	South Cell Microcystin (µg/L)	North Cell Microcystin (µg/L)	South Cell Cylindro-spermopsin (µg/L)	North Cell Cylindro-spermopsin (µg/L)	South Cell Anatoxin-a (µg/L)	North Cell Anatoxin-a (µg/L)	South Cell Saxitoxins (µg/L)	North Cell Saxitoxins (µg/L)
4/5/2018	0.36	0.26	<0.05	<0.05	<0.16	<0.16	<0.022	<0.022
5/16/2018	0.33	0.38	<0.05	<0.05	<0.16	<0.16	<0.022	<0.022
6/15/2018	*	*	*	*	*	*	*	*
6/28/2018	0.25	0.18	<0.05	<0.05	<0.16	<0.16	<0.022	<0.022
7/11/2018	0.26	0.27	<0.05	<0.05	<0.16	<0.16	<0.022	<0.022
7/26/2018	0.38	0.31	<0.05	<0.05	<0.16	<0.16	<0.022	<0.022
8/8/2018	0.26	0.25	<0.05	<0.05	<0.16	<0.16	<0.022	<0.022
8/28/2018	0.15	<0.15	<0.05	<0.05	<0.16	<0.16	<0.022	<0.022
9/12/2018	0.31	0.24	<0.05	<0.05	<0.16	<0.16	<0.022	<0.022
9/27/2018	0.18	0.25	<0.05	<0.05	<0.16	<0.16	<0.022	<0.022
Average	0.28	0.25	<0.05	<0.05	<0.16	<0.16	<0.022	<0.022
Minimum	0.15	<0.15	<0.05	<0.05	<0.16	<0.16	<0.022	<0.022
Maximum	0.38	0.38	<0.05	<0.05	<0.16	<0.16	<0.022	<0.022

*No results due to laboratory accident.

Table 24. Dissolved oxygen (mg/L), pH (no units), temperature (°C), and turbidity (NTU) measured at of the south and north cells of Ada Hayden Lake, May through September 2018. Measurements were made at approximately 0.5 m below the surface.

Date Collected	South Cell Dissolved Oxygen (mg/L)	North Cell Dissolved Oxygen (mg/L)	South Cell pH (no units)	North Cell pH (no units)	South Cell Temperature (°C)	North Cell Temperature (°C)	South Cell Turbidity (NTU)	North Cell Turbidity (NTU)
4/5/2018	13.4	13.2	8.3	8.4	4.5	4.7	2.0	2.5
5/16/2018	9.5	10.7	8.2	8.5	19.1	19.7	<0.1	0.4
6/15/2018	10.3	8.7	8.3	8.1	23.1	23.6	6.8	<1
6/28/2018	13.3	12.5	8.6	8.3	25.4	25.2	2.0	<1
7/11/2018	16.5	10.3	8.6	8.4	28.8	28.7	8.2	*
7/26/2018	10.6	9.4	8.7	8.4	26.3	26.1	6.3	3.3
8/8/2018	10.9	9.9	8.7	8.5	25.9	25.5	1.6	2.0
8/28/2018	8.5	8.2	8.7	8.4	25.3	25.3	1.2	1.2
9/12/2018	11.9	8.2	8.7	8.1	22.7	22.7	1.6	1.2
9/27/2018	7.7	7.0	8.2	7.7	19.7	19.7	2.2	2.2
Average	11.3	9.8	8.5	8.3	22.1	22.1	3.2	1.5
Minimum	7.7	7.0	8.2	7.7	4.5	4.7	<0.1	<1
Maximum	16.5	13.2	8.7	8.5	28.8	28.7	8.2	3.3

*No result due to equipment malfunction.

Table 25. Secchi depth (m), thermocline depth (m), total depth (m), and specific conductivity (umho/cm) measured at of the south and north cells of Ada Hayden Lake, May through September 2018. Specific conductivity was measured at approximately 0.5 m below the surface.

Date Collected	South Cell Secchi Depth (m)	North Cell Secchi Depth (m)	South Cell Thermocline Depth (m)	North Cell Thermocline Depth (m)	South Cell Total Depth (m)	North Cell Total Depth (m)	South Cell Specific Conductivity (umho/cm)	North Cell Specific Conductivity (umho/cm)
4/5/2018	1.5	1.3	none	none	16.0	11.8	470	450
5/16/2018	6.2	2.1	4.0	3.5	17.7	11.4	430	420
6/15/2018	0.7	2.0	6.7	6.0	18.0	12.5	370	410
6/28/2018	1.2	1.6	1.9	3.8	17.1	11.6	370	380
7/11/2018	1.3	2.3	1.0	2.5	17.4	12.0	320	380
7/26/2018	1.2	1.3	3.8	3.5	18.0	12.0	350	390
8/8/2018	1.2	1.3	4.2	4.0	16.0	11.8	320	360
8/28/2018	1.8	1.8	3.5	4.0	18.0	11.5	350	400
9/12/2018	1.2	1.8	6.0	5.5	18.0	12.0	370	410
9/27/2018	1.4	1.5	6.4	6.5	15.2	12.0	390	430
Average	1.8	1.7	4.2	4.4	17.1	11.9	374	403
Minimum	0.7	1.3	1.0	2.5	15.2	11.4	320	360
Maximum	6.2	2.3	6.7	6.5	18.0	12.5	470	450

Table 26. Dissolved oxygen (mg/L), pH (no units), temperature (°C), and specific conductivity (umho/cm) measured at the inlet and outlet of the north wetland, May through October 2017. Samples were not collected if the site was dry (d).

Date Collected	Inlet Dissolved Oxygen (mg/L)	Outlet Dissolved Oxygen (mg/L)	Inlet pH (no units)	Outlet pH (no units)	Inlet Temperature (°C)	Outlet Temperature (°C)	Inlet Specific Conductivity (umho/cm)	Outlet Specific Conductivity (umho/cm)
5/18/2017	9.9	8.0	7.8	8.1	12.6	19.7	710	540
5/21/2017	9.8	10.1	6.9	8.0	11.4	13.2	700	580
5/31/2017	9.8	7.0	7.8	7.4	12.3	18.1	720	600
6/13/2017	9.1	d	8.0	d	16.3	d	770	d
6/27/2017	9.4	d	8.0	d	14.8	d	740	d
7/11/2017	8.3	d	8.0	d	19.0	d	720	d
7/26/2017	7.7	d	7.9	d	20.9	d	760	d
8/9/2017	9.5	d	7.7	d	18.5	d	750	d
8/22/2017	8.5	d	7.8	d	17.8	d	550	d
9/5/2017	d	d	d	d	d	d	d	d
9/19/2017	d	d	d	d	d	d	d	d
10/11/2017	d	d	d	d	d	d	d	d
Average	9.1	8.4	7.8	7.8	16.0	17.0	713	573
Minimum	7.7	7.0	6.9	7.4	11.4	13.2	550	540
Maximum	9.9	10.1	8.0	8.1	20.9	19.7	770	600

Table 27. Turbidity (NTU), flow rate (cfs), *E. coli* (MPN/100mL), and total suspended solids (TSS, mg/L) measured at the inlet and outlet of the north wetland, May through October 2017. Samples were not collected if the site was dry (d). The average *E. coli* per cell was not calculated since it may not provide the true mean because of the non-linear growth rate of bacteria.

Date Collected	Inlet Turbidity (NTU)	Outlet Turbidity (NTU)	Inlet Flow Rate (CFS)	Outlet Flow Rate (CFS)	Inlet *E. coli* (MPN/100mL)	Outlet *E. coli* (MPN/100mL)	Inlet TSS (mg/L)	Outlet TSS (mg/L)
5/18/2017	5.8	7.0	3.8	<1	63	20	17	10
5/21/2017	16.0	6.6	7.9	5.9	74	98	43	7
5/31/2017	3.8	1.6	3.0	<1	780	150	13	3
6/13/2017	3.4	d	1.4	d	590	d	11	d
6/27/2017	2.4	d	1.2	d	1200	d	5	d
7/11/2017	4.6	d	<1	d	990	d	8	d
7/26/2017	2.6	d	<1	d	1700	d	2	d
8/9/2017	24.0	d	<1	d	2400	d	150	d
8/22/2017	25.0	d	<1	d	2800	d	20	d
9/5/2017	d	d	d	d	d	d	d	d
9/19/2017	d	d	d	d	d	d	d	d
10/11/2017	d	d	d	d	d	d	d	d
Average	9.7	5.1	2.1	2.3	675	66	30	7
Minimum	2.4	1.6	<1	<1	63	20	2	3
Maximum	25.0	7.0	7.9	5.9	2800	150	150	10

*geometric mean

Table 28. Ammonia nitrogen (mg/L), unionized ammonia (mg/L), nitrate + nitrite nitrogen (mg/L), and total Kjeldahl nitrogen (mg/L) measured at the inlet and outlet of the north wetland, May through October 2017. Samples were not collected if the site was dry (d).

Date Collected	Inlet Ammonia Nitrogen (mg/L)	Outlet Ammonia Nitrogen (mg/L)	Inlet Unionized Ammonia (mg/L)	Outlet Unionized Ammonia (mg/L)	Inlet Nitrate+Nitrite Nitrogen (mg/L)	Outlet Nitrate+Nitrite Nitrogen (mg/L)	Inlet TKN (mg/L)	Outlet TKN (mg/L)
5/18/2017	<0.05	<0.05	<0.01	<0.01	11	3.7	0.4	0.3
5/21/2017	<0.05	<0.05	<0.01	<0.01	12	6.1	0.4	0.5
5/31/2017	<0.05	<0.05	<0.01	<0.01	13	4.0	0.5	0.4
6/13/2017	<0.05	d	<0.01	d	12	d	0.5	d
6/27/2017	<0.05	d	<0.01	d	8.4	d	0.2	d
7/11/2017	<0.05	d	<0.01	d	8.5	d	0.2	d
7/26/2017	<0.05	d	<0.01	d	5.1	d	0.6	d
8/9/2017	<0.05	d	<0.01	d	3.4	d	0.5	d
8/22/2017	<0.05	d	<0.01	d	1.1	d	0.4	d
9/5/2017	d	d	d	d	d	d	d	d
9/19/2017	d	d	d	d	d	d	d	d
10/11/2017	d	d	d	d	d	d	d	d
Average	<0.05	<0.05	<0.01	<0.01	8.3	4.6	0.4	0.4
Minimum	<0.05	<0.05	<0.01	<0.01	1.1	3.7	0.2	0.3
Maximum	<0.05	<0.05	<0.01	<0.01	13.0	6.1	0.6	0.5

Table 29. Total phosphorus (mg/L) and orthophosphate (mg/L) measured at the inlet and outlet of the north wetland, May through October 2017. Total phosphorus and orthophosphate analyses were not added until July 2017. Samples were not collected if the site was dry (d).

Date Collected	Inlet Total Phosphorus (mg/L)	Outlet Total Phosphorus (mg/L)	Inlet Orthophosphate (mg/L)	Outlet Orthophosphate (mg/L)
5/18/2017	-	-	-	-
5/21/2017	-	-	-	-
5/31/2017	-	-	-	-
6/13/2017	-	-	-	-
6/27/2017	-	-	-	-
7/11/2017	0.17	d	0.08	d
7/26/2017	0.21	d	0.16	d
8/9/2017	0.23	d	0.11	d
8/22/2017	0.26	d	0.14	d
9/5/2017	d	d	d	d
9/19/2017	d	d	d	d
10/11/2017	d	d	d	d
Average	0.22	d	0.12	d
Minimum	0.17	d	0.08	d
Maximum	0.26	d	0.16	d

Table 30. Dissolved oxygen (mg/L), pH (no units), temperature (°C), and specific conductivity (umho/cm) measured at the inlet and outlet of the north wetland, April through September 2018. Samples were not collected if the site was dry (d).

Date Collected	Inlet Dissolved Oxygen (mg/L)	Outlet Dissolved Oxygen (mg/L)	Inlet pH (no units)	Outlet pH (no units)	Inlet Temperature (°C)	Outlet Temperature (°C)	Inlet Specific Conductivity (umho/cm)	Outlet Specific Conductivity (umho/cm)
4/5/2018	14.3	d	7.6	d	4.2	d	690	d
5/16/2018	11.7	7.0	8.0	7.5	12.4	20.2	710	520
6/7/2018	7.8	5.9	7.2	7.3	17.5	21.2	510	430
6/12/2018	8.0	7.5	7.2	7.8	17.4	24.7	680	400
6/15/2018	7.3	5.7	7.3	7.6	19.4	22.6	410	250
6/28/2018	7.7	8.6	7.5	7.6	21.7	24.4	620	510
7/5/2018	6.9	7.6	7.0	7.7	22.3	26.8	480	420
7/11/2018	7.3	4.7	6.8	7.0	21.0	26.9	710	510
7/26/2018	8.4	d	7.8	d	20.5	d	660	d
8/8/2018	8.2	d	7.7	d	19.4	d	660	d
8/21/2018	8.1	d	8.0	d	20.8	d	730	d
8/28/2018	7.5	4.8	7.2	6.3	19.7	23.0	570	370
9/3/2018	8.8	7.0	7.4	7.7	17.8	21.2	690	560
9/12/2018	8.9	7.1	7.9	7.7	16.5	16.4	750	540
9/27/2018	14.3	d	7.6	d	4.2	d	690	d
Average	8.6	6.6	7.5	7.4	17.9	22.7	634	451
Minimum	6.9	4.7	6.8	6.3	4.2	16.4	410	250
Maximum	14.3	8.6	8.0	7.8	22.3	26.9	750	560

Table 31. Turbidity (NTU), flow rate (cfs), and *E. coli* (MP/100mL) measured at the inlet and outlet of the north wetland, April through September 2018. Samples were not collected if the site was dry (d).

Date Collected	Inlet Turbidity (NTU)	Outlet Turbidity (NTU)	Inlet Flow Rate (CFS)	Outlet Flow Rate (CFS)	Inlet *E. coli* (MP/100mL)	Outlet *E. coli* (MP/100mL)
4/5/2018	<1.0	d	1.2	d	740	d
5/16/2018	1.8	0.3	1.1	<1	86	20
6/7/2018	110	46	12	<1	2800	7700
6/12/2018	17	1.6	3.5	1.2	760	180
6/15/2018	75	79	18	*	1100	980
6/28/2018	20	5.9	7.4	7.6	200	110
7/5/2018	69	4.4	22	*	3300	620
7/11/2018	5.7	5.5	3.4	1.9	490	130
7/26/2018	4.7	d	1.3	d	7300	d
8/8/2018	11	d	1.9	d	1200	d
8/21/2018	<1	d	<1	d	550	d
8/28/2018	44	17	15	3.1	2200	790
9/3/2018	8.6	9.9	3.2	<1	600	75
9/12/2018	11	13	4.5	4.7	320	10
9/27/2018	<1.0	d	1.2	d	740	d
Average	27	18	6.8	2.5	847**	207**
Minimum	<1.0	0.3	<1	<1	86	10
Maximum	110	79	22	7.6	7300	7700

*Flow not measured because of high water level. **Geometric mean.

Table 32. Ammonia nitrogen (mg/L), unionized ammonia (mg/L), nitrate + nitrite nitrogen (mg/L), and total Kjeldahl nitrogen (mg/L) measured at the inlet and outlet of the north wetland, April through September 2018. Samples were not collected if the site was dry (d).

Date Collected	Inlet Ammonia Nitrogen (mg/L)	Outlet Ammonia Nitrogen (mg/L)	Inlet Unionized Ammonia (mg/L)	Outlet Unionized Ammonia (mg/L)	Inlet Nitrate+Nitrite Nitrogen (mg/L)	Outlet Nitrate+Nitrite Nitrogen (mg/L)	Inlet TKN (mg/L)	Outlet TKN (mg/L)
4/5/2018	<0.05	d	<0.01	d	6.7	d	0.6	d
5/16/2018	<0.05	<0.05	<0.01	<0.01	13	0.17	0.3	0.6
6/7/2018	0.36	0.2	<0.01	<0.01	14	4.8	1.9	1.4
6/12/2018	0.06	0.09	<0.01	<0.01	14	3.2	0.8	0.9
6/15/2018	0.08	0.5	<0.01	0.01	8.1	3.3	1.2	1.8
6/28/2018	<0.05	<0.05	<0.01	<0.01	10	6.2	1.0	1.1
7/5/2018	<0.05	<0.05	<0.01	<0.01	6.6	4.3	1.3	1.0
7/11/2018	<0.05	0.12	<0.01	<0.01	9.5	2.4	1.1	1.3
7/26/2018	<0.05	d	<0.01	d	4.4	d	1.1	d
8/8/2018	<0.05	d	<0.01	d	5.3	d	0.9	d
8/21/2018	<0.05	d	<0.01	d	5.9	d	0.7	d
8/28/2018	<0.05	<0.05	<0.01	<0.01	5.9	1.4	0.8	1.4
9/3/2018	<0.05	<0.05	<0.01	<0.01	6.5	1.6	0.6	1.3
9/12/2018	<0.05	<0.05	<0.01	<0.01	7.8	0.94	0.5	1.5
9/27/2018	<0.05	d	<0.01	d	6.7	d	0.6	d
Average	0.06	0.11	<0.01	<0.01	8.4	2.8	0.9	1.2
Minimum	<0.05	<0.05	<0.01	<0.01	4.4	0.2	0.3	0.6
Maximum	0.36	0.5	<0.01	<0.01	14	6.2	1.9	1.8

Table 33. Total phosphorus (mg/L), orthophosphate (mg/L), total volatile suspended solids (TVSS, mg/L), and total suspended solids (TSS, mg/L) measured at the inlet and outlet of the north wetland, April through September 2018. Samples were not collected if the site was dry (d).

Date Collected	Inlet Total Phosphorus (mg/L)	Outlet Total Phosphorus (mg/L)	Inlet Ortho-phosphate (mg/L)	Outlet Ortho-phosphate (mg/L)	Inlet TVSS (mg/L)	Outlet TVSS (mg/L)	Inlet TSS (mg/L)	Outlet TSS (mg/L)
4/5/2018	0.08	d	0.05	d	2	d	3	d
5/16/2018	0.08	0.23	0.04	0.19	2	1	5	<1
6/7/2018	0.56	0.24	0.26	0.08	56	13	280	37
6/12/2018	0.23	0.13	0.11	0.02	7	2	46	2
6/15/2018	0.38	0.32	0.18	0.17	32	10	210	40
6/28/2018	0.27	0.12	0.18	0.05	9	4	45	10
7/5/2018	0.40	0.10	0.16	0.03	35	4	240	8
7/11/2018	0.32	0.15	0.21	0.06	4	4	18	9
7/26/2018	0.24	d	0.17	d	3	d	6	d
8/8/2018	0.17	d	0.1	d	5	d	15	d
8/21/2018	0.18	d	0.1	d	3	d	11	d
8/28/2018	0.34	0.19	0.17	0.04	16	9	98	22
9/3/2018	0.14	0.14	0.09	<0.02	8	12	23	18
9/12/2018	0.21	0.16	0.07	0.02	4	11	22	21
9/27/2018	0.08	d	0.05	d	2	d	3	d
Average	0.26	0.18	0.14	0.07	13	7	73	17
Minimum	0.08	0.10	0.04	<0.02	2	1	3	<1
Maximum	0.56	0.32	0.26	0.19	56	13	280	40

Table 34. Dissolved oxygen (mg/L), pH (no units), temperature (°C), and specific conductivity (umho/cm) measured at the inlet and outlet of the middle wetland, May through October 2017. Samples were not collected if the site was dry (d).

Date Collected	Inlet Dissolved Oxygen (mg/L)	Outlet Dissolved Oxygen (mg/L)	Inlet pH (no units)	Outlet pH (no units)	Inlet Temperature (°C)	Outlet Temperature (°C)	Inlet Specific Conductivity (umho/cm)	Outlet Specific Conductivity (umho/cm)
5/18/2017	9.3	9.4	7.9	8.3	15.0	20.4	580	460
5/21/2017	9.8	10.3	7.6	8.1	12.7	14.5	610	420
5/31/2017	9.4	8.3	7.7	8.0	15.9	20.8	690	480
6/13/2017	8.8	d	7.2	d	20.2	d	770	d
6/27/2017	9.6	d	8.0	d	14.6	d	700	d
7/11/2017	8.6	d	8.1	d	19.1	d	750	d
7/26/2017	7.8	d	8.0	d	21.1	d	760	d
8/9/2017	d	d	d	d	d	d	d	d
8/22/2017	8.3	d	7.7	d	20.9	d	400	d
9/5/2017	d	d	d	d	d	d	d	d
9/19/2017	d	d	d	d	d	d	d	d
10/11/2017	9.2	8.9	7.3	7.8	15.0	12.4	550	300
Average	9.0	9.2	7.7	8.1	17.2	17.0	646	415
Minimum	7.8	8.3	7.2	7.8	12.7	12.4	400	300
Maximum	9.8	10.3	8.1	8.3	21.1	20.8	770	480

Table 35. Turbidity (NTU), flow rate (cfs), *E. coli* (MPN/100mL), and total suspended solids (TSS, mg/L) measured at the inlet and outlet of the middle wetland, May through October 2017. Samples were not collected if the site was dry (d).

Date Collected	Inlet Turbidity (NTU)	Outlet Turbidity (NTU)	Inlet Flow Rate (CFS)	Outlet Flow Rate (CFS)	Inlet *E. coli* (MPN/100mL)	Outlet *E. coli* (MPN/100mL)	Inlet TSS (mg/L)	Outlet TSS (mg/L)
5/18/2017	6.4	13	<1	<1	370	210	3	15
5/21/2017	2.5	9.9	1.6	<1	260	170	5	13
5/31/2017	<1	6.5	<1	<1	97	20	2	9
6/13/2017	1.8	d	<1	d	1700	d	1	d
6/27/2017	<1	d	<1	d	730	d	1	d
7/11/2017	1.4	d	<1	d	900	d	1	d
7/26/2017	3.7	d	<1	d	4100	d	9	d
8/9/2017	d	d	d	d	d	d	d	d
8/22/2017	4.0	d	<1	d	3100	d	5	d
9/5/2017	d	d	d	d	d	d	d	d
9/19/2017	d	d	d	d	d	d	d	d
10/11/2017	2.0	11.6	<1	<1	2100	2200	<0.1	16
Average	2.5	10.3	0.6	<1	867*	199*	3.1	13.3
Minimum	<1	6.5	<1	<1	97	20	<0.1	9
Maximum	6.4	13	1.6	<1	4100	2200	9	16

*Geometric mean

Table 36. Ammonia nitrogen (mg/L), unionized ammonia (mg/L), nitrate + nitrite nitrogen (mg/L), and total Kjeldahl nitrogen (mg/L) measured at the inlet and outlet of the middle wetland, May through October 2017. Samples were not collected if the site was dry (d).

Date Collected	Inlet Ammonia Nitrogen (mg/L)	Outlet Ammonia Nitrogen (mg/L)	Inlet Unionized Ammonia (mg/L)	Outlet Unionized Ammonia (mg/L)	Inlet Nitrate+Nitrite Nitrogen (mg/L)	Outlet Nitrate+Nitrite Nitrogen (mg/L)	Inlet TKN (mg/L)	Outlet TKN (mg/L)
5/18/2017	<0.05	<0.05	<0.01	<0.01	4.0	1.9	0.4	0.3
5/21/2017	<0.05	0.09	<0.01	<0.01	4.5	1.8	0.4	0.7
5/31/2017	<0.05	<0.05	<0.01	<0.01	5.7	2.2	0.4	0.5
6/13/2017	<0.05	d	<0.01	d	7.3	d	0.5	d
6/27/2017	<0.05	d	<0.01	d	7.6	d	0.1	d
7/11/2017	<0.05	d	<0.01	d	7.5	d	0.3	d
7/26/2017	<0.05	d	<0.01	d	5.4	d	0.4	d
8/9/2017	d	d	d	d	d	d	d	d
8/22/2017	<0.05	d	<0.01	d	0.55	d	0.5	d
9/5/2017	d	d	d	d	d	d	d	d
9/19/2017	d	d	d	d	d	d	d	d
10/11/2017	<0.05	<0.05	<0.01	<0.01	4.2	0.7	0.3	1.0
Average	<0.05	<0.05	<0.01	<0.01	5.2	1.7	0.4	0.6
Minimum	<0.05	<0.05	<0.01	<0.01	0.55	0.7	0.1	0.3
Maximum	<0.05	0.09	<0.01	<0.01	7.6	2.2	0.5	1.0

Table 37. Total phosphorus (mg/L) and orthophosphate (mg/L) measured at the inlet and outlet of the middle wetland, May through October 2017. Total phosphorus and orthophosphate analyses were not added until July 2017. Samples were not collected if the site was dry (d).

Date Collected	Inlet Total Phosphorus (mg/L)	Outlet Total Phosphorus (mg/L)	Inlet Orthophosphate (mg/L)	Outlet Orthophosphate (mg/L)
5/18/2017	-	-	-	-
5/21/2017	-	-	-	-
5/31/2017	-	-	-	-
6/13/2017	-	-	-	-
6/27/2017	-	-	-	-
7/11/2017	0.11	d	0.04	d
7/26/2017	0.16	d	0.05	d
8/9/2017	d	d	d	d
8/22/2017	0.17	d	0.03	d
9/5/2017	d	d	d	d
9/19/2017	d	d	d	d
10/11/2017	0.13	0.16	0.04	0.02
Average	0.14	-	0.04	0.02
Minimum	0.11	0.16	0.03	0.02
Maximum	0.17	0.16	0.05	0.02

Table 38. Dissolved oxygen (mg/L), pH (no units), temperature (°C), and specific conductivity (umho/cm) measured at the inlet and outlet of the middle wetland, April through September 2018. Samples were not collected if the site was dry (d).

Date Collected	Inlet Dissolved Oxygen (mg/L)	Outlet Dissolved Oxygen (mg/L)	Inlet pH (no units)	Outlet pH (no units)	Inlet Temperature (°C)	Outlet Temperature (°C)	Inlet Specific Conductivity (umho/cm)	Outlet Specific Conductivity (umho/cm)
4/5/2018	11.9	15.2	7.4	8.5	6.9	5.4	750	560
5/16/2018	12.9	7.8	7.7	7.9	12.9	22.1	780	440
6/7/2018	8.2	6.7	7.4	7.3	18.6	22.7	500	380
6/12/2018	7.9	6.6	7.2	7.6	19.2	23.6	570	340
6/15/2018	8.2	5.7	7.6	7.4	20.4	24.9	460	280
6/28/2018	7.7	7.2	7.5	7.6	21.8	24.0	650	400
7/5/2018	8.0	7.8	7.5	7.7	24.0	26.4	380	210
7/11/2018	7.7	2.8	6.8	7.2	20.4	25.7	780	360
7/26/2018	8.2	d	7.6	d	21.5	d	520	d
8/8/2018	8.1	5.2	7.7	7.6	21.5	23.7	530	330
8/21/2018	8.1	4.5	7.7	7.6	20.7	21.8	530	340
8/28/2018	8.1	d	8.2	d	20.9	d	750	d
9/3/2018	8.1	4.7	6.2	6.3	21.5	22.6	440	140
9/12/2018	9.1	3.5	7.7	7.3	18.9	20.9	750	460
9/27/2018	8.9	7.2	7.9	7.5	17.7	16.3	670	450
Average	8.7	6.5	7.5	7.5	19.1	21.5	604	361
Minimum	7.7	2.8	6.2	6.3	6.9	5.4	380	140
Maximum	12.9	15.2	8.2	8.5	24.0	26.4	780	560

Table 39. Turbidity (NTU), flow rate (cfs), and *E. coli* (MP/100mL) measured at the inlet and outlet of the middle wetland, April through September 2018. Samples were not collected if the site was dry (d).

Date Collected	Inlet Turbidity (NTU)	Outlet Turbidity (NTU)	Inlet Flow Rate (CFS)	Outlet Flow Rate (CFS)	Inlet *E. coli* (MP/100mL)	Outlet *E. coli* (MP/100mL)
4/5/2018	<1	2.9	<1	<1	52	<10
5/16/2018	<1	3	<1	<1	160	52
6/7/2018	28	28	1.3	<1	2100	1400
6/12/2018	5.2	2.2	<1	<1	1600	41
6/15/2018	12	33	3.1	*	1600	2600
6/28/2018	2.1	<1	1.1	6	660	41
7/5/2018	26	37	4.6	*	8200	8700
7/11/2018	<1	<1	0.4	<1	830	86
7/26/2018	4.2	d	<1	d	6100	d
8/8/2018	2.4	3.3	<1	1.5	600	84
8/21/2018	5.1	3.9	1	1.6	990	74
8/28/2018	<1	d	<1	d	<10	d
9/3/2018	10	16	4.2	4	3300	2500
9/12/2018	<1	4.2	<1	<1	250	130
9/27/2018	1.4	4.9	<1	2	630	110
Average	7	10.7	1.3	1.6	658**	183**
Minimum	<1	<1	<1	<1	<10	<10
Maximum	28	37	4.6	6.0	8200	8700

*Flow not measured due to high water level. **Geometric mean.

Table 40. Ammonia nitrogen (mg/L), unionized ammonia (mg/L), nitrate + nitrite nitrogen (mg/L), and total Kjeldahl nitrogen (mg/L) measured at the inlet and outlet of the middle wetland, April through September 2018. Samples were not collected if the site was dry (d).

Date Collected	Inlet Ammonia Nitrogen (mg/L)	Outlet Ammonia Nitrogen (mg/L)	Inlet Unionized Ammonia (mg/L)	Outlet Unionized Ammonia (mg/L)	Inlet Nitrate+Nitrite Nitrogen (mg/L)	Outlet Nitrate+Nitrite Nitrogen (mg/L)	Inlet TKN (mg/L)	Outlet TKN (mg/L)
4/5/2018	<0.05	<0.05	<0.01	<0.01	4.1	0.98	0.4	1.0
5/16/2018	<0.05	<0.05	<0.01	<0.01	6.0	0.64	0.5	0.6
6/7/2018	0.10	0.06	<0.01	<0.01	4.9	0.59	1.2	1.0
6/12/2018	<0.05	<0.05	<0.01	<0.01	6.1	0.42	0.6	0.6
6/15/2018	<0.05	0.14	<0.01	<0.01	3.5	1.3	0.8	1.0
6/28/2018	<0.05	<0.05	<0.01	<0.01	5.0	1.4	0.5	0.7
7/5/2018	<0.05	<0.05	<0.01	<0.01	1.7	1.1	0.9	0.9
7/11/2018	<0.05	<0.05	<0.01	<0.01	5.7	0.38	0.5	0.6
7/26/2018	<0.05	d	<0.01	d	2.4	d	0.8	d
8/8/2018	<0.05	<0.05	<0.01	<0.01	2.3	<0.1	0.3	0.8
8/21/2018	<0.05	<0.05	<0.01	<0.01	2.2	0.14	0.5	0.5
8/28/2018	<0.05	d	<0.01	d	3.3	d	0.4	d
9/3/2018	<0.05	<0.05	<0.01	<0.01	1.9	0.58	0.7	0.7
9/12/2018	<0.05	<0.05	<0.01	<0.01	4.6	0.17	0.1	0.6
9/27/2018	<0.05	<0.05	<0.01	<0.01	4.1	0.90	0.4	0.5
Average	<0.05	<0.05	<0.01	<0.01	3.9	0.67	0.6	0.7
Minimum	<0.05	<0.05	<0.01	<0.01	1.7	<0.1	0.1	0.5
Maximum	0.10	0.14	<0.01	<0.01	6.1	1.4	1.2	1.0

Table 41. Total phosphorus (mg/L), orthophosphate (mg/L), total volatile suspended solids (TVSS, mg/L), and total suspended solids (TSS, mg/L) measured at the inlet and outlet of the middle wetland, May through October 2018. Samples were not collected if the site was dry (d).

Date Collected	Inlet Total Phosphorus (mg/L)	Outlet Total Phosphorus (mg/L)	Inlet Ortho-phosphate (mg/L)	Outlet Ortho-phosphate (mg/L)	Inlet TVSS (mg/L)	Outlet TVSS (mg/L)	Inlet TSS (mg/L)	Outlet TSS (mg/L)
4/5/2018	0.04	0.08	0.03	<0.02	1	6	<1	8
5/16/2018	0.07	0.08	0.03	0.02	1	2	2	3
6/7/2018	0.38	0.16	0.26	<0.02	8	8	38	26
6/12/2018	0.18	0.14	0.08	<0.02	4	4	11	5
6/15/2018	0.21	0.20	0.13	0.09	6	11	23	31
6/28/2018	0.08	0.09	0.04	0.02	2	4	3	4
7/5/2018	0.16	0.28	0.05	0.12	8	10	41	30
7/11/2018	0.08	0.16	0.04	0.05	2	3	2	3
7/26/2018	0.12	d	0.03	d	4	d	5	d
8/8/2018	0.10	0.16	0.04	<0.02	3	8	3	10
8/21/2018	0.12	0.12	0.04	<0.02	2	3	9	5
8/28/2018	0.04	d	0.03	d	2	d	1	d
9/3/2018	0.20	0.22	0.08	0.08	4	5	15	16
9/12/2018	0.05	0.07	0.04	0.03	1	3	2	4
9/27/2018	0.11	0.04	0.04	<0.02	2	3	2	6
Average	0.13	0.14	0.06	0.04	3.3	5.4	11	11.6
Minimum	0.04	0.04	0.03	<0.02	1	2	<1	3
Maximum	0.38	0.28	0.26	0.12	8	11	41	31

Table 42. Dissolved oxygen (mg/L), pH (no units), temperature (°C), and specific conductivity (umho/cm) measured at the inlet and outlet of the south wetland, May through October 2017. Samples were not collected if the site was dry (d).

Date Collected	Inlet Dissolved Oxygen (mg/L)	Outlet Dissolved Oxygen (mg/L)	Inlet pH (no units)	Outlet pH (no units)	Inlet Temperature (°C)	Outlet Temperature (°C)	Inlet Specific Conductivity (umho/cm)	Outlet Specific Conductivity (umho/cm)
5/18/2017	9.5	9.6	8.0	8.2	14.6	19.5	870	500
5/21/2017	9.4	10.9	7.9	8.3	12.5	14.2	880	380
5/31/2017	9.5	11.8	8.0	8.1	13.3	21.1	930	550
6/13/2017	7.9	5.7	8.1	7.5	19.5	28.5	1000	650
6/27/2017	8.4	d	8.0	d	14.9	d	810	d
7/11/2017	7.4	d	8.1	d	21.0	d	880	d
7/26/2017	7.6	d	8.1	d	21.8	d	940	d
8/9/2017	8.5	d	8.1	d	19.5	d	800	d
8/22/2017	8.1	4.9	7.8	8.0	19.1	22.2	600	200
9/5/2017	d	d	d	d	d	d	d	d
9/19/2017	8.3	7.1	7.7	7.4	18.5	20.1	560	270
10/11/2017	9.9	8.0	8.0	7.2	13.6	12.3	800	230
Average	8.6	8.3	8.0	7.8	17.1	19.7	825	397
Minimum	7.4	4.9	7.7	7.2	12.5	12.3	560	200
Maximum	9.9	11.8	8.1	8.3	21.8	28.5	1000	650

Table 43. Turbidity (NTU), flow rate (cfs), *E. coli* (MPN/100mL), and total suspended solids (TSS, mg/L) measured at the inlet and outlet of the south wetland, May through October 2017. Samples were not collected if the site was dry (d). The average *E. coli* per cell was not calculated since it may not provide the true mean because of the non-linear growth rate of bacteria.

Date Collected	Inlet Turbidity (NTU)	Outlet Turbidity (NTU)	Inlet Flow Rate (CFS)	Outlet Flow Rate (CFS)	Inlet *E. coli* (MPN/100mL)	Outlet *E. coli* (MPN/100mL)	Inlet TSS (mg/L)	Outlet TSS (mg/L)
5/18/2017	3.4	19	<1	<1	390	150	2	29
5/21/2017	15	19	1.3	1.4	340	220	2	20
5/31/2017	<1	12	<1	<1	860	41	1	17
6/13/2017	0.5	11	<1	<1	1800	10	2	17
6/27/2017	<1	d	<1	d	880	d	<1	d
7/11/2017	<1	d	<1	d	4400	d	<1	d
7/26/2017	<1	d	<1	d	3400	d	1	d
8/9/2017	<1	d	<1	d	2000	d	6	d
8/22/2017	1.0	44	<1	<1	1100	700	1	70
9/5/2017	d	d	d	d	d	d	d	d
9/19/2017	<1	31	<1	<1	8200	560	2	50
10/11/2017	<1	22	<1	<1	530	2000	4	42
Average	2.3	22.6	<1	<1	1344*	195*	2	35
Minimum	<1	11	<1	<1	340	10	<1	17
Maximum	15	44	1.4	1.4	8200	2000	6	70

*Geometric mean.

Table 44. Ammonia nitrogen (mg/L), unionized ammonia (mg/L), nitrate + nitrite nitrogen (mg/L), and total Kjeldahl nitrogen (mg/L) measured at the inlet and outlet of the south wetland, May through October 2017. Samples were not collected if the site was dry (d).

Date Collected	Inlet Ammonia Nitrogen (mg/L)	Outlet Ammonia Nitrogen (mg/L)	Inlet Unionized Ammonia (mg/L)	Outlet Unionized Ammonia (mg/L)	Inlet Nitrate+Nitrite Nitrogen (mg/L)	Outlet Nitrate+Nitrite Nitrogen (mg/L)	Inlet TKN (mg/L)	Outlet TKN (mg/L)
5/18/2017	<0.05	<0.05	<0.01	<0.01	3.4	0.88	<0.1	0.5
5/21/2017	<0.05	0.08	<0.01	<0.01	4.0	1.1	0.2	0.4
5/31/2017	<0.05	<0.05	<0.01	<0.01	3.9	1	0.2	0.6
6/13/2017	<0.05	<0.05	<0.01	<0.01	3.2	<0.1	0.4	1.6
6/27/2017	<0.05	d	<0.01	d	1.9	d	0.2	d
7/11/2017	<0.05	d	<0.01	d	1.5	d	0.2	d
7/26/2017	<0.05	d	<0.01	d	2.6	d	0.4	d
8/9/2017	<0.05	d	<0.01	d	1.2	d	0.2	d
8/22/2017	<0.05	0.08	<0.01	<0.01	2.8	<0.1	0.3	1
9/5/2017	d	d	d	d	d	d	d	d
9/19/2017	<0.05	<0.05	<0.01	<0.01	0.73	<0.1	0.5	1.2
10/11/2017	<0.05	0.14	<0.01	<0.01	2.6	0.90	0.7	0.9
Average	<0.05	0.06	<0.01	<0.01	2.5	0.6	0.3	0.9
Minimum	<0.05	<0.05	<0.01	<0.01	0.73	<0.1	<0.1	0.4
Maximum	<0.05	0.14	<0.01	<0.01	4.0	1.1	0.7	1.6

Table 45. Total phosphorus (mg/L) and orthophosphate (mg/L) measured at the inlet and outlet of the south wetland, May through October 2017. Total phosphorus and orthophosphate analyses were not added until July 2017. Samples were not collected if the site was dry (d).

Date Collected	Inlet Total Phosphorus (mg/L)	Outlet Total Phosphorus (mg/L)	Inlet Orthophosphate (mg/L)	Outlet Orthophosphate (mg/L)
5/18/2017	-	-	-	-
5/21/2017	-	-	-	-
5/31/2017	-	-	-	-
6/13/2017	-	-	-	-
6/27/2017	-	-	-	-
7/11/2017	0.22	0.10	0.10	d
7/26/2017	0.13	0.07	0.07	d
8/9/2017	0.12	0.06	0.06	d
8/22/2017	0.11	0.05	0.05	<0.02
9/5/2017	d	d	d	d
9/19/2017	<0.1	0.04	0.04	<0.02
10/11/2017	0.12	0.04	0.04	<0.02
Average	0.13	0.06	0.06	<0.02
Minimum	<0.1	0.04	0.04	<0.02
Maximum	0.22	0.10	0.10	<0.02

Table 46. Dissolved oxygen (mg/L), pH (no units), temperature (°C), and specific conductivity (umho/cm) measured at the inlet and outlet of the south wetland, April through September 2018.

Date Collected	Inlet Dissolved Oxygen (mg/L)	Outlet Dissolved Oxygen (mg/L)	Inlet pH (no units)	Outlet pH (no units)	Inlet Temperature (°C)	Outlet Temperature (°C)	Inlet Specific Conductivity (umho/cm)	Outlet Specific Conductivity (umho/cm)
4/5/2018	14.8	14.8	7.8	8.5	7.6	5.1	970	570
5/16/2018	12.8	8.3	8.1	7.1	14.7	21.8	1000	780
6/7/2018	9.3	3.2	8.0	7.3	17.0	23.1	840	310
6/12/2018	8.4	5.7	7.9	7.8	20.5	24.7	780	310
6/15/2018	8.8	5.3	7.8	7.5	16.7	20.9	840	230
6/28/2018	8.7	8.0	8.0	8.0	19.0	25.2	940	430
7/5/2018	8.6	6.7	7.7	7.7	20.3	25.1	860	220
7/11/2018	8.4	7.2	7.6	7.5	19.6	27.9	1000	710
7/26/2018	9.2	7.1	6.9	7.7	19.4	23.9	780	620
8/8/2018	8.7	5.0	8.1	8.2	19.5	24.7	840	230
8/21/2018	8.6	5.2	8.1	7.8	19.9	21.4	830	260
8/28/2018	8.4	4.0	9.8	7.1	21.4	26.3	890	350
9/3/2018	8.2	5.3	6.3	6.4	20.3	22.3	700	290
9/12/2018	9.1	11.1	7.9	7.9	18.8	23.2	940	680
9/27/2018	9.1	8.7	8.2	8.3	17.0	16.7	900	340
Average	9.4	7.0	7.9	7.7	18.1	22.2	874	422
Minimum	8.2	3.2	6.3	6.4	7.6	5.1	700	220
Maximum	14.8	14.8	9.8	8.5	21.4	27.9	1000	780

Table 47. Turbidity (NTU), flow rate (cfs), and *E. coli* (MP/100mL) measured at the inlet and outlet of the south wetland, April through September 2018.

Date Collected	Inlet Turbidity (NTU)	Outlet Turbidity (NTU)	Inlet Flow Rate (CFS)	Outlet Flow Rate (CFS)	Inlet *E. coli* (MP/100mL)	Outlet *E. coli* (MP/100mL)
4/5/2018	<1	8.7	<1	<1	2700	<10
5/16/2018	2.3	28	<1	<1	910	10
6/7/2018	<1	42	<1	<1	1300	1700
6/12/2018	<1	40	<1	1.2	930	420
6/15/2018	1.7	27	2.3	*	570	9200
6/28/2018	5.3	45	<1	<1	1200	420
7/5/2018	3.1	31	4.3	4.7	1200	24000
7/11/2018	<1	31	0.5	0.1	1700	530
7/26/2018	3.4	38	<1	<1	13000	3100
8/8/2018	<1	43	<1	<1	1000	97
8/21/2018	2.1	34	<1	<1	810	680
8/28/2018	2.7	44	<1	<1	1800	120
9/3/2018	3.6	35	5.0	6.0	1700	3100
9/12/2018	<1	12	<1	3.0	980	31
9/27/2018	<1	15	<1	1.2	3000	600
Average	1.8	32	1.2	1.4	1489**	423**
Minimum	<1	8.7	<1	<1	570	10
Maximum	5.3	45	5.0	6.0	13000	24000

*Flow not measured due to high water levels. **Geometric mean.

Table 48. Ammonia nitrogen (mg/L), unionized ammonia (mg/L), nitrate + nitrite nitrogen (mg/L), and total Kjeldahl nitrogen (mg/L) measured at the inlet and outlet of the south wetland, April through September 2018.

Date Collected	Inlet Ammonia Nitrogen (mg/L)	Outlet Ammonia Nitrogen (mg/L)	Inlet Unionized Ammonia (mg/L)	Outlet Unionized Ammonia (mg/L)	Inlet Nitrate+Nitrite Nitrogen (mg/L)	Outlet Nitrate+Nitrite Nitrogen (mg/L)	Inlet TKN (mg/L)	Outlet TKN (mg/L)
4/5/2018	<0.05	<0.05	<0.01	<0.01	4.0	1.8	0.3	0.8
5/16/2018	<0.05	<0.05	<0.01	<0.01	4.6	1.9	0.5	0.8
6/7/2018	<0.05	0.5	<0.01	<0.01	5.7	0.19	0.3	1.5
6/12/2018	<0.05	0.38	<0.01	0.02	4.7	0.30	0.3	1.5
6/15/2018	<0.05	0.22	<0.01	<0.01	6.2	1.6	0.4	0.9
6/28/2018	<0.05	<0.05	<0.01	<0.01	5.6	1.1	0.3	1.2
7/5/2018	<0.05	0.09	<0.01	<0.01	6.0	1.2	0.4	0.9
7/11/2018	<0.05	0.14	<0.01	<0.01	5.2	2.7	0.3	2.0
7/26/2018	<0.05	0.12	<0.01	<0.01	3.7	0.29	0.5	1.4
8/8/2018	<0.05	0.22	<0.01	0.02	5.4	0.30	<0.1	1.4
8/21/2018	<0.05	0.18	<0.01	<0.01	5.1	0.46	0.2	1.0
8/28/2018	<0.05	0.14	<0.01	<0.01	4.0	0.24	0.4	1.1
9/3/2018	<0.05	0.12	<0.01	<0.01	4.6	1.9	0.5	0.7
9/12/2018	<0.05	<0.05	<0.01	<0.01	5.0	2.8	0.2	1.3
9/27/2018	<0.05	0.07	<0.01	<0.01	5.2	0.85	0.3	0.7
Average	<0.05	0.15	<0.01	<0.01	5.0	1.2	0.3	1.1
Minimum	<0.05	<0.05	<0.01	<0.01	3.7	0.19	<0.1	0.7
Maximum	<0.05	0.50	<0.01	0.02	6.2	2.8	0.5	2.0

Table 49. Total phosphorus (mg/L), orthophosphate (mg/L), total volatile suspended solids (TVSS, mg/L) and total suspended solids (TSS, mg/L) measured at the inlet and outlet of the south wetland, April through September 2018.

Date Collected	Inlet Total Phosphorus (mg/L)	Outlet Total Phosphorus (mg/L)	Inlet Ortho-phosphate (mg/L)	Outlet Ortho-phosphate (mg/L)	Inlet TVSS (mg/L)	Outlet TVSS (mg/L)	Inlet TSS (mg/L)	Outlet TSS (mg/L)
4/5/2018	0.03	0.06	0.03	<0.02	1	6	<1	14
5/16/2018	0.06	0.18	0.02	<0.02	2	33	2	160
6/7/2018	0.07	0.20	0.04	0.02	1	22	2	54
6/12/2018	0.12	0.23	0.04	<0.02	1	21	<1	67
6/15/2018	0.08	0.19	0.04	0.09	2	9	5	25
6/28/2018	0.07	0.17	0.04	<0.02	2	27	6	85
7/5/2018	0.10	0.21	0.06	0.08	3	11	9	38
7/11/2018	0.07	0.30	0.04	<0.02	3	40	2	170
7/26/2018	0.12	0.19	0.06	<0.02	2	22	2	66
8/8/2018	0.07	0.27	0.04	<0.02	1	26	1	73
8/21/2018	0.06	0.18	0.03	<0.02	1	18	<1	53
8/28/2018	0.05	0.20	0.04	<0.02	1	20	<1	71
9/3/2018	0.13	0.23	0.06	0.06	2	14	5	44
9/12/2018	0.05	0.08	0.03	<0.02	1	13	<1	21
9/27/2018	0.66	0.13	0.03	<0.02	1	7	<1	21
Average	0.12	0.19	0.04	0.02	2	19	2	64
Minimum	0.03	0.06	0.02	<0.02	1	6	<1	14
Maximum	0.66	0.30	0.06	0.09	3	40	9	170

Table 50. Dissolved oxygen (mg/L), pH (no units), temperature (°C), specific conductivity (umho/cm), turbidity (NTU), flow rate (cfs), *E. coli* (MPN/100mL), and total suspended solids (mg/L) measured at the outlet of Ada Hayden Lake, May through October 2017. Samples were not collected if the site was dry (d). An additional grab sample for flow rate, total phosphorus, and orthophosphate only was added in July 2017. The average *E. coli* per cell was not calculated since it may not provide the true mean because of the non-linear growth rate of bacteria.

Date Collected	Dissolved Oxygen (mg/L)	pH (no units)	Temperature (°C)	Specific Conductivity (umho/cm)	Turbidity (NTU)	Flow Rate (CFS)	*E. coli* (MPN/100mL)	Total Suspended Solids (mg/L)
5/18/2017	11.0	8.5	19.6	430	5.0	7.0	10	6
6/13/2017	10.3	8.7	25.7	420	9.4	<1	<10	8
7/11/2017	8.6	8.6	27.5	390	1.7	<1	110	4
7/26/2017	-	-	-	-	-	<1	-	-
8/9/2017	5.8	8.1	28.1	800	54	<1	30	19
8/22/2017	-	-	-	-	-	<1	-	-
9/5/2017	d	d	d	d	d	d	d	d
9/19/2017	d	d	d	d	d	d	d	d
Average	8.9	8.5	25.2	510	17.5	1.6	20*	9
Minimum	5.8	8.1	19.6	390	1.7	<1	<10	4
Maximum	11.0	8.7	28.1	800	54	7.0	110	19

*Geometric mean.

Table 51. Ammonia N (mg/L), nitrate + nitrite nitrogen (mg/L), unionized ammonia (mg/L), total Kjeldahl nitrogen (TKN, mg/L), total phosphorus (mg/L), and orthophosphate (mg/L) measured at the outlet of Ada Hayden Lake, May through October 2017. An additional grab sample for flow rate, total phosphorus, and orthophosphate only was added in July 2017. Two samples were not analyzed for total phosphorus due to a laboratory error (**). Samples were not collected if the site was dry (d).

Date Collected	Ammonia Nitrogen (mg/L)	Nitrate+Nitrite Nitrogen (mg/L)	Unionized Ammonia (mg/L)	TKN (mg/L)	Total Phosphorus (mg/L)	Orthophosphate (mg/L)
5/18/2017	<0.05	0.45	<0.01	0.3	-	-
6/13/2017	<0.05	<0.1	<0.01	0.8	-	-
7/11/2017	<0.05	<0.1	<0.01	0.7	**	<0.02
7/26/2017	-	-	<0.01	-	0.13	<0.02
8/9/2017	0.20	<0.1	<0.01	1.0	**	<0.02
8/22/2017	-	-	-	-	0.12	<0.02
9/5/2017	d	d	d	d	d	d
9/19/2017	d	d	d	d	d	d
Average	0.07	0.15	<0.01	0.7	0.13	<0.02
Minimum	<0.05	<0.1	<0.01	0.3	0.12	<0.02
Maximum	0.20	0.45	<0.01	1.0	0.13	<0.02

Table 52. Dissolved oxygen (mg/L), pH (no units), temperature (°C), specific conductivity (umho/cm), turbidity (NTU), flow rate (cfs), *E. coli* (MP/100mL), and total suspended solids (mg/L) measured at the outlet of Ada Hayden Lake, April through September 2018. Samples were not collected if the site was dry (d).

Date Collected	Dissolved Oxygen (mg/L)	pH (no units)	Temperature (°C)	Specific Conductivity (umho/cm)	Turbidity (NTU)	Flow Rate (CFS)	*E. coli* (MP/100mL)	Total Suspended Solids (mg/L)
4/5/2018	13.0	7.6	4.5	460	<1.0	2.6	<10	5
5/16/2018	9.2	8.1	18.7	450	0.8	4.0	<10	2
6/15/2018	9.7	8.2	22.5	370	14	28	430	31
6/28/2018	12.5	8.8	24.7	360	5.2	19	10	7
7/11/2018	15.6	8.6	28.4	340	19	12	<10	16
7/26/2018	d	d	d	d	d	d	d	d
8/8/2018	11.0	8.8	26.7	320	3.2	9.9	<10	6
8/28/2018	7.6	8.5	25.3	340	3.4	2.9	1300	4
9/12/2018	13.0	8.7	22.8	360	3.5	12	10	7
9/27/2018	8.5	8.5	20.2	380	3.1	7.4	10	5
Average	11.1	8.4	21.5	376	5.9	10.9	19*	9.2
Minimum	7.6	7.6	4.5	320	<1.0	2.6	<10	2
Maximum	15.6	8.8	28.4	460	19.0	28.0	1300	31

*Geometric mean.

Table 53. Ammonia N (mg/L), nitrate + nitrite nitrogen (mg/L), unionized ammonia (mg/L), total Kjeldahl nitrogen (TKN, mg/L), total phosphorus (mg/L), and orthophosphate (mg/L) measured at the outlet of Ada Hayden Lake, April through September 2018. Samples were not collected if the site was dry (d).

Date Collected	Ammonia Nitrogen (mg/L)	Nitrate+Nitrite Nitrogen (mg/L)	Unionized Ammonia (mg/L)	TKN (mg/L)	Total Phosphorus (mg/L)	Orthophosphate (mg/L)
4/5/2018	0.40	0.11	<0.01	1.2	0.06	<0.02
5/16/2018	0.12	0.21	<0.01	0.8	<0.05	<0.02
6/15/2018	0.12	0.44	<0.01	0.9	0.12	<0.02
6/28/2018	<0.05	1.0	<0.01	0.8	0.06	<0.02
7/11/2018	<0.05	0.89	<0.01	1.6	0.13	<0.02
7/26/2018	d	d	d	d	d	d
8/8/2018	<0.05	<0.1	<0.01	0.5	0.04	<0.02
8/28/2018	<0.05	<0.1	<0.01	0.6	0.03	<0.02
9/12/2018	<0.05	<0.1	<0.01	0.6	0.04	<0.02
9/27/2018	<0.05	<0.1	<0.01	0.5	0.03	<0.02
Average	0.09	0.32	<0.01	0.8	0.06	<0.02
Minimum	<0.05	<0.1	<0.01	0.5	<0.05	<0.02
Maximum	0.4	1.0	0.01	1.6	0.13	<0.02

Table 54. Dissolved oxygen (mg/L), temperature (°C), pH (no units), turbidity (NTU), and specific conductivity (umho/cm) measured at approximately 0.5 m depth intervals in the north cell of Ada Hayden Lake on May 18, 2017.

Depth (m)	Dissolved Oxygen (mg/L)	Temperature (°C)	pH (no units)	Turbidity (NTU)	Specific Conductivity (umho/cm)
0.2	9.9	20.0	8.0	2.7	450
0.5	10.0	20.1	8.0	2.7	450
1.0	10.1	20.1	8.0	2.6	450
1.5	10.0	20.1	8.0	2.7	450
2.0	10.1	20.0	8.0	2.7	450
2.5	10.0	20.1	8.0	2.8	450
3.0	10.1	20.0	8.0	2.9	450
3.6	10.8	15.4	8.0	3.5	460
4.1	11.4	13.8	8.0	4.1	470
4.6	11.5	11.9	8.0	3.8	480
5.1	11.0	11.5	7.9	3.8	490
5.5	9.4	11.3	7.7	4.0	490
6.0	8.5	11.1	7.5	4.2	500
6.5	7.8	11.0	7.5	4.3	500
7.0	6.8	10.5	7.4	3.1	500
7.5	6.1	10.1	7.4	2.6	500
8.0	3.6	9.4	7.4	2.4	500
8.5	2.5	9.1	7.3	2.9	510
8.5	1.5	9.0	7.3	2.8	510
9.0	1.2	8.5	7.2	2.9	510
9.5	0.4	8.3	7.2	3.4	510
10.0	0.2	8.1	7.2	3.8	520
10.5	0.2	7.9	7.1	4.4	540
10.9	0.1	7.8	7.2	6.4	540

Table 55. Dissolved oxygen (mg/L), temperature (°C), pH (no units), turbidity (NTU), and specific conductivity (umho/cm) measured at approximately 0.5 m depth intervals in the north cell of Ada Hayden Lake on May 31, 2017.

Depth (m)	Dissolved Oxygen (mg/L)	Temperature (°C)	pH (no units)	Turbidity (NTU)	Specific Conductivity (umho/cm)
0.1	11.7	18.2	7.8	4.7	440
0.5	11.8	18.2	7.8	3.9	440
1.0	11.8	18.1	7.9	4.0	440
1.6	11.7	18.1	7.9	4.2	440
2.0	11.7	18.1	7.9	4.1	440
2.5	11.8	18.1	7.9	3.8	440
3.0	11.7	18.1	7.9	4.2	440
3.5	11.5	17.7	7.9	5.0	440
4.0	11.4	17.0	7.8	6.2	450
4.6	8.4	14.7	7.5	9.0	470
5.0	6.1	13.5	7.3	5.3	480
5.6	4.1	12.1	7.3	2.9	490
6.1	3.4	11.2	7.3	2.0	500
6.5	1.8	10.4	7.3	0.6	500
7.0	1.3	9.9	7.2	1.0	500
7.5	0.3	9.6	7.2	1.5	510
8.0	0.2	9.0	7.1	1.5	520
8.5	0.1	8.8	7.1	1.3	520
9.0	0.1	8.6	7.2	1.3	520
9.5	<0.1	8.4	7.1	2.2	530
10.0	<0.1	8.3	7.1	3.7	540
10.5	<0.1	8.2	7.1	4.3	550
11.0	<0.1	8.1	7.2	*	550

*substrate disturbed by probe increasing the turbidity result, therefore turbidity results not reported.

Table 56. Dissolved oxygen (mg/L), temperature (°C), pH (no units), turbidity (NTU), and specific conductivity (umho/cm) measured at approximately 0.5 m depth intervals in the north cell of Ada Hayden Lake on June 13, 2017.

Depth (m)	Dissolved Oxygen (mg/L)	Temperature (°C)	pH (no units)	Turbidity (NTU)	Specific Conductivity (umho/cm)
0.2	9.7	25.4	8.3	3.4	410
0.5	9.8	25.4	8.3	3.3	410
1.0	9.8	25.4	8.3	3.1	410
1.5	9.8	25.4	8.3	3.5	410
2.0	9.7	25.4	8.3	3.2	410
2.6	9.7	25.4	8.3	3.4	410
3.1	12.4	23.0	8.2	8.5	420
3.5	13.3	19.3	7.9	21.6	440
4.1	11.3	17.7	7.5	28.5	450
4.5	4.8	15.4	7.1	15.8	470
5.1	1.6	13.8	7.0	8.1	480
5.6	0.7	12.9	6.9	4.3	490
6.1	0.4	11.0	6.8	1.5	510
6.6	0.3	10.2	6.8	1.4	510
7.0	0.2	9.8	6.8	1.9	520
7.5	0.2	9.5	6.8	1.7	520
8.0	0.2	9.1	6.9	3.1	520
8.6	0.1	8.8	6.9	3.9	530
9.0	0.1	8.6	6.9	4.5	540
9.5	0.1	8.5	6.9	4.5	540
10.1	0.1	8.3	6.9	6.5	560
10.5	0.1	8.2	6.8	6.7	580
11.0	<0.1	8.2	6.8	6.7	580
11.5	<0.1	8.2	6.9	7.1	590
11.8	<0.1	8.2	6.9	*	590

*substrate disturbed by probe increasing the turbidity result, therefore turbidity results not reported

Table 57. Dissolved oxygen (mg/L), temperature (°C), pH (no units), turbidity (NTU), and specific conductivity (umho/cm) measured at approximately 0.5 m depth intervals in the north cell of Ada Hayden Lake on June 27, 2017.

Depth (m)	Dissolved Oxygen (mg/L)	Temperature (°C)	pH (no units)	Turbidity (NTU)	Specific Conductivity (umho/cm)
0.0	9.9	22.8	7.9	3.6	410
0.5	9.9	22.8	8.1	4.1	410
1.0	9.9	22.8	8.1	4.3	410
1.5	10.0	22.8	8.1	4.2	410
2.0	9.6	22.6	8.1	5.4	410
2.5	9.0	22.5	8.0	5.7	420
3.0	8.7	22.4	8.0	5.4	420
3.5	8.3	22.2	8.0	9.9	420
4.0	6.7	21.3	7.9	24.8	430
4.5	0.7	17.9	7.3	13.5	470
5.0	0.2	16.8	7.1	5.9	480
5.5	0.2	15.0	7.0	3.8	490
6.0	0.1	13.0	7.0	2.7	500
6.5	0.1	11.0	7.0	2.7	520
7.0	<0.1	10.0	7.0	2.7	530
7.5	<0.1	9.5	7.0	3.4	530
8.0	<0.1	9.2	7.0	4.2	540
8.5	<0.1	9.0	7.0	5.0	540
9.0	<0.1	8.8	7.1	5.4	540
9.5	<0.1	8.7	7.0	5.7	560
10.0	<0.1	8.5	7.0	5.9	560
10.5	<0.1	8.4	7.0	5.5	580
11.0	<0.1	8.4	7.0	5.7	580

Table 58. Dissolved oxygen (mg/L), temperature (°C), pH (no units), turbidity (NTU), and specific conductivity (umho/cm) measured at approximately 0.5 m depth intervals in the north cell of Ada Hayden Lake on July 11, 2017.

Depth (m)	Dissolved Oxygen (mg/L)	Temperature (°C)	pH (no units)	Turbidity (NTU)	Specific Conductivity (umho/cm)
0.1	8.5	27.6	8.4	<1	420
0.5	8.5	27.6	8.5	<1	420
1.0	8.5	27.6	8.5	<1	420
1.5	8.5	27.6	8.5	<1	420
2.0	8.5	27.6	8.5	<1	420
2.5	8.5	27.6	8.5	<1	420
3.0	9.8	26.1	8.4	<1	430
3.5	9.7	24.0	8.3	1.1	440
4.0	8.5	22.1	8.2	1.7	450
4.5	5.4	20.1	7.7	8.7	480
5.0	1.5	17.8	7.4	21.6	490
5.5	0.4	15.7	7.3	10.9	500
6.0	0.3	13.6	7.2	6.6	520
6.5	0.2	11.8	7.3	4.6	540
6.9	0.1	10.3	7.2	4.7	550
7.5	<0.1	9.8	7.3	4.6	550
7.9	<0.1	9.4	7.2	4.9	550
8.5	<0.1	9.0	7.2	5.2	560
9.0	<0.1	8.9	7.2	5.5	570
9.5	<0.1	8.7	7.2	5.3	580
10.0	<0.1	8.6	7.1	5.4	590
10.5	<0.1	8.5	7.1	5.5	600
11.0	<0.1	8.5	7.1	5.4	610

Table 59. Dissolved oxygen (mg/L), temperature (°C), pH (no units), turbidity (NTU), and specific conductivity (umho/cm) measured at approximately 0.5 m depth intervals in the north cell of Ada Hayden Lake on July 26, 2017.

Depth (m)	Dissolved Oxygen (mg/L)	Temperature (°C)	pH (no units)	Turbidity (NTU)	Specific Conductivity (umho/cm)
0.1	8.2	27.9	8.5	<1	400
0.5	8.2	27.9	8.5	<1	400
1.0	8.2	27.9	8.5	<1	400
1.5	8.1	27.8	8.5	<1	400
2.0	8.1	27.8	8.5	<1	400
2.5	8.1	27.8	8.5	<1	400
3.0	8.1	27.7	8.5	<1	400
3.5	8.0	27.6	8.5	<1	410
4.0	8.0	25.3	8.2	<1	430
4.5	7.2	22.9	7.9	<1	450
5.0	3.0	19.8	7.5	4.2	470
5.5	1.5	17.7	7.4	7.8	480
6.0	0.9	15.7	7.3	7.5	490
6.5	0.5	12.9	7.2	4.6	510
7.0	0.3	10.8	7.2	2.9	530
7.5	0.3	10.1	7.2	2.8	540
8.0	0.2	9.5	7.1	2.8	540
8.5	0.2	9.2	7.1	2.7	550
9.0	0.2	9.0	7.1	2.8	550
9.5	0.1	8.8	7.0	2.3	560
10.0	0.1	8.7	7.0	2.5	570

Table 60. Dissolved oxygen (mg/L), temperature (°C), pH (no units), turbidity (NTU), and specific conductivity (umho/cm) measured at approximately 0.5 m depth intervals in the north cell of Ada Hayden Lake on August 9, 2017.

Depth (m)	Dissolved Oxygen (mg/L)	Temperature (°C)	pH (no units)	Turbidity (NTU)	Specific Conductivity (umho/cm)
0.0	9.1	25.6	8.5	<1	400
0.5	9.2	25.6	8.5	<1	400
1.0	9.2	25.6	8.5	<1	400
1.5	9.2	25.6	8.5	<1	400
2.0	9.2	25.5	8.5	<1	400
2.5	9.2	25.5	8.5	<1	400
3.0	9.2	25.5	8.5	<1	400
3.5	8.9	25.3	8.4	<1	400
4.0	8.5	25.2	8.4	<1	410
4.5	6.7	23.9	8.0	<1	430
5.0	4.6	22.5	7.7	1.6	440
5.5	1.3	20.4	7.4	6.0	460
6.0	0.5	16.8	7.2	7.9	490
6.5	0.3	12.8	7.1	5.4	510
7.0	0.2	11.1	7.1	3.6	530
7.5	0.2	10.3	7.0	3.1	530
8.0	0.1	9.6	7.0	2.7	540
8.5	0.1	9.2	7.0	2.5	540
9.0	0.1	9.0	7.0	2.3	550
9.5	0.1	8.9	6.9	2.2	570
10.0	<0.1	8.7	6.9	1.8	570
10.5	<0.1	8.7	6.9	1.9	580
11.0	<0.1	8.7	6.9	2.2	590

Table 61. Dissolved oxygen (mg/L), temperature (°C), pH (no units), turbidity (NTU), and specific conductivity (umho/cm) measured at approximately 0.5 m depth intervals in the north cell of Ada Hayden Lake on August 22, 2017.

Depth (m)	Dissolved Oxygen (mg/L)	Temperature (°C)	pH (no units)	Turbidity (NTU)	Specific Conductivity (umho/cm)
0.0	8.3	24.1	8.5	<1	410
0.5	8.3	24.1	8.5	<1	410
1.0	8.3	24.1	8.5	<1	410
1.5	8.3	24.1	8.5	<1	410
2.0	8.3	24.1	8.4	<1	410
2.5	8.2	24.1	8.4	<1	410
3.0	8.2	24.1	8.4	<1	410
3.5	8.2	24.1	8.4	<1	410
4.0	8.1	24.0	8.4	<1	410
4.5	7.1	23.7	8.3	<1	410
5.0	4.7	22.9	7.9	<1	430
5.5	2.1	21.2	7.5	<1	450
6.0	1.1	19.2	7.4	1.5	470
6.5	0.6	16.8	7.2	6.2	490
7.0	0.4	13.1	7.2	6.2	520
7.5	0.3	10.7	7.1	3.3	540
8.0	0.3	9.8	7.0	2.7	550
8.5	0.2	9.4	7.0	2.2	550
9.0	0.2	9.2	6.9	2.3	570
9.5	0.2	9.1	6.9	2.2	570
10.0	0.2	9.0	6.9	2.1	580
10.5	0.2	8.9	6.9	2.2	580
11.0	0.1	8.8	6.8	2.4	600
11.3	0.1	8.7	6.8	*	610
11.5	0.1	8.7	6.8	*	600

*substrate disturbed by probe increasing the turbidity result, therefore turbidity results not reported

Table 62. Dissolved oxygen (mg/L), temperature (°C), pH (no units), turbidity (NTU), and specific conductivity (umho/cm) measured at approximately 0.5 m depth intervals in the north cell of Ada Hayden Lake on September 5, 2017.

Depth (m)	Dissolved Oxygen (mg/L)	Temperature (°C)	pH (no units)	Turbidity (NTU)	Specific Conductivity (umho/cm)
0.0	8.3	22.7	8.4	<1	420
0.5	8.2	22.7	8.4	<1	420
1.0	8.2	22.7	8.4	<1	420
1.5	8.2	22.7	8.4	<1	420
2.0	8.1	22.7	8.4	<1	420
2.5	8.1	22.7	8.4	<1	420
3.0	8.1	22.7	8.4	<1	420
3.5	8.1	22.7	8.4	<1	420
4.0	8.0	22.7	8.4	<1	420
4.5	7.9	22.6	8.4	<1	420
5.0	7.9	22.6	8.3	<1	420
5.5	7.3	22.5	8.3	<1	420
6.0	3.6	19.9	7.6	<1	460
6.5	1.6	18.3	7.4	1.2	480
7.1	0.8	14.8	7.2	6.7	530
7.5	0.6	11.5	7.1	4.6	550
8.0	0.4	10.1	7.1	2.3	560
8.5	0.4	9.6	7.0	1.7	570
9.0	0.3	9.3	7.0	1.5	570
9.5	0.3	9.1	6.9	1.7	580
10.0	0.3	9.0	6.9	1.9	600
10.5	0.3	8.9	6.9	2.1	610
11.0	0.2	8.8	6.9	3.0	620
11.4	0.2	8.8	6.8	*	620

*substrate disturbed by probe increasing the turbidity result, therefore turbidity results not reported

Table 63. Dissolved oxygen (mg/L), temperature (°C), pH (no units), turbidity (NTU), and specific conductivity (umho/cm) measured at approximately 0.5 m depth intervals in the north cell of Ada Hayden Lake on September 19, 2017.

Depth (m)	Dissolved Oxygen (mg/L)	Temperature (°C)	pH (no units)	Turbidity (NTU)	Specific Conductivity (umho/cm)
0.0	8.7	22.0	8.4	1.2	410
0.5	8.8	22.1	8.4	1.1	410
1.0	8.7	22.0	8.4	1.2	410
1.5	8.7	22.0	8.4	1.2	410
2.0	8.7	22.0	8.4	1.2	410
2.5	8.7	21.9	8.4	1.2	410
3.0	8.7	21.9	8.4	1.2	410
3.5	8.7	21.9	8.4	1.3	410
4.0	8.6	21.9	8.4	1.4	410
4.5	8.4	21.9	8.4	1.6	410
5.0	7.9	21.6	8.3	1.7	410
5.5	4.0	20.6	7.7	2.0	430
6.0	1.2	19.7	7.5	1.6	440
6.5	0.8	19.2	7.4	1.4	450
7.0	0.6	16.9	7.3	3.7	480
7.5	0.4	12.7	7.1	6.6	540
8.0	0.3	11.0	7.1	4.8	550
8.5	0.2	10.0	6.9	3.3	560
9.0	0.2	9.4	6.9	3.0	570
9.5	0.2	9.2	6.9	2.9	580
10.0	0.2	9.1	6.9	2.9	580
10.5	0.2	9.0	6.9	*	590

*substrate disturbed by probe increasing the turbidity result, therefore turbidity results not reported

Table 64. Dissolved oxygen (mg/L), temperature (°C), pH (no units), turbidity (NTU), and specific conductivity (umho/cm) measured at approximately 0.5 m depth intervals in the south cell of Ada Hayden Lake on May 18, 2017.

Depth (m)	Dissolved Oxygen (mg/L)	Temperature (°C)	pH (no units)	Turbidity (NTU)	Specific Conductivity (umho/cm)
0.2	11.5	19.2	8.5	9.7	450
0.5	11.2	20.1	8.5	6.5	440
1.0	11.3	20.2	8.5	2.4	440
1.5	11.3	20.2	8.5	1.8	440
2.0	11.3	20.2	8.5	1.2	440
2.5	11.3	20.2	8.5	<1	440
3.0	11.4	19.6	8.5	1.0	440
3.5	12.8	18.4	8.5	1.1	450
4.0	13.8	15.2	8.3	1.5	460
4.5	14.2	12.4	8.3	1.5	480
5.0	13.1	11.5	8.1	1.5	480
5.6	11.7	10.8	8.0	1.5	490
6.0	7.3	10.3	7.8	1.5	490
6.5	6.6	9.8	7.7	1.3	490
7.0	6.0	9.5	7.7	1.3	490
7.5	5.6	9.3	7.7	1.3	490
8.0	5.2	9.0	7.6	1.2	500
8.6	2.7	8.2	7.5	1.6	510
9.3	2.2	8.2	7.4	1.4	510
9.5	2.0	7.9	7.4	1.9	510
10.0	1.4	7.7	7.4	1.4	510
10.5	0.9	7.6	7.4	1.6	510
11.0	0.5	7.5	7.4	1.4	510
11.5	0.3	7.4	7.4	1.4	510
12.0	0.2	7.4	7.4	1.4	510
12.5	0.2	7.2	7.4	1.9	510
13.0	0.2	7.0	7.4	9.7	510
13.5	0.1	6.9	7.3	6.5	510
14.0	0.1	6.9	7.3	2.4	510
14.5	0.1	6.9	7.3	1.8	510
15.0	0.1	6.9	7.4	1.2	510
15.5	<0.1	6.9	7.3	<1	510
16.0	<0.1	6.8	7.3	1.0	510
16.5	<0.1	6.8	7.3	1.1	510
16.7	<0.1	6.8	7.3	1.5	510
17.2	<0.1	6.8	7.3	1.5	510

Table 65. Dissolved oxygen (mg/L), temperature (°C), pH (no units), turbidity (NTU), and specific conductivity (umho/cm) measured at approximately 0.5 m depth intervals in the south cell of Ada Hayden Lake on May 31, 2017.

Depth (m)	Dissolved Oxygen (mg/L)	Temperature (°C)	pH (no units)	Turbidity (NTU)	Specific Conductivity (umho/cm)
0.0	11.9	18.6	8.2	10.8	430
0.5	13.0	18.5	8.4	10.3	430
1.0	12.9	18.2	8.4	10.6	430
1.5	12.7	18.1	8.4	10.2	430
2.0	12.7	18.1	8.4	10.9	430
2.5	12.7	18.1	8.4	10.7	430
3.0	12.4	17.9	8.4	13.5	430
3.5	12.4	17.5	8.4	18.0	440
4.0	11.1	16.3	8.2	18.8	450
4.5	8.4	14.6	7.9	6.7	460
5.1	6.9	13.7	7.8	2.7	470
5.5	4.9	12.4	7.6	<1	480
6.0	4.0	10.5	7.5	<1	490
6.5	3.9	9.7	7.5	<1	500
7.0	3.4	9.3	7.5	<1	500
7.5	2.4	9.0	7.4	<1	500
8.0	1.6	8.8	7.4	<1	510
8.5	0.6	8.5	7.4	<1	510
9.1	0.3	8.2	7.4	<1	510
9.6	0.2	7.9	7.3	<1	510
10.0	0.1	7.7	7.3	1.0	510
10.6	0.1	7.5	7.3	1.3	510
11.1	0.1	7.5	7.3	1.8	510
11.5	<0.1	7.4	7.3	1.7	510
12.0	<0.1	7.3	7.2	1.4	510
12.6	<0.1	7.2	7.3	1.2	520
13.1	<0.1	7.2	7.2	<1	520
13.5	<0.1	7.1	7.2	1.0	520
14.0	<0.1	7.1	7.3	<1	520
14.5	<0.1	7.1	7.3	<1	520
15.0	<0.1	7.0	7.3	<1	520
15.5	<0.1	7.0	7.3	<1	520
16.0	<0.1	7.0	7.3	<1	520
16.5	<0.1	7.0	7.3	1.0	520
17.0	<0.1	7.0	7.3	1.2	520
17.5	<0.1	7.0	7.3	2.3	520
17.7	<0.1	7.0	7.3	*	520

*substrate disturbed by probe increasing the turbidity result, therefore turbidity results not reported.

Table 66. Dissolved oxygen (mg/L), temperature (°C), pH (no units), turbidity (NTU), and specific conductivity (umho/cm) measured at approximately 0.5 m depth intervals in the south cell of Ada Hayden Lake on June 13, 2017.

Depth (m)	Dissolved Oxygen (mg/L)	Temperature (°C)	pH (no units)	Turbidity (NTU)	Specific Conductivity (umho/cm)
0.2	*	25.8	8.2	*	390
0.5	10.6	25.8	8.2	5.6	390
1.1	10.6	25.8	8.2	6.0	390
1.6	10.6	25.7	8.2	6.4	390
2.1	10.6	25.6	8.2	6.1	390
2.6	13.0	23.9	8.1	16.0	390
3.0	12.1	22.1	7.8	40.7	410
3.6	9.0	19.1	7.4	25.2	430
4.0	5.1	16.6	7.1	10.2	450
4.5	3.2	14.5	7.0	4.7	470
5.1	2.0	12.6	6.9	2.4	480
5.5	1.1	11.4	6.8	1.9	490
6.1	0.6	10.2	6.7	2.3	500
6.5	0.3	9.7	6.7	2.0	510
7.1	0.2	9.3	6.7	1.9	510
7.6	0.2	9.1	6.7	2.4	510
8.1	0.2	8.8	6.7	2.2	520
8.6	0.1	8.3	6.6	2.2	510
9.1	0.1	8.1	6.6	1.9	520
9.6	0.1	7.9	6.4	2.5	520
10.0	0.1	7.8	6.4	2.9	520
10.5	0.1	7.8	6.5	3.3	520
11.0	0.1	7.7	6.6	3.9	520
11.5	<0.1	7.6	6.6	4.0	520
12.1	<0.1	7.5	6.6	3.4	520
12.5	<0.1	7.4	6.6	3.1	520
13.0	<0.1	7.3	6.7	2.9	520
13.6	<0.1	7.2	6.7	3.0	520
14.1	<0.1	7.2	6.7	3.3	520
14.5	<0.1	7.1	6.7	3.3	520
15.1	<0.1	7.1	6.7	3.5	520
15.6	<0.1	7.1	6.7	4.5	520
16.1	<0.1	7.1	6.7	3.7	520
16.5	<0.1	7.1	6.7	3.4	520
17.0	<0.1	7.1	6.8	<1	530

*Measurement not obtained.

Table 67. Dissolved oxygen (mg/L), temperature (°C), pH (no units), turbidity (NTU), and specific conductivity (umho/cm) measured at approximately 0.5 m depth intervals in the south cell of Ada Hayden Lake on June 27, 2017.

Depth (m)	Dissolved Oxygen (mg/L)	Temperature (°C)	pH (no units)	Turbidity (NTU)	Specific Conductivity (umho/cm)
0.0	9.9	23.1	8.5	3.5	390
0.5	9.9	23.1	8.5	3.6	390
1.0	9.9	23.0	8.5	3.5	390
1.5	9.9	23.0	8.5	3.9	390
2.0	9.8	22.8	8.5	4.0	390
2.5	9.5	22.7	8.5	5.6	390
3.0	9.5	22.5	8.5	7.9	390
3.5	9.3	22.1	8.4	24.3	400
4.0	4.3	19.4	7.6	22.3	440
4.5	0.7	17.0	7.3	12.2	460
5.0	0.2	16.1	7.1	6.2	470
5.5	0.2	13.6	7.1	3.8	490
6.0	0.1	11.5	7.1	5.3	510
6.5	0.1	10.0	7.1	4.1	520
7.0	0.1	9.4	7.1	3.6	530
7.5	0.1	9.0	7.1	3.6	530
8.0	0.1	8.8	7.1	3.7	530
8.5	<0.1	8.6	7.1	3.8	530
9.0	<0.1	8.4	7.1	3.3	530
9.5	<0.1	8.1	7.1	3.4	530
10.0	0.1	8.0	7.1	3.3	530
10.5	<0.1	7.9	7.1	3.8	530
11.0	<0.1	7.8	7.1	3.3	530
11.5	<0.1	7.7	7.1	3.0	530
12.0	<0.1	7.6	7.1	2.7	530
12.5	<0.1	7.5	7.1	2.3	530
13.0	<0.1	7.4	7.1	2.3	530
13.5	<0.1	7.4	7.1	2.3	530
14.5	<0.1	7.3	7.1	2.2	530
15.0	<0.1	7.2	7.1	2.2	540
15.5	<0.1	7.2	7.1	2.4	540
16.0	<0.1	7.2	7.1	2.6	540
16.5	<0.1	7.2	7.1	3.1	540

Table 68. Dissolved oxygen (mg/L), temperature (°C), pH (no units), turbidity (NTU), and specific conductivity (umho/cm) measured at approximately 0.5 m depth intervals in the south cell of Ada Hayden Lake on July 11, 2017.

Depth (m)	Dissolved Oxygen (mg/L)	Temperature (°C)	pH (no units)	Turbidity (NTU)	Specific Conductivity (umho/cm)
0.0	9.1	27.5	8.7	<1	400
0.5	9.2	27.5	8.7	<1	400
1.0	9.2	27.5	8.7	<1	400
1.5	9.2	27.5	8.7	<1	400
2.0	9.2	27.5	8.7	<1	400
2.5	9.3	27.5	8.7	<1	400
3.1	10.2	25.8	8.6	<1	410
3.0	10.3	25.6	8.6	<1	410
3.5	10.2	23.5	8.5	<1	420
4.1	9.7	21.6	8.4	<1	440
4.5	8.5	20.0	8.2	2.1	460
5.0	8.1	17.5	8.0	8.5	480
5.5	5.3	15.8	7.7	27.7	490
6.0	2.2	12.7	7.4	14.9	520
6.5	1.2	10.8	7.3	6.1	540
7.0	0.7	9.8	7.3	4.4	550
7.5	0.5	9.3	7.3	3.5	560
8.0	0.4	9.0	7.3	3.0	550
8.5	0.3	8.8	7.3	3.2	550
8.5	0.3	8.8	7.3	3.4	550
9.0	0.2	8.5	7.3	2.3	550
9.4	0.2	8.3	7.2	2.4	550
10.0	0.2	8.1	7.2	2.1	550
10.5	0.2	8.0	7.2	1.9	550
11.0	0.1	7.9	7.2	1.7	550
11.5	0.1	7.7	7.2	1.8	550
12.0	<0.1	7.6	7.2	1.4	550
12.5	<0.1	7.5	7.2	1.5	550
13.0	<0.1	7.5	7.2	1.2	560
13.5	<0.1	7.4	7.2	1.2	560
14.0	<0.1	7.4	7.2	1.3	560
14.5	<0.1	7.4	7.2	1.4	560
15.0	<0.1	7.4	7.2	1.4	560
15.5	<0.1	7.4	7.2	1.4	560
16.0	<0.1	7.4	7.2	1.5	560
16.5	<0.1	7.4	7.2	1.6	560
17.1	<0.1	7.4	7.2	*	570

*substrate disturbed by probe increasing the turbidity result, therefore turbidity results not reported.

Table 69. Dissolved oxygen (mg/L), temperature (°C), pH (no units), turbidity (NTU), and specific conductivity (umho/cm) measured at approximately 0.5 m depth intervals in the south cell of Ada Hayden Lake on July 26, 2017.

Depth (m)	Dissolved Oxygen (mg/L)	Temperature (°C)	pH (no units)	Turbidity (NTU)	Specific Conductivity (umho/cm)
0.1	8.4	27.8	8.6	<1	390
0.5	8.4	27.9	8.6	<1	390
1.0	8.4	27.9	8.6	<1	390
1.6	8.4	27.9	8.6	<1	390
2.1	8.3	27.8	8.6	<1	390
2.5	8.4	27.8	8.6	<1	390
3.0	8.4	27.8	8.6	<1	390
3.5	8.7	27.4	8.6	<1	390
4.0	9.8	25.3	8.5	<1	410
4.5	10.9	22.3	8.4	<1	430
5.0	11.1	20.1	8.4	<1	450
5.5	10.9	16.6	8.1	6.3	480
6.0	6.5	14.4	7.5	30.5	490
6.5	1.3	12.2	7.1	7.0	510
7.0	0.8	11.0	7.1	3.6	520
7.5	0.5	9.8	7.1	2.5	530
8.0	0.4	9.4	7.1	2.3	530
8.5	0.3	9.0	7.1	2.2	530
9.0	0.3	8.8	7.1	1.5	530
9.5	0.2	8.5	7.1	1.0	530
10.0	0.2	8.3	7.1	<1	530
10.5	0.2	8.1	7.1	<1	530
11.0	0.2	8.0	7.1	<1	530
11.5	0.2	8.0	7.1	<1	530
12.0	0.1	7.9	7.1	<1	530
12.5	0.1	7.7	7.1	<1	540
13.0	0.1	7.6	7.1	<1	540
13.5	0.1	7.6	7.0	<1	540
14.0	0.1	7.5	7.0	<1	540
14.5	0.1	7.5	7.0	<1	540
15.0	<0.1	7.5	7.0	<1	550
15.5	<0.1	7.5	7.0	<1	550
16.0	<0.1	7.4	7.0	<1	550
16.5	<0.1	7.4	7.0	<1	550
17.0	<0.1	7.4	7.0	1.1	550
17.5	<0.1	7.4	6.8	*	560

*substrate disturbed by probe increasing the turbidity result, therefore turbidity results not reported.

Table 70. Dissolved oxygen (mg/L), temperature (°C), pH (no units), turbidity (NTU), and specific conductivity (umho/cm) measured at approximately 0.5 m depth intervals in the south cell of Ada Hayden Lake on August 9, 2017.

Depth (m)	Dissolved Oxygen (mg/L)	Temperature (°C)	pH (no units)	Turbidity (NTU)	Specific Conductivity (umho/cm)
0.0	9.0	25.5	8.5	<1	390
0.5	9.0	25.5	8.6	<1	390
1.0	9.1	25.5	8.6	<1	390
1.5	9.1	25.5	8.6	<1	390
2.0	9.0	25.4	8.6	<1	390
2.5	9.1	25.4	8.6	<1	390
3.0	9.1	25.3	8.6	<1	390
3.5	9.1	25.3	8.6	<1	390
4.0	9.1	25.3	8.6	<1	390
4.5	10.5	23.5	8.4	<1	410
5.0	11.1	21.5	8.3	<1	430
5.5	10.2	18.5	8.0	1.5	460
6.0	7.3	15.6	7.6	16.6	490
6.5	1.9	13.4	7.2	9.5	500
7.5	0.7	10.0	7.1	3.1	530
8.1	0.5	9.2	7.1	2.1	530
8.6	0.3	8.9	7.1	1.2	530
9.1	0.3	8.6	7.1	<1	530
9.6	0.2	8.4	7.1	<1	530
10.1	0.2	8.3	7.1	<1	530
10.0	0.2	8.3	7.1	<1	530
10.6	0.1	8.1	7.1	<1	530
11.1	0.1	8.0	7.1	<1	530
11.6	0.1	7.9	7.1	<1	540
12.0	0.1	7.7	7.1	<1	540
12.5	0.1	7.6	7.0	<1	540
12.5	<0.1	7.6	7.0	<1	540
13.0	<0.1	7.6	7.0	<1	540
13.5	<0.1	7.5	7.0	<1	550
14.0	<0.1	7.5	7.0	<1	550
14.5	<0.1	7.5	7.0	<1	550
15.0	<0.1	7.5	7.0	<1	550
15.5	<0.1	7.5	7.0	<1	560
16.0	<0.1	7.5	7.0	<1	560
16.6	<0.1	7.4	7.0	<1	570
17.0	<0.1	7.4	6.9	2.1	590
17.5	<0.1	7.4	6.7	<1	630

Table 71. Dissolved oxygen (mg/L), temperature (°C), pH (no units), turbidity (NTU), and specific conductivity (umho/cm) measured at approximately 0.5 m depth intervals in the south cell of Ada Hayden Lake on August 22, 2017.

Depth (m)	Dissolved Oxygen (mg/L)	Temperature (°C)	pH (no units)	Turbidity (NTU)	Specific Conductivity (umho/cm)
0.0	9.0	24.2	8.6	<1	390
0.5	9.1	24.2	8.6	<1	390
1.0	9.1	24.2	8.6	<1	390
1.5	9.1	24.2	8.6	<1	390
2.0	9.1	24.2	8.6	<1	390
2.5	9.1	24.1	8.6	<1	390
3.0	9.1	24.1	8.6	<1	390
3.5	9.1	24.1	8.6	<1	390
4.0	9.1	24.1	8.6	<1	390
4.5	9.1	24.0	8.6	<1	390
5.0	9.0	21.6	8.3	<1	430
5.5	8.0	20.2	8.0	2.1	450
6.0	3.7	17.5	7.6	17.8	480
6.5	3.7	15.3	7.4	17.2	500
7.0	1.1	13.5	7.2	4.2	510
7.5	0.7	11.5	7.2	3.4	530
8.0	0.5	10.2	7.2	1.9	530
8.5	0.4	9.3	7.2	1.2	530
9.0	0.3	8.8	7.1	<1	530
9.5	0.2	8.6	7.1	<1	530
10.0	0.2	8.4	7.1	<1	530
10.5	0.2	8.2	7.1	<1	540
11.0	0.2	8.0	7.0	<1	540
11.5	0.2	7.9	7.0	<1	540
12.0	0.2	7.9	7.0	<1	550
12.5	0.1	7.8	7.0	<1	550
13.0	0.1	7.6	7.0	<1	550
13.5	0.1	7.6	7.0	<1	560
14.0	0.1	7.6	7.0	<1	560
14.5	0.1	7.6	7.0	<1	560
15.0	0.1	7.6	6.9	<1	560
15.5	0.1	7.5	7.0	<1	560
16.0	0.1	7.5	7.0	<1	560
16.5	0.1	7.5	7.0	<1	560
17.0	0.1	7.5	7.0	<1	560
17.4	0.1	7.5	6.8	<1	570

Table 72. Dissolved oxygen (mg/L), temperature (°C), pH (no units), turbidity (NTU), and specific conductivity (umho/cm) measured at approximately 0.5 m depth intervals in the south cell of Ada Hayden Lake on September 5, 2017.

Depth (m)	Dissolved Oxygen (mg/L)	Temperature (°C)	pH (no units)	Turbidity (NTU)	Specific Conductivity (umho/cm)
0.0	8.8	22.5	8.4	<1	410
0.5	8.8	22.6	8.4	<1	410
1.0	8.8	22.6	8.4	<1	410
1.5	8.8	22.6	8.5	<1	410
2.0	8.8	22.6	8.5	<1	410
2.5	8.8	22.6	8.5	<1	410
3.0	8.8	22.6	8.5	<1	410
3.5	8.8	22.5	8.5	<1	410
4.0	8.8	22.5	8.5	<1	410
4.5	8.7	22.5	8.5	<1	410
5.0	8.1	22.1	8.4	<1	410
5.5	6.2	20.4	7.9	2.5	450
6.0	3.9	19.4	7.6	6.9	460
6.5	1.2	17.9	7.4	12.6	480
7.0	0.9	16.9	7.3	14.4	490
7.2	0.5	15.5	7.2	3.8	500
7.5	0.4	12.8	7.1	2.5	530
8.0	0.3	10.6	7.1	1.5	540
8.5	0.3	9.6	7.1	<1	540
9.0	0.2	9.0	7.1	<1	540
9.5	0.2	8.7	7.1	<1	550
9.9	0.2	8.5	7.1	<1	550
10.5	0.2	8.3	7.1	<1	550
10.9	0.2	8.2	7.0	<1	550
11.5	0.2	8.1	7.0	<1	560
11.9	0.1	7.9	7.0	<1	560
12.5	0.1	7.8	7.0	<1	560
13.0	0.1	7.7	7.0	<1	570
13.5	0.1	7.7	7.0	<1	570
14.0	0.1	7.6	6.9	<1	570
14.5	0.1	7.6	6.9	<1	580
15.0	0.1	7.6	6.9	<1	580
15.5	<0.1	7.6	6.9	<1	580
15.9	<0.1	7.6	6.9	<1	580
16.5	<0.1	7.6	6.9	*	580
16.7	<0.1	7.5	6.9	*	610

*substrate disturbed by probe increasing the turbidity result, therefore turbidity results not reported

Table 73. Dissolved oxygen (mg/L), temperature (°C), pH (no units), turbidity (NTU), and specific conductivity (umho/cm) measured at approximately 0.5 m depth intervals in the south cell of Ada Hayden Lake on September 19, 2017.

Depth (m)	Dissolved Oxygen (mg/L)	Temperature (°C)	pH (no units)	Turbidity (NTU)	Specific Conductivity (umho/cm)
0.0	8.7	21.8	8.3	<1	400
0.5	8.7	21.8	8.3	<1	400
1.0	8.8	21.8	8.3	<1	400
1.5	8.8	21.8	8.4	<1	400
2.0	8.8	21.8	8.4	<1	400
2.5	8.8	21.8	8.4	<1	400
3.0	8.7	21.8	8.4	1.0	400
3.5	8.7	21.8	8.4	<1	400
4.0	8.6	21.8	8.4	<1	400
4.5	7.6	21.3	8.2	1.2	410
5.0	6.9	21.0	8.0	1.9	420
5.5	4.6	20.0	7.7	5.7	430
6.0	2.7	19.4	7.5	8.4	440
6.5	1.2	18.7	7.4	8.1	450
7.0	0.4	17.8	7.2	5.8	460
7.5	0.4	15.2	7.0	5.4	490
8.0	0.2	12.5	7.0	2.7	520
8.5	0.1	10.2	7.0	1.5	530
9.0	0.1	9.2	7.0	1.3	530
9.5	0.1	8.8	7.0	<1	530
10.0	0.1	8.5	7.0	<1	540
10.5	0.1	8.3	7.0	<1	540
11.0	<0.1	8.1	7.0	<1	540
11.5	<0.1	8.1	7.0	<1	550
12.0	<0.1	8.0	7.0	<1	550
12.5	<0.1	7.8	7.0	<1	550
13.0	<0.1	7.8	6.9	<1	560
13.5	<0.1	7.7	6.9	<1	560
14.0	<0.1	7.7	6.9	<1	560
14.5	<0.1	7.7	6.9	<1	570
15.0	<0.1	7.6	6.9	<1	570
15.5	<0.1	7.6	6.9	<1	570
16.0	<0.1	7.6	6.9	<1	570
16.5	<0.1	7.6	6.9	<1	570
17.0	<0.1	7.6	6.9	1.2	580

Table 74. Dissolved oxygen (mg/L), temperature (°C), pH (no units), turbidity (NTU), and specific conductivity (µS/cm) measured at approximately 0.5 m depth intervals in the north cell of Ada Hayden Lake on April 5, 2018.

Depth (m)	Dissolved Oxygen (mg/L)	Temperature (°C)	pH (no units)	Turbidity (NTU)	Specific Conductivity (µS/cm)
0.5	13.2	4.7	8.4	2.5	450
1.0	13.2	4.7	8.3	2.5	450
1.5	13.2	4.6	8.3	2.7	450
2.0	13.2	4.6	8.3	2.7	450
2.5	13.2	4.6	8.3	2.8	450
3.0	13.2	4.6	8.3	2.6	450
3.6	13.2	4.6	8.3	2.4	450
4.0	13.2	4.6	8.3	2.7	450
4.6	13.2	4.6	8.3	2.5	450
5.0	13.1	4.6	8.3	2.7	450
5.6	13.1	4.6	8.3	2.4	450
6.0	13.1	4.6	8.3	2.4	450
6.5	13.1	4.5	8.3	2.5	450
7.1	13.1	4.5	8.3	2.5	450
7.5	13.1	4.5	8.3	2.7	450
8.0	13.1	4.5	8.3	2.5	450
8.6	13.1	4.5	8.3	2.7	450
9.0	13.0	4.5	8.3	2.4	450
9.0	13.0	4.5	8.3	2.5	450
9.5	12.9	4.5	8.3	2.7	460
10.0	12.8	4.5	8.3	2.9	460
10.5	12.8	4.6	8.3	3.3	460
10.4	12.6	4.5	8.3	2.7	460
10.7	12.7	4.5	8.3	2.6	450
11.0	12.8	4.5	8.3	2.6	460
11.0	13.7	4.5	8.4	2.7	450
11.5	13.2	4.5	8.3	6.9	460
11.8	12.5	4.6	8.2	*	460

*substrate disturbed by probe increasing the turbidity result, therefore turbidity results not reported.

Table 75. Dissolved oxygen (mg/L), temperature (°C), pH (no units), turbidity (NTU), and specific conductivity (µS/cm) measured at approximately 0.5 m depth intervals in the north cell of Ada Hayden Lake on May 16, 2018.

Depth (m)	Dissolved Oxygen (mg/L)	Temperature (°C)	pH (no units)	Turbidity (NTU)	Specific Conductivity (µS/cm)
0.1	10.6	20.2	8.5	<1	420
0.5	10.7	19.7	8.5	<1	420
1.0	10.9	19.3	8.5	<1	420
1.5	11.2	18.8	8.5	<1	420
2.0	11.4	18.1	8.5	<1	420
2.5	11.5	17.2	8.5	1.0	420
3.0	11.5	16.6	8.5	1.3	420
3.5	11.4	16.3	8.4	2.4	420
4.0	11.3	15.0	8.3	4.5	430
4.5	10.9	13.9	8.1	7.6	430
5.0	9.1	11.9	7.9	5.5	450
5.5	8.1	10.6	7.7	2.6	450
6.0	7.1	9.4	7.6	1.0	450
6.5	6.6	8.5	7.6	<1	450
7.0	6.3	7.5	7.6	<1	450
7.5	6.4	7.0	7.6	<1	450
8.0	6.1	6.9	7.6	<1	450
8.5	5.6	6.6	7.6	1.0	450
9.0	5.3	6.5	7.5	1.1	450
9.5	4.9	6.4	7.5	1.3	460
10.0	4.3	6.4	7.5	1.7	460
10.5	3.3	6.3	7.4	2.2	460
11.0	2.3	6.2	7.4	2.1	470
11.4	1.4	6.2	7.2	*	480

*substrate disturbed by probe increasing the turbidity result, therefore turbidity results not reported.

Table 76. Dissolved oxygen (mg/L), temperature (°C), pH (no units), turbidity (NTU), and specific conductivity (µS/cm) measured at approximately 0.5 m depth intervals in the north cell of Ada Hayden Lake on June 15, 2018.

Depth (m)	Dissolved Oxygen (mg/L)	Temperature (°C)	pH (no units)	Turbidity (NTU)	Specific Conductivity (µS/cm)
0.1	8.7	23.6	8.1	<1	410
0.5	8.8	23.6	8.1	<1	410
1.0	8.8	23.6	8.1	<1	410
1.5	8.8	23.5	8.1	1.3	410
2.0	8.6	23.4	8.1	1.6	410
2.5	8.5	23.3	8.1	2.0	410
3.0	8.4	23.3	8.1	1.9	410
3.5	8.3	23.2	8.1	2.4	410
4.0	8.2	22.9	8.1	4.0	400
4.5	8.3	22.4	8.0	2.5	410
5.0	8.8	21.2	8.0	2.5	420
5.5	9.8	19.3	7.9	2.6	440
6.0	11.5	16.5	7.9	3.5	460
6.5	8.6	13.4	7.7	5.8	470
7.0	2.8	11.4	7.3	3.7	470
7.5	0.2	10.2	7.2	6.0	470
8.1	0.1	9.4	7.2	4.3	480
8.5	<0.1	8.8	7.2	4.1	480
9.1	<0.1	8.4	7.2	3.0	480
9.5	<0.1	8.2	7.2	3.8	480
10.0	<0.1	8.0	7.2	3.9	490
10.5	<0.1	7.7	7.2	4.1	500
11.0	<0.1	7.5	7.2	3.9	500
11.5	<0.1	7.4	7.2	3.9	500
12.0	<0.1	7.2	7.2	5.0	520
12.5	<0.1	7.2	7.1	<1	520

Table 77. Dissolved oxygen (mg/L), temperature (°C), pH (no units), turbidity (NTU), and specific conductivity (µS/cm) measured at approximately 0.5 m depth intervals in the north cell of Ada Hayden Lake on June 28, 2018.

Depth (m)	Dissolved Oxygen (mg/L)	Temperature (°C)	pH (no units)	Turbidity (NTU)	Specific Conductivity (µS/cm)
0.0	12.3	25.2	8.2	<1	380
0.5	12.5	25.2	8.3	<1	380
1.0	12.5	25.1	8.4	<1	380
1.5	12.9	25.1	8.4	<1	380
2.0	13.2	24.6	8.3	1.6	380
2.5	12.5	24.4	8.3	1.7	380
3.0	11.1	24.0	8.1	1.7	400
3.5	9.0	23.2	8.0	1.9	410
4.0	7.8	21.9	7.7	1.6	430
4.5	2.6	19.2	7.3	1.5	430
5.0	1.0	17.4	7.1	1.1	470
5.5	0.5	16.6	7.1	1.0	480
6.0	0.2	15.9	7.1	1.4	480
6.5	0.1	15.0	7.2	<1	480
7.0	<0.1	13.3	7.2	<1	490
7.5	<0.1	10.3	7.2	<1	500
8.0	<0.1	9.0	7.1	1.1	510
8.5	<0.1	8.5	7.2	1.7	510
9.0	<0.1	8.3	7.2	2.1	520
9.5	<0.1	8.1	7.2	2.3	520
10.0	<0.1	7.8	7.2	3.2	530
10.5	<0.1	7.5	7.2	3.4	530
11.0	<0.1	7.5	7.1	3.5	540
11.5	<0.1	7.4	7.1	*	550

*substrate disturbed by probe increasing the turbidity result, therefore turbidity results not reported.

Table 78. Dissolved oxygen (mg/L), temperature (°C), pH (no units), turbidity (NTU), and specific conductivity (µS/cm) measured at approximately 0.5 m depth intervals in the north cell of Ada Hayden Lake on July 11, 2018.

Depth (m)	Dissolved Oxygen (mg/L)	Temperature (°C)	pH (no units)	Turbidity (NTU)	Specific Conductivity (µS/cm)
0.1	*	28.7	8.5	*	380
0.5	*	28.7	8.4	*	380
1.1	*	28.6	8.4	*	380
1.5	*	28.3	8.4	*	380
2.0	*	28.0	8.4	*	380
2.5	*	27.8	8.4	*	380
3.1	*	26.3	8.3	*	390
3.5	*	24.6	8.2	*	410
4.0	*	22.8	8.1	*	440
4.5	*	20.9	7.8	*	460
5.0	*	18.8	7.2	*	480
5.5	*	17.6	7.1	*	500
6.0	*	16.6	7.1	*	510
6.5	*	14.8	7.1	*	520
7.0	*	12.6	7.0	*	490
7.5	*	10.9	7.0	*	520
8.0	*	9.5	7.0	*	540
8.5	*	8.8	6.9	*	550
9.0	*	8.6	6.8	*	560
9.5	*	8.2	6.8	*	570
10.0	*	8.0	6.7	*	580
10.5	*	7.9	6.7	*	580
11.0	*	7.8	6.7	*	590
11.5	*	7.7	6.7	*	610
12.0	*	7.7	6.5	*	610

* No result due to equipment malfunction.

Table 79. Dissolved oxygen (mg/L), temperature (°C), pH (no units), turbidity (NTU), and specific conductivity (µS/cm) measured at approximately 0.5 m to 1.0 m depth intervals in the north cell of Ada Hayden Lake on July 26, 2018.

Depth (m)	Dissolved Oxygen (mg/L)	Temperature (°C)	pH (no units)	Turbidity (NTU)	Specific Conductivity (µS/cm)
0	9.4	26.1	8.4	3.0	400
0.5	9.4	26.1	8.4	3.3	400
1.0	9.5	26.1	8.5	3.3	400
2.0	9.5	26.0	8.5	3.5	390
3.0	9.5	25.9	8.5	3.4	390
3.5	8.0	24.3	8.2	7.7	420
4.0	6.3	23.5	8.1	7.1	430
5.0	0.5	18.4	7.8	8.0	490
6.0	0.3	15.4	7.4	6.2	500
7.0	0.1	10.9	7.4	7.6	530
8.0	<0.1	9.1	7.8	7.3	630
9.0	<0.1	8.4	7.5	6.5	690
10.0	<0.1	8.4	7.2	6.8	540
11.0	<0.1	8.0	7.0	6.0	560
12.0	<0.1	7.8	7.0	10.7	580

Table 80. Dissolved oxygen (mg/L), temperature (°C), pH (no units), turbidity (NTU), and specific conductivity (µS/cm) measured at approximately 0.5 m to 1.0 m depth intervals in the north cell of Ada Hayden Lake on August 8, 2018.

Depth (m)	Dissolved Oxygen (mg/L)	Temperature (°C)	pH (no units)	Turbidity (NTU)	Specific Conductivity (µS/cm)
0	9.8	25.5	8.5	2.1	360
0.5	9.9	25.5	8.5	2.0	360
1.0	10.0	25.5	8.5	2.2	360
2.0	9.9	25.4	8.5	2.1	360
3.0	9.7	25.3	8.5	2.6	360
3.5	9.3	25.0	8.4	3.1	370
4.0	8.0	24.6	8.3	5.4	380
4.5	6.1	23.7	7.9	10.5	400
5.0	0.5	21.5	7.4	10.1	440
5.5	0.2	19.3	7.2	7.2	460
6.0	0.2	18.2	7.1	5.5	470
7.0	0.1	14.1	7.1	4.7	490
8.0	<0.1	10.1	7.1	5.8	510
9.0	<0.1	8.9	7.0	4.8	530
10.0	<0.1	8.4	7.0	4.2	530
11.0	<0.1	8.1	6.9	3.9	550
11.5	<0.1	7.9	6.9	4.2	570

Table 81. Dissolved oxygen (mg/L), temperature (°C), pH (no units), turbidity (NTU), and specific conductivity (µS/cm) measured at approximately 0.5 m to 1.0 m depth intervals in the north cell of Ada Hayden Lake on August 28, 2018.

Depth (m)	Dissolved Oxygen (mg/L)	Temperature (°C)	pH (no units)	Turbidity (NTU)	Specific Conductivity (µS/cm)
0	8.2	25.3	8.4	1.2	400
0.5	8.2	25.3	8.4	1.8	390
1.0	8.1	25.2	8.4	1.3	390
1.5	8.0	24.9	8.4	1.3	390
2.0	7.9	24.9	8.4	1.3	390
2.5	7.9	24.9	8.4	1.4	390
3.0	7.8	24.8	8.4	1.5	390
3.5	7.6	24.7	8.3	1.4	390
4.0	6.3	24.2	8.2	1.2	400
4.5	4.4	22.9	7.8	1.5	410
5.0	2.5	22.3	7.6	1.5	430
5.5	0.7	20.8	7.4	5.9	450
6.0	0.3	18.2	7.3	6.1	480
7.0	0.2	12.9	7.2	4.8	530
8.0	0.1	10.3	7.1	4.6	540
9.0	<0.1	9.2	7.1	4.3	550
10.0	<0.1	8.5	7.1	4.6	580
11.0	<0.1	8.1	7.1	5.7	600

Table 82. Dissolved oxygen (mg/L), temperature (°C), pH (no units), turbidity (NTU), and specific conductivity (µS/cm) measured at approximately 0.5 m depth intervals in the north cell of Ada Hayden Lake on September 12, 2018.

Depth (m)	Dissolved Oxygen (mg/L)	Temperature (°C)	pH (no units)	Turbidity (NTU)	Specific Conductivity (µS/cm)
0	8.2	22.7	8.0	1.0	410
0.5	8.2	22.7	8.1	1.2	410
1.0	8.2	22.7	8.1	1.1	400
1.5	8.2	22.6	8.1	1.2	400
2.0	8.3	22.6	8.1	<1	400
2.5	8.3	22.5	8.1	<1	400
3.0	8.2	22.5	8.1	<1	400
3.5	8.2	22.5	8.1	<1	400
4.0	7.7	22.4	8.0	1.0	400
4.5	6.9	22.3	7.9	1.1	410
5.0	6.5	22.1	7.9	1.3	410
5.5	4.6	21.5	7.6	1.7	420
6.0	0.8	20.6	7.3	2.7	430
6.5	0.3	19.4	7.2	3.0	450
7.0	0.1	16.4	7.1	5.3	500
7.5	0.1	13.8	7.1	6.5	520
8.0	<0.1	12.0	7.1	5.5	530
8.5	<0.1	10.4	7.0	4.7	550
9.0	<0.1	9.4	7.0	4.0	550
9.5	<0.1	9.1	7.0	4.4	570
10.0	<0.1	8.9	7.0	4.2	570
10.5	<0.1	8.6	7.0	4.2	580
11.0	<0.1	8.5	7.0	4.3	590
11.5	<0.1	8.4	7.0	4.5	600

Table 83. Dissolved oxygen (mg/L), temperature (°C), pH (no units), turbidity (NTU), and specific conductivity (µS/cm) measured at approximately 0.5 m to 1.0 m depth intervals in the north cell of Ada Hayden Lake on September 27, 2018.

Depth (m)	Dissolved Oxygen (mg/L)	Temperature (°C)	pH (no units)	Turbidity (NTU)	Specific Conductivity (µS/cm)
0	7.1	19.7	7.7	2.2	430
0.5	7.0	19.7	7.7	2.2	430
1.0	7.0	19.8	7.7	2.1	420
2.0	7.0	19.8	7.7	2.3	420
3.0	6.9	19.8	7.7	2.2	420
4.0	6.9	19.8	7.7	2.2	420
5.0	6.8	19.8	7.8	2.2	420
6.0	6.7	19.8	7.7	2.3	420
6.5	5.9	19.7	7.7	2.4	430
7.0	0.7	16.9	7.1	5.8	500
7.5	0.2	13.0	7.0	7.5	540
8.0	0.2	11.2	7.0	6.3	560
9.0	0.1	9.6	7.0	5.0	570
10.0	0.1	8.9	6.9	4.8	590
11.0	<0.1	8.7	6.9	7.1	610
12.0	<0.1	8.5	7.0	8.8	630

Table 84. Dissolved oxygen (mg/L), temperature (°C), pH (no units), turbidity (NTU), and specific conductivity (µS/cm) measured at approximately 0.5 m depth intervals in the south cell of Ada Hayden Lake on April 5, 2018.

Depth (m)	Dissolved Oxygen (mg/L)	Temperature (°C)	pH (no units)	Turbidity (NTU)	Specific Conductivity (µS/cm)
0.5	13.4	4.5	8.3	2.0	470
1.0	13.2	4.5	8.3	2.3	470
1.5	13.1	4.5	8.3	2.2	470
2.0	13.1	4.5	8.3	2.0	470
2.5	13.0	4.5	8.3	2.0	470
2.5	13.0	4.5	8.2	2.0	470
3.0	13.0	4.5	8.3	2.0	470
3.5	13.0	4.5	8.3	2.1	470
4.0	13.0	4.5	8.3	2.0	470
4.5	12.9	4.5	8.3	2.0	470
5.0	12.9	4.5	8.3	2.0	470
5.5	12.9	4.5	8.3	2.1	470
6.0	12.9	4.5	8.3	2.1	470
6.5	12.9	4.5	8.3	2.1	470
7.0	12.9	4.5	8.3	2.1	470
7.5	12.9	4.5	8.3	2.0	470
8.1	12.9	4.5	8.3	1.9	470
8.5	12.9	4.5	8.3	2.1	470
9.1	12.9	4.5	8.3	1.9	470
9.5	12.9	4.5	8.3	1.9	470
10.0	12.9	4.5	8.3	2.2	470
10.5	12.9	4.5	8.3	2.0	470
11.0	12.8	4.5	8.3	2.5	470
11.0	12.8	4.5	8.3	2.4	470
11.5	12.8	4.5	8.3	2.4	470
12.0	12.8	4.5	8.3	2.0	470
12.5	12.8	4.5	8.3	1.9	470
13.0	12.8	4.5	8.3	2.0	470
13.5	12.8	4.5	8.3	1.8	470
14.0	12.8	4.4	8.3	2.0	470
14.1	12.8	4.4	8.3	2.0	470
14.5	12.7	4.4	8.3	1.9	470
14.6	12.7	4.4	8.3	2.1	470
15.1	12.6	4.4	8.3	2.2	470
15.6	12.6	4.4	8.3	2.6	470
16.0	11.9	4.4	8.3	1.1	470
16.1	11.4	4.4	8.2	1.4	470

Table 85. Dissolved oxygen (mg/L), temperature (°C), pH (no units), turbidity (NTU), and specific conductivity (µS/cm) measured at approximately 0.5 m depth intervals in the south cell of Ada Hayden Lake on May 16, 2018.

Depth (m)	Dissolved Oxygen (mg/L)	Temperature (°C)	pH (no units)	Turbidity (NTU)	Specific Conductivity (µS/cm)
0.1	9.5	19.8	8.2	<1	440
0.5	9.5	19.1	8.2	<1	440
1.1	9.4	18.8	8.2	<1	440
1.5	9.4	18.6	8.2	<1	440
2.0	9.4	18.1	8.2	<1	440
2.5	9.2	17.4	8.2	<1	440
3.0	9.1	16.9	8.1	<1	440
3.5	8.8	16.2	8.1	<1	440
4.0	8.6	15.5	8.0	<1	440
4.5	8.1	14.3	7.9	<1	450
5.0	7.6	12.6	7.8	<1	460
5.5	7.3	11.5	7.7	<1	460
6.0	7.3	10.0	7.7	<1	460
6.5	7.4	8.9	7.6	<1	470
7.0	7.3	7.9	7.6	<1	470
7.5	7.2	7.6	7.6	<1	470
8.0	7.2	7.2	7.6	<1	470
8.5	7.1	6.9	7.6	<1	470
9.0	7.0	6.7	7.6	<1	470
9.5	5.6	6.5	7.5	<1	470
10.0	5.6	6.4	7.5	<1	470
10.5	5.6	6.3	7.5	<1	470
11.0	5.6	6.2	7.5	<1	470
11.5	5.6	6.1	7.5	<1	470
12.0	5.5	6.1	7.5	<1	470
12.5	5.4	6.0	7.5	<1	470
13.0	5.3	5.9	7.5	<1	470
13.5	5.0	5.9	7.5	<1	470
13.9	4.7	5.9	7.5	<1	470
14.5	4.3	5.8	7.5	<1	470
15.0	3.7	5.8	7.5	<1	470
15.5	3.2	5.8	7.4	<1	470
16.0	2.7	5.8	7.4	<1	470
16.5	2.3	5.8	7.4	<1	470
17.0	2.0	5.8	7.4	<1	470
17.5	1.8	5.8	7.4	<1	470
17.7	1.7	5.8	7.2	<1	470

Table 86. Dissolved oxygen (mg/L), temperature (°C), pH (no units), turbidity (NTU), and specific conductivity (µS/cm) measured at approximately 0.5 m depth intervals in the south cell of Ada Hayden Lake on June 15, 2018.

Depth (m)	Dissolved Oxygen (mg/L)	Temperature (°C)	pH (no units)	Turbidity (NTU)	Specific Conductivity (µS/cm)
0.0	10.2	23.1	8.3	6.8	370
0.5	10.3	23.1	8.3	6.8	370
1.0	10.3	23.0	8.4	7.0	370
1.5	10.3	22.9	8.4	6.7	380
2.0	9.9	22.6	8.3	6.7	380
2.5	9.4	22.4	8.2	7.8	370
3.0	9.2	22.1	8.2	10.5	370
3.5	8.7	21.6	8.1	13.6	370
4.0	8.1	20.9	8.0	17.8	360
4.5	8.2	20.6	7.9	12.4	370
5.0	8.1	20.0	7.9	7.7	380
5.5	7.3	18.7	7.7	6.8	400
6.0	6.7	17.4	7.6	6.8	430
6.5	5.8	16.1	7.7	5.6	440
7.0	4.0	13.8	7.5	4.5	470
7.5	2.0	11.9	7.3	3.4	480
8.0	1.2	11.0	7.2	2.8	490
8.5	0.5	10.5	7.2	2.6	490
9.0	0.4	10.3	7.2	2.1	490
9.5	0.3	9.8	7.3	1.9	490
10.0	0.1	9.3	7.3	1.2	490
10.5	<0.1	9.1	7.3	<1	490
11.0	<0.1	8.9	7.3	1.6	490
11.5	<0.1	8.6	7.3	1.0	490
12.0	<0.1	8.4	7.3	1.0	490
12.5	<0.1	8.1	7.3	1.0	490
13.0	<0.1	7.8	7.3	1.1	490
13.5	<0.1	7.6	7.3	<1	490
14.0	<0.1	7.5	7.3	<1	490
14.5	<0.1	7.3	7.3	<1	490
15.0	<0.1	7.2	7.3	1.0	490
15.5	<0.1	7.2	7.2	1.1	490
16.0	<0.1	7.2	7.3	<1	490
16.5	<0.1	7.1	7.3	<1	490
17.0	<0.1	7.1	7.3	<1	490
17.5	<0.1	7.1	7.3	<1	490
18.0	<0.1	7.0	7.2	<1	490

Table 87. Dissolved oxygen (mg/L), temperature (°C), pH (no units), turbidity (NTU), and specific conductivity (µS/cm) measured at approximately 0.5 m depth intervals in the south cell of Ada Hayden Lake on June 28, 2018.

Depth (m)	Dissolved Oxygen (mg/L)	Temperature (°C)	pH (no units)	Turbidity (NTU)	Specific Conductivity (µS/cm)
0.0	13.2	25.4	8.6	1.9	370
0.5	13.3	25.4	8.6	2.0	370
1.0	13.3	25.3	8.7	2.4	370
1.5	13.2	25.0	8.7	2.4	370
2.0	10.7	23.9	8.5	2.0	370
2.5	9.2	23.6	8.3	1.5	380
3.0	7.6	23.2	8.1	1.5	390
3.5	4.9	22.4	7.7	<1	400
4.0	3.6	21.5	7.5	<1	410
4.5	2.2	20.0	7.4	<1	420
5.0	1.6	18.6	7.3	<1	430
5.5	0.9	16.4	7.3	<1	450
6.0	0.6	15.5	7.3	<1	470
6.5	0.4	14.9	7.3	<1	470
7.0	0.3	13.9	7.2	<1	480
7.5	0.1	13.2	7.2	<1	490
8.0	0.1	11.5	7.2	<1	500
8.5	<0.1	10.5	7.2	<1	510
9.0	<0.1	9.9	7.2	<1	510
9.5	<0.1	9.5	7.2	<1	510
10.0	<0.1	9.1	7.2	<1	510
10.5	<0.1	9.0	7.2	<1	510
11.0	<0.1	8.7	7.1	<1	510
11.5	<0.1	8.4	7.1	<1	510
12.0	<0.1	8.1	7.1	<1	510
12.5	<0.1	7.9	7.1	<1	510
13.0	<0.1	7.7	7.1	<1	510
13.5	<0.1	7.6	7.1	<1	510
14.0	<0.1	7.5	7.1	<1	510
14.5	<0.1	7.5	7.1	<1	510
15.0	<0.1	7.5	7.1	<1	510
15.5	<0.1	7.4	7.2	<1	510
16.0	<0.1	7.4	7.2	<1	520
16.5	<0.1	7.4	7.2	<1	520
17.0	<0.1	7.4	7.2	*	520

*substrate disturbed by probe increasing the turbidity result, therefore turbidity results not reported.

Table 88. Dissolved oxygen (mg/L), temperature (°C), pH (no units), turbidity (NTU), and specific conductivity (µS/cm) measured at approximately 0.5 m depth intervals in the south cell of Ada Hayden Lake on July 11, 2018.

Depth (m)	Dissolved Oxygen (mg/L)	Temperature (°C)	pH (no units)	Turbidity (NTU)	Specific Conductivity (µS/cm)
0.1	15.6	28.9	8.6	7.7	320
0.5	16.5	28.8	8.6	8.2	320
1.0	16.5	28.8	8.6	8.0	320
1.5	14.7	27.7	8.5	9.7	340
2.0	12.7	26.8	8.3	8.4	350
2.5	9.2	26.0	8.1	4.1	360
3.1	5.1	24.1	7.6	1.7	380
3.5	2.5	22.6	7.3	1.2	400
4.0	1.2	21.5	7.2	0.8	410
4.5	0.6	21.0	7.1	0.7	420
5.0	0.2	19.8	7.1	0.6	430
6.0	0.2	17.1	7.0	0.9	450
6.5	0.1	15.7	6.9	1.8	470
7.0	0.1	13.9	6.9	1.4	490
7.5	0.1	12.4	6.8	1.1	500
8.0	0.1	11.3	6.8	1.0	510
8.5	0.1	10.7	6.8	0.9	510
9.0	0.1	10.2	6.8	1.0	510
9.5	0.0	9.7	6.8	0.9	510
10.0	0.0	9.3	6.8	0.8	510
10.5	0.0	9.1	6.8	0.8	510
11.0	0.1	8.8	6.8	0.3	510
11.5	0.0	8.6	6.8	0.8	510
12.0	0.0	8.5	6.8	0.6	510
12.5	0.0	8.3	6.8	0.4	520
13.0	0.0	8.2	6.8	0.3	520
13.5	0.0	8.0	6.8	0.3	520
14.0	0.0	7.9	6.8	0.4	530
14.5	0.0	7.8	6.8	0.3	530
15.0	0.0	7.8	6.8	0.2	530
15.5	0.0	7.7	6.8	0.2	530
16.0	0.0	7.7	6.8	0.3	530
16.5	0.0	7.7	6.8	0.6	540
17.0	0.0	7.7	6.8	5.4	540
17.4	0.0	7.6	6.6	16.5	540

Table 89. Dissolved oxygen (mg/L), temperature (°C), pH (no units), turbidity (NTU), and specific conductivity (µS/cm) measured at approximately 0.5 m to 1.0 m depth intervals in the south cell of Ada Hayden Lake on July 26, 2018.

Depth (m)	Dissolved Oxygen (mg/L)	Temperature (°C)	pH (no units)	Turbidity (NTU)	Specific Conductivity (µS/cm)
0.0	10.6	26.3	8.7	6.2	347
0.5	10.6	26.3	8.7	6.3	348
1.0	10.7	26.2	8.7	6.4	348
2.0	10.5	26.1	8.7	6.5	346
3.0	9.9	26.0	8.7	6.9	353
3.5	7.9	25.6	8.6	8.5	373
4.0	2.0	23.9	8.2	4.2	389
5.0	0.6	20.3	7.7	2.8	434
6.0	0.3	16.6	7.5	1.0	472
7.0	0.2	13.6	7.4	1.0	504
8.0	0.2	12.0	7.6	1.0	649
9.0	0.2	10.0	7.6	1.2	524
10.0	0.2	9.2	7.3	1.5	524
11.0	0.2	8.7	7.3	1.2	529
12.0	0.2	8.4	7.3	1.2	529
13.0	0.2	8.0	7.6	1.1	620
14.0	0.2	8.0	7.5	1.1	660

Table 90. Dissolved oxygen (mg/L), temperature (°C), pH (no units), turbidity (NTU), and specific conductivity (µS/cm) measured at approximately 0.5 m to 1.0 m depth intervals in the south cell of Ada Hayden Lake on August 8, 2018.

Depth (m)	Dissolved Oxygen (mg/L)	Temperature (°C)	pH (no units)	Turbidity (NTU)	Specific Conductivity (µS/cm)
0	10.8	25.9	8.7	1.6	322
0.5	10.9	25.9	8.7	1.6	322
1.0	11.0	25.8	8.7	1.6	322
2.0	11.0	25.6	8.7	1.8	322
3.0	10.1	25.4	8.6	2.1	330
3.5	8.2	25.0	8.5	2.8	338
4.0	5.3	24.5	8.2	2.6	350
4.5	2.3	22.7	7.6	3.1	390
5.0	1.0	21.5	7.5	5.8	413
5.5	0.4	19.2	7.3	2.2	441
6.0	0.2	16.1	7.3	<1	472
7.0	0.2	14.2	7.2	<1	494
8.0	0.2	11.6	7.2	<1	516
9.0	<0.1	10.4	7.2	1.1	518
10.0	<0.1	9.3	7.2	1.9	514
11.0	<0.1	8.8	7.2	1.8	518
12.0	<0.1	8.6	7.2	1.5	519
13.0	<0.1	8.1	7.2	1.3	521
14.0	<0.1	8.0	7.2	1.2	525
15.0	<0.1	7.9	7.2	1.2	528
16.0	<0.1	7.8	7.2	1.3	529

Table 91. Dissolved oxygen (mg/L), temperature (°C), pH (no units), turbidity (NTU), and specific conductivity (µS/cm) measured at approximately 0.5 m to 1.0 m depth intervals in the south cell of Ada Hayden Lake on August 28, 2018.

Depth (m)	Dissolved Oxygen (mg/L)	Temperature (°C)	pH (no units)	Turbidity (NTU)	Specific Conductivity (µS/cm)
0	8.5	25.3	8.7	1.2	350
0.5	8.5	25.3	8.7	1.2	350
1.0	8.5	25.3	8.7	1.2	350
1.5	8.5	25.3	8.7	1.2	350
2.0	8.4	25.3	8.7	1.3	350
2.5	8.4	25.1	8.7	1.3	350
3.0	8.3	25.0	8.7	1.3	350
3.5	8.0	24.2	8.6	1.2	354
4.0	7.2	23.8	8.5	1.3	357
4.5	6.0	23.2	8.2	1.4	369
5.0	4.0	22.0	7.8	2.0	390
5.5	0.9	19.9	7.5	5.0	440
6.0	0.5	19.0	7.4	4.2	450
7.0	0.3	13.4	7.3	2.3	520
8.0	0.2	11.6	7.3	2.3	530
9.0	0.1	10.5	7.3	1.9	530
10.0	<0.1	9.3	7.3	1.8	530
11.0	<0.1	8.8	7.3	1.7	540
13.0	<0.1	8.2	7.2	1.5	540
15.0	<0.1	8.0	7.2	1.6	550
17.0	<0.1	7.9	7.2	2.2	560
17.5	<0.1	7.9	7.2	2.3	560

Table 92. Dissolved oxygen (mg/L), temperature (°C), pH (no units), turbidity (NTU), and specific conductivity (µS/cm) measured at approximately 0.5 m depth intervals in the south cell of Ada Hayden Lake on September 12, 2018.

Depth (m)	Dissolved Oxygen (mg/L)	Temperature (°C)	pH (no units)	Turbidity (NTU)	Specific Conductivity (µS/cm)
0	11.8	22.7	8.7	1.7	370
0.5	11.9	22.7	8.7	1.6	370
1.0	12.0	22.7	8.7	1.6	370
1.5	12.0	22.6	8.7	1.7	370
2.0	12.0	22.5	8.7	1.6	370
2.5	11.7	22.4	8.7	1.6	371
3.0	11.3	22.3	8.6	1.6	371
3.5	11.2	22.3	8.6	1.5	371
4.0	11.0	22.2	8.6	1.7	372
4.5	8.9	21.9	8.4	1.6	377
5.0	7.0	21.7	8.2	1.7	386
5.5	4.9	21.4	7.8	1.9	397
6.0	2.6	20.8	7.5	2.5	411
6.5	0.6	19.6	7.4	3.3	436
7.0	0.3	18.4	7.3	3.4	456
7.5	0.2	16.1	7.3	4.2	498
8.0	0.1	13.5	7.2	4.4	533
8.5	<0.1	12.0	7.2	2.5	539
9.0	<0.1	11.1	7.2	2.2	542
9.5	<0.1	10.5	7.2	1.6	539
10.0	<0.1	10.0	7.2	1.3	537
10.5	<0.1	9.5	7.2	1.1	536
11.0	<0.1	9.2	7.2	1.1	540
11.5	<0.1	8.9	7.1	1.1	544
12.0	<0.1	8.7	7.1	<1	545
12.5	<0.1	8.5	7.1	<1	548
13.0	<0.1	8.3	7.1	1.1	551
13.5	<0.1	8.2	7.1	<1	555
14.0	<0.1	8.1	7.1	1.0	557
14.5	<0.1	8.1	7.1	1.2	559
15.0	<0.1	8.1	7.1	1.2	559
15.5	<0.1	8.0	7.1	1.3	560
16.0	<0.1	8.0	7.1	1.6	560
16.5	<0.1	8.0	7.1	1.7	562
17.0	<0.1	8.0	7.1	1.9	563
17.5	<0.1	8.0	7.1	2.5	566

Table 93. Dissolved oxygen (mg/L), temperature (°C), pH (no units), turbidity (NTU), and specific conductivity (µS/cm) measured at approximately 0.5 m to 1.0 m depth intervals in the south cell of Ada Hayden Lake on September 27, 2018.

Depth (m)	Dissolved Oxygen (mg/L)	Temperature (°C)	pH (no units)	Turbidity (NTU)	Specific Conductivity (µS/cm)
0	7.7	19.7	8.2	2.2	390
0.5	7.7	19.7	8.2	2.2	390
1.0	7.6	19.7	8.2	2.3	390
2.0	7.4	19.7	8.2	2.2	390
3.0	7.3	19.7	8.1	2.3	390
4.0	7.3	19.7	8.2	2.3	391
5.0	7.1	19.7	8.1	2.2	392
6.0	6.9	19.7	8.1	2.3	393
6.5	0.9	18.3	7.4	6.0	449
7.0	0.5	17.7	7.4	6.7	464
7.5	0.3	15.1	7.2	6.0	529
8.0	0.2	12.1	7.2	5.1	540
9.0	0.1	10.5	7.2	1.9	540
10.0	0.1	9.5	7.2	1.3	540
11.0	<0.1	9.0	7.1	1.1	550
12.0	<0.1	8.8	7.1	1.1	550
13.0	<0.1	8.5	7.1	1.1	555
14.0	<0.1	8.3	7.1	2.6	559
15.0	<0.1	8.2	7.1	3.2	566

Table 94. Wet mass (mg/L) of algae collected from the north and south cells of Ada Hayden Lake. Samples were collected twice a month from May through September 2017.

Location	Date	Total Wet Mass (mg/L)	Cyanobacteria (mg/L)	Chlorophyta (mg/L)	Diatoms (mg/L)	Dinophyceae (mg/L)
North Cell	5/18/2017	15.794	6.177	0.792	2.736	0.077
South Cell	5/18/2017	19.868	11.098	0.822	2.866	0.000
North Cell	5/31/2017	23.902	13.857	0.638	0.549	2.834
South Cell	5/31/2017	34.937	33.695	0.139	0.034	0.000
North Cell	6/13/2017	15.601	13.297	0.596	0.056	0.007
South Cell	6/13/2017	21.204	19.966	0.629	0.027	0.019
North Cell	6/27/2017	20.424	18.288	0.659	0.027	0.010
South Cell	6/27/2017	15.617	11.819	0.545	0.037	0.000
North Cell	7/11/2017	5.988	3.270	0.542	0.636	0.010
South Cell	7/11/2017	9.302	2.436	1.398	0.807	0.003
North Cell	7/26/2017	5.966	4.215	0.357	0.503	0.000
South Cell	7/26/2017	6.754	4.574	0.267	0.985	0.030
North Cell	8/9/2017	7.915	6.617	0.462	0.269	0.010
South Cell	8/9/2017	12.320	7.689	0.759	0.138	0.000
North Cell	8/22/2017	9.179	7.547	0.579	0.264	0.000
South Cell	8/22/2017	7.949	4.850	0.784	0.147	0.000
North Cell	9/5/2017	16.901	13.474	0.249	0.088	0.019
South Cell	9/5/2017	27.115	21.751	0.737	0.123	0.019
North Cell	9/19/2017	19.592	15.284	0.956	0.041	0.060
South Cell	9/19/2017	10.490	5.866	0.458	0.093	0.918

Table 94, continued. Wet mass (mg/L) of algae collected from the north and south cells of Ada Hayden Lake. Samples were collected twice a month from May through September 2017.

Location	Date	Protozoa (mg/L)	Chrysosphyceae (mg/L)	Euglenophyta (mg/L)	Cryptophyta (mg/L)
North Cell	5/18/2017	0.000	5.373	0.027	0.612
South Cell	5/18/2017	0.023	4.020	0.000	1.038
North Cell	5/31/2017	0.075	4.199	0.028	1.722
South Cell	5/31/2017	0.000	0.158	0.000	0.912
North Cell	6/13/2017	0.000	0.084	0.000	1.561
South Cell	6/13/2017	0.020	0.000	0.000	0.543
North Cell	6/27/2017	0.933	0.101	0.066	0.340
South Cell	6/27/2017	0.633	1.873	0.050	0.660
North Cell	7/11/2017	0.332	1.096	0.020	0.083
South Cell	7/11/2017	0.287	4.144	0.049	0.179
North Cell	7/26/2017	0.309	0.423	0.012	0.148
South Cell	7/26/2017	0.274	0.577	0.000	0.047
North Cell	8/9/2017	0.068	0.388	0.017	0.084
South Cell	8/9/2017	0.218	3.487	0.000	0.028
North Cell	8/22/2017	0.156	0.517	0.043	0.072
South Cell	8/22/2017	0.513	1.254	0.033	0.369
North Cell	9/5/2017	0.237	2.028	0.136	0.668
South Cell	9/5/2017	0.551	3.828	0.018	0.087
North Cell	9/19/2017	0.150	2.303	0.384	0.415
South Cell	9/19/2017	0.189	2.681	0.022	0.261

Table 95. Wet mass (mg/L) of algae collected from the north and south cells of Ada Hayden Lake. Samples were collected from April through September 2018.

Location	Sample Number	Date	Total Wet Mass (mg/L)	Cyanobacteria (mg/L)	Chlorophyta (mg/L)	Diatoms (mg/L)	Dinophyceae (mg/L)
North Cell	641789	4/5/2018	16.255	2.427	0.885	10.094	0.014
South Cell	641785	4/5/2018	12.411	3.300	0.341	6.205	
North Cell	658598	5/16/2018	5.394	1.151	0.368	1.076	
South Cell	658595	5/16/2018	2.235		0.081	0.022	
North Cell	671121	6/15/2018	8.105	4.647	0.528	0.030	
South Cell	671123	6/15/2018	4.884	1.061	0.614	0.841	
North Cell	676695	6/28/2018	13.111	7.661	0.352	0.922	3.264
South Cell	676700	6/28/2018	8.288	2.343	1.111	0.018	3.148
North Cell	681854	7/11/2018	6.808	3.401	0.992	0.185	
South Cell	681853	7/11/2018	33.817	27.490	0.705	0.291	3.674
North Cell	689155	7/26/2018	13.921	10.872	1.833	0.624	
South Cell	689154	7/26/2018	16.965	13.712	1.512	0.380	0.055
North Cell	695755	8/8/2018	19.137	16.795	0.536	0.733	0.024
South Cell	695753	8/8/2018	14.947	10.433	0.661	0.358	1.006
North Cell	705507	8/28/2018	13.439	9.439	0.241	0.805	0.007
South Cell	705509	8/28/2018	10.454	5.896	0.925	0.588	0.008
North Cell	712073	9/12/2018	13.091	9.576	0.682	0.530	0.008
South Cell	712070	9/12/2018	15.475	12.181	0.830	1.244	
North Cell	719481	9/27/2018	11.722	9.885	0.415	0.453	
South Cell	719481	9/27/2018	9.001	5.783	1.033	0.333	0.018

Table 95, continued. Wet mass (mg/L) of algae collected from the north and south cells of Ada Hayden Lake. Samples were collected from April through September 2018.

Location	Sample Number	Date	Protozoa (mg/L)	Chrysosphyceae (mg/L)	Euglenophyta (mg/L)	Cryptophyta (mg/L)
North Cell	641789	4/5/2018	0.031	0.626	0.183	1.996
South Cell	641785	4/5/2018	0.719	0.173	0.089	1.585
North Cell	658598	5/16/2018		1.790		1.010
South Cell	658595	5/16/2018		0.025		2.107
North Cell	671121	6/15/2018		1.455	0.008	1.437
South Cell	671123	6/15/2018	0.131	0.057	0.016	2.163
North Cell	676695	6/28/2018	0.160	0.139		0.612
South Cell	676700	6/28/2018	0.093		0.105	1.469
North Cell	681854	7/11/2018	0.745	0.542		0.943
South Cell	681853	7/11/2018	0.536			1.122
North Cell	689155	7/26/2018	0.328		0.016	0.249
South Cell	689154	7/26/2018	0.393	0.055	0.014	0.844
North Cell	695755	8/8/2018	0.611			0.438
South Cell	695753	8/8/2018	1.621	0.027		0.841
North Cell	705507	8/28/2018	0.689	1.835	0.133	0.289
South Cell	705509	8/28/2018	0.411	2.003	0.015	0.607
North Cell	712073	9/12/2018	0.405	1.313	0.266	0.311
South Cell	712070	9/12/2018	0.575			0.645
North Cell	719481	9/27/2018	0.411	0.341		0.217
South Cell	719481	9/27/2018	0.475	0.956		0.403

Table 96. Zooplankton biomass (µg/L) in samples collected from the north and south cells of Ada Hayden Lake. Samples were collected twice a month from May through September 2017.

Location	Date Sampled	*Alonella* (µg/L)	*Anuraeopsis* (µg/L)	*Ascomorpha* (µg/L)	*Asplanchna* (µg/L)	*Brachionus* (µg/L)	Calanoid (µg/L)
Ada Hayden North Cell	5/18/2017						7.1540
Ada Hayden South Cell	5/18/2017						42.2531
Ada Hayden North Cell	5/31/2017				1.9816		
Ada Hayden South Cell	5/31/2017	1.0983			10.7255		32.4875
Ada Hayden North Cell	6/13/2017						
Ada Hayden South Cell	6/13/2017			0.3999			
Ada Hayden North Cell	6/27/2017					0.0609	55.3692
Ada Hayden South Cell	6/27/2017		0.0095			0.0444	
Ada Hayden North Cell	7/11/2017					0.0052	
Ada Hayden South Cell	7/11/2017				0.7058		
Ada Hayden North Cell	7/26/2017				1.5870		
Ada Hayden South Cell	7/26/2017		0.0022		2.1010	0.0090	
Ada Hayden North Cell	8/9/2017				3.6184		
Ada Hayden South Cell	8/9/2017				1.1340		
Ada Hayden North Cell	8/22/2017				3.5307	0.0119	3.2070
Ada Hayden South Cell	8/22/2017		0.0008			0.0694	
Ada Hayden North Cell	9/5/2017		0.0026				33.1120
Ada Hayden South Cell	9/5/2017						12.8133
Ada Hayden North Cell	9/19/2017						
Ada Hayden South Cell	9/19/2017						

Table 96, continued. Zooplankton biomass (µg/L) in samples collected from the north and south cells of Ada Hayden Lake. Samples were collected twice a month from May through September 2017.

Location	Date Sampled	*Cephalodella* (µg/L)	*Conochiloides* Individual (µg/L)	*Conochilus* Individual (µg/L)	Cyclopoid (µg/L)	*Daphnia* (µg/L)	*Euchanis* (µg/L)
Ada Hayden North Cell	5/18/2017		0.0007		27.9299	23.7702	
Ada Hayden South Cell	5/18/2017				104.7332	48.7544	
Ada Hayden North Cell	5/31/2017				7.4824	14.3603	
Ada Hayden South Cell	5/31/2017				1.6379	45.0841	
Ada Hayden North Cell	6/13/2017			0.1324		71.2383	
Ada Hayden South Cell	6/13/2017			0.3255		33.2827	0.1367
Ada Hayden North Cell	6/27/2017	0.0212		0.4435	12.8597		
Ada Hayden South Cell	6/27/2017			0.5913			
Ada Hayden North Cell	7/11/2017						
Ada Hayden South Cell	7/11/2017				0.7482		
Ada Hayden North Cell	7/26/2017		0.0502		2.4626		
Ada Hayden South Cell	7/26/2017		0.0401				
Ada Hayden North Cell	8/9/2017		0.0037				
Ada Hayden South Cell	8/9/2017		0.0036		1.1787		
Ada Hayden North Cell	8/22/2017		0.0288		1.3352		
Ada Hayden South Cell	8/22/2017		0.0260		8.6970		0.0324
Ada Hayden North Cell	9/5/2017		0.0479		8.5345		
Ada Hayden South Cell	9/5/2017		0.0846		12.1095		
Ada Hayden North Cell	9/19/2017		0.0141		18.3733	3.8012	
Ada Hayden South Cell	9/19/2017				42.3776	7.4799	

Table 96, continued. Zooplankton biomass (µg/L) in samples collected from the north and south cells of Ada Hayden Lake. Samples were collected twice a month from May through September 2017.

Location	Date Sampled	*Filina* (µg/L)	*Gastropus* (µg/L)	*Hexarthra* (µg/L)	*Kellicottia* (µg/L)	*Keratell cochleari* group (µg/L)	*Monostyla* (µg/L)
Ada Hayden North Cell	5/18/2017	1.2367	0.0945		0.1028	0.2324	
Ada Hayden South Cell	5/18/2017	2.0896			0.0187	0.2092	
Ada Hayden North Cell	5/31/2017	0.4430	2.2130			0.6710	
Ada Hayden South Cell	5/31/2017	2.9965	0.7173			0.7136	
Ada Hayden North Cell	6/13/2017		1.5897			0.5897	
Ada Hayden South Cell	6/13/2017	0.4334	1.0483			0.7258	
Ada Hayden North Cell	6/27/2017		4.9729			0.5623	
Ada Hayden South Cell	6/27/2017	0.5771	0.2265		0.0548	0.7114	
Ada Hayden North Cell	7/11/2017		0.0224		0.0031	0.0080	
Ada Hayden South Cell	7/11/2017			0.0367		0.0096	
Ada Hayden North Cell	7/26/2017	0.0138		0.0452		0.0085	0.0053
Ada Hayden South Cell	7/26/2017			0.0542		0.0029	
Ada Hayden North Cell	8/9/2017	0.0227	0.1083	0.1568		0.0043	
Ada Hayden South Cell	8/9/2017			0.0240		0.0022	
Ada Hayden North Cell	8/22/2017	0.0220	0.0028	0.0681		0.0090	
Ada Hayden South Cell	8/22/2017		0.0422	0.0962		0.0105	
Ada Hayden North Cell	9/5/2017		0.1110			0.0636	
Ada Hayden South Cell	9/5/2017		0.0309			0.0559	
Ada Hayden North Cell	9/19/2017				0.0057	0.0285	
Ada Hayden South Cell	9/19/2017				0.1308	0.1326	

Table 96, continued. Zooplankton biomass (µg/L) in samples collected from the north and south cells of Ada Hayden Lake. Samples were collected twice a month from May through September 2017.

Location	Date Sampled	Nauplii (µg/L)	Ostracod (µg/L)	*Polyarthra* (µg/L)	*Pompholyx* (µg/L)	*Synchaeta* (µg/L)	*Trichocerca* (µg/L)
Ada Hayden North Cell	5/18/2017	14.1359		6.3396		2.4390	0.0888
Ada Hayden South Cell	5/18/2017	15.1641		3.3939		3.2198	
Ada Hayden North Cell	5/31/2017	22.8627		10.1477		1.3068	1.1810
Ada Hayden South Cell	5/31/2017	10.2305		2.9834		0.5036	0.2255
Ada Hayden North Cell	6/13/2017	5.5796		1.1099		0.5654	0.3400
Ada Hayden South Cell	6/13/2017	15.5494		2.1235		7.7616	0.3458
Ada Hayden North Cell	6/27/2017	2.6900	0.1009	5.7275	0.1383	1.7436	0.7017
Ada Hayden South Cell	6/27/2017	11.6509		10.9582		1.9102	
Ada Hayden North Cell	7/11/2017	0.2566		0.5161		0.6999	
Ada Hayden South Cell	7/11/2017	1.0663		0.8006		1.1457	
Ada Hayden North Cell	7/26/2017	0.2453		1.4531		0.1340	0.1231
Ada Hayden South Cell	7/26/2017	1.4305		0.2484			0.0079
Ada Hayden North Cell	8/9/2017	0.5878		0.9781		0.6010	
Ada Hayden South Cell	8/9/2017	1.8257		0.2688		0.0766	
Ada Hayden North Cell	8/22/2017	1.6924		2.3946		0.8170	0.0367
Ada Hayden South Cell	8/22/2017	6.1725		6.3605		0.5422	0.0572
Ada Hayden North Cell	9/5/2017	5.9573		1.8214		0.6089	
Ada Hayden South Cell	9/5/2017	6.4526		2.4059			
Ada Hayden North Cell	9/19/2017	4.6778		0.6844			
Ada Hayden South Cell	9/19/2017	6.4855		1.8124			

Table 96, continued. Zooplankton biomass (µg/L) in samples collected from the north and south cells of Ada Hayden Lake. Samples were collected twice a month from May through September 2017.

Location	Date Sampled	Unknown Monogononta Rotifer (µg/L)	Cladoceran Total Biomass (µg/L)	Copepoda Total Biomass (µg/L)	Rotifer Total Biomass (µg/L)	Ostracod Total Biomass (µg/L)	Total Biomass (µg/L)
Ada Hayden North Cell	5/18/2017		23.7702	49.2199	10.5345		83.5246
Ada Hayden South Cell	5/18/2017		48.7544	162.1504	8.9312		219.8360
Ada Hayden North Cell	5/31/2017		14.3603	30.3452	17.9441		62.6495
Ada Hayden South Cell	5/31/2017		46.1824	44.3559	18.8655		109.4038
Ada Hayden North Cell	6/13/2017		71.2383	5.5796	4.3271		81.1449
Ada Hayden South Cell	6/13/2017		33.2827	15.5494	13.3005		62.1326
Ada Hayden North Cell	6/27/2017			70.9189	14.3717	0.1009	85.3915
Ada Hayden South Cell	6/27/2017			11.6509	15.0834		26.7343
Ada Hayden North Cell	7/11/2017			0.2566	1.2547		1.5113
Ada Hayden South Cell	7/11/2017	0.1229		1.8145	2.8213		4.6358
Ada Hayden North Cell	7/26/2017			2.7079	3.4203		6.1282
Ada Hayden South Cell	7/26/2017			1.4305	2.4658		3.8963
Ada Hayden North Cell	8/9/2017			0.5878	5.4933		6.0811
Ada Hayden South Cell	8/9/2017			3.0044	1.5091		4.5135
Ada Hayden North Cell	8/22/2017			6.2347	6.9216		13.1563
Ada Hayden South Cell	8/22/2017			14.8695	7.2374		22.1069
Ada Hayden North Cell	9/5/2017			47.6038	2.6552		50.2591
Ada Hayden South Cell	9/5/2017			31.3754	2.5772		33.9526
Ada Hayden North Cell	9/19/2017		3.8012	23.0511	0.7327		27.5850
Ada Hayden South Cell	9/19/2017		7.4799	48.8631	2.0758		58.4188

Table 97. Zooplankton biomass (µg/L) in samples collected from the north and south cells of Ada Hayden Lake. Samples were collected twice a month from April through September 2018.

Location	Date Sampled	*Euchanis* (µg/L)	*Keratella quadrata group* (µg/L)	*Rhinoglena* (µg/L)	*Asplanchna* (µg/L)	*Brachionus* (µg/L)	Calanoid (µg/L)
Ada Hayden North Cell	4/5/18						
Ada Hayden South Cell	4/5/18						
Ada Hayden North Cell	5/16/18				34.9352		
Ada Hayden South Cell	5/16/18						
Ada Hayden North Cell	6/15/18						26.9485
Ada Hayden South Cell	6/15/18	0.0198	0.2373			0.0121	20.8329
Ada Hayden North Cell	6/28/18						
Ada Hayden South Cell	6/28/18					0.3519	142.3951
Ada Hayden North Cell	7/11/18	0.2723				0.3702	
Ada Hayden South Cell	7/11/18			0.4260			
Ada Hayden North Cell	7/26/18					0.7912	
Ada Hayden South Cell	7/26/18			0.0956	3.6959	1.7822	
Ada Hayden North Cell	8/8/18				0.6079	0.0760	
Ada Hayden South Cell	8/8/18				34.2682	0.8934	
Ada Hayden North Cell	8/28/18				11.8157		
Ada Hayden South Cell	8/28/18					0.0782	
Ada Hayden North Cell	9/12/18				2.0306		6.5420
Ada Hayden South Cell	9/12/18		0.0974		3.3965		6.1100
Ada Hayden North Cell	9/27/18						17.3877
Ada Hayden South Cell	9/27/18						16.2594

Table 97 continued. Zooplankton biomass (µg/L) in samples collected from the north and south cells of Ada Hayden Lake. Samples were collected twice a month from April through September 2018.

Location	Date Sampled	*Bosmina* (µg/L)	*Conochiloides* Individual (µg/L)	*Conochilus* Individual (µg/L)	Cyclopoid (µg/L)	*Daphnia* (µg/L)	*Chydorus* (µg/L)
Ada Hayden North Cell	4/5/18				225.2849		
Ada Hayden South Cell	4/5/18				29.8561		
Ada Hayden North Cell	5/16/18	5.0984			11.5699	23.8567	0.6211
Ada Hayden South Cell	5/16/18	3.6078			33.0089	52.5083	
Ada Hayden North Cell	6/15/18				35.7906	65.2614	
Ada Hayden South Cell	6/15/18	0.2382			26.9210	23.5222	
Ada Hayden North Cell	6/28/18			0.0615		25.8154	
Ada Hayden South Cell	6/28/18			0.5284	60.3175		
Ada Hayden North Cell	7/11/18						
Ada Hayden South Cell	7/11/18						
Ada Hayden North Cell	7/26/18			0.0495			
Ada Hayden South Cell	7/26/18			0.0436			
Ada Hayden North Cell	8/8/18			0.0421			
Ada Hayden South Cell	8/8/18			0.0130			
Ada Hayden North Cell	8/28/18						
Ada Hayden South Cell	8/28/18				2.1089		
Ada Hayden North Cell	9/12/18				0.6921		
Ada Hayden South Cell	9/12/18				8.6651		
Ada Hayden North Cell	9/27/18			0.0357	9.7453	3.8509	
Ada Hayden South Cell	9/27/18			0.0169	7.8171		

Table 97, continued. Zooplankton biomass (µg/L) in samples collected from the north and south cells of Ada Hayden Lake. Samples were collected twice a month from April through September 2018.

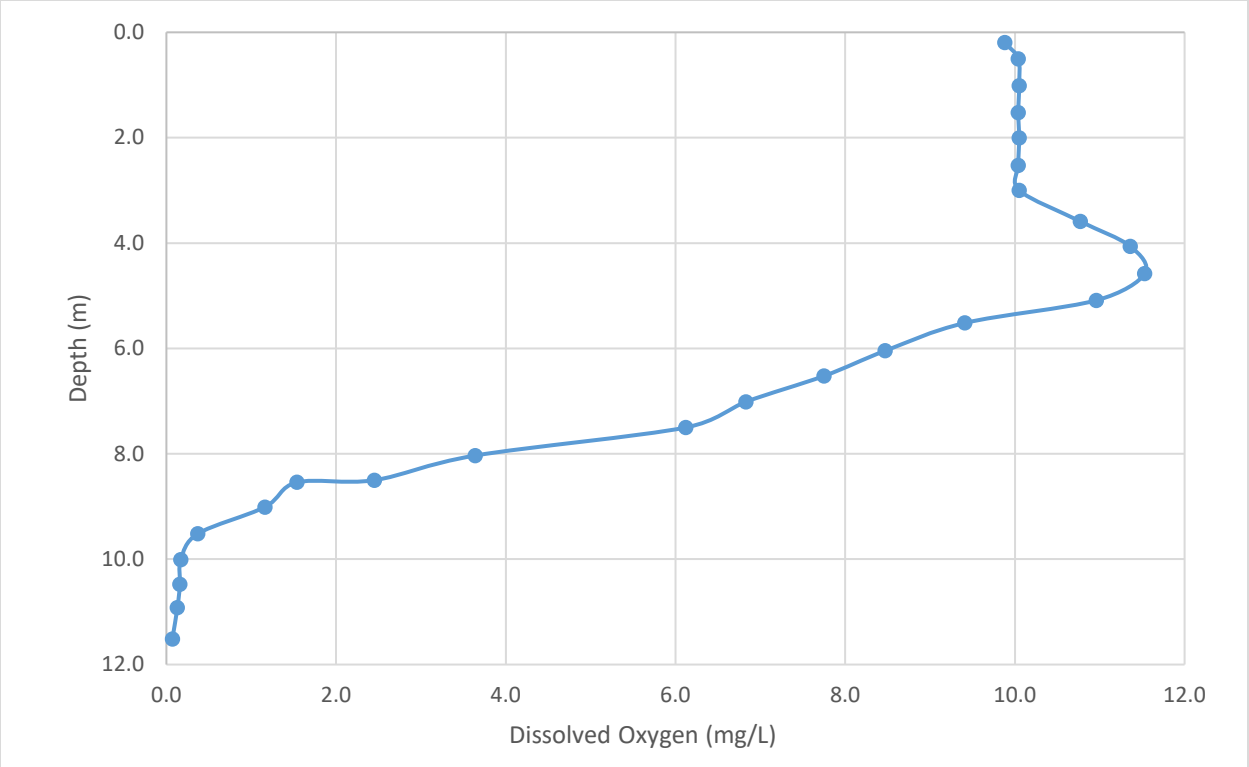
Location	Date Sampled	*Filina* (µg/L)	*Gastropus* (µg/L)	*Hexarthra* (µg/L)	*Kellicottia* (µg/L)	*Keratell cochlearis* group (µg/L)	*Notholca* (µg/L)
Ada Hayden North Cell	4/5/18					0.3035	
Ada Hayden South Cell	4/5/18	0.6457				1.1012	0.0861
Ada Hayden North Cell	5/16/18	9.6629				0.7676	
Ada Hayden South Cell	5/16/18	5.9993				0.2800	
Ada Hayden North Cell	6/15/18				0.0128	0.2258	
Ada Hayden South Cell	6/15/18	0.0199		0.0261		0.3625	
Ada Hayden North Cell	6/28/18		0.2907			0.4366	
Ada Hayden South Cell	6/28/18	0.7827	0.2427			0.3307	
Ada Hayden North Cell	7/11/18	0.5958	0.0922			0.0839	
Ada Hayden South Cell	7/11/18	13.0413	0.4705	2.4519		1.2456	
Ada Hayden North Cell	7/26/18	0.5633		5.3623		0.0753	
Ada Hayden South Cell	7/26/18	0.3913		10.2519		0.0779	
Ada Hayden North Cell	8/8/18		0.3039	1.6549		0.0281	
Ada Hayden South Cell	8/8/18	0.1104		5.3902		0.0317	
Ada Hayden North Cell	8/28/18			1.6123		0.0857	
Ada Hayden South Cell	8/28/18			0.6940		0.0216	
Ada Hayden North Cell	9/12/18		0.0287		0.0026	0.0102	
Ada Hayden South Cell	9/12/18		0.1994		0.1190	0.0179	
Ada Hayden North Cell	9/27/18	0.1119			0.0047	0.0224	
Ada Hayden South Cell	9/27/18	0.1448				0.0205	

Table 97, continued. Zooplankton biomass (µg/L) in samples collected from the north and south cells of Ada Hayden Lake. Samples were collected twice a month from April through September, 2018.

Location	Date Sampled	Nauplii (µg/L)	*Ascomorpha* (µg/L)	*Polyarthra* (µg/L)	*Pompholyx* (µg/L)	*Synchaeta* (µg/L)	*Trichocerca* (µg/L)
Ada Hayden North Cell	4/5/18	5.8667		73.5804		4.7162	
Ada Hayden South Cell	4/5/18	6.0780		83.4761		6.8304	
Ada Hayden North Cell	5/16/18			0.3116		6.0139	
Ada Hayden South Cell	5/16/18			0.1418		2.8399	
Ada Hayden North Cell	6/15/18	12.3035		0.7987			
Ada Hayden South Cell	6/15/18	9.0293		0.3103			
Ada Hayden North Cell	6/28/18	4.5189		4.5743		5.5705	0.1136
Ada Hayden South Cell	6/28/18	9.9966		8.1635		4.9939	0.1292
Ada Hayden North Cell	7/11/18	3.5998		5.0059	1.0374	1.9919	1.0727
Ada Hayden South Cell	7/11/18	10.5595		31.9495	1.4523	6.0667	17.6668
Ada Hayden North Cell	7/26/18	11.6929	0.2447	11.9322		2.5498	0.0614
Ada Hayden South Cell	7/26/18	0.6907	0.0367	12.7632		3.1143	1.0150
Ada Hayden North Cell	8/8/18	1.8746	0.0138	2.6041		0.4126	0.1543
Ada Hayden South Cell	8/8/18	1.0261	0.0299	5.9972		6.6080	1.1349
Ada Hayden North Cell	8/28/18	1.3869		4.1168			
Ada Hayden South Cell	8/28/18	0.8683		1.6430		0.1024	0.0374
Ada Hayden North Cell	9/12/18	4.9238		1.0268		0.0687	0.1829
Ada Hayden South Cell	9/12/18	6.3719		2.2272	0.1406	0.9652	0.0829
Ada Hayden North Cell	9/27/18	1.9148		1.0539		0.3515	
Ada Hayden South Cell	9/27/18	3.3797		3.5954		0.0769	0.3792

Table 97, continued. Zooplankton biomass (µg/L) in samples collected from the north and south cells of Ada Hayden Lake. Samples were collected twice a month from April through September, 2018.

Location	Date Sampled	*Anuraeopsis* (µg/L)	Unknown Monogononta Rotifer (µg/L)	Cladoceran Total Biomass (µg/L)	Copepoda Total Biomass (µg/L)	Rotifer Total Biomass (µg/L)	Total Biomass (µg/L)
Ada Hayden North Cell	4/5/18				231.1517	78.6000	309.7517
Ada Hayden South Cell	4/5/18				35.9341	92.1394	128.0735
Ada Hayden North Cell	5/16/18			29.5762	21.2327	42.0283	92.8372
Ada Hayden South Cell	5/16/18			56.1162	39.0083	3.2616	98.3860
Ada Hayden North Cell	6/15/18			65.2614	75.0426	1.0373	141.3412
Ada Hayden South Cell	6/15/18			23.7604	56.7832	0.9880	81.5316
Ada Hayden North Cell	6/28/18			25.8154	4.5189	11.0471	41.3813
Ada Hayden South Cell	6/28/18				212.7092	15.5229	228.2321
Ada Hayden North Cell	7/11/18				3.5998	10.5222	14.1221
Ada Hayden South Cell	7/11/18				10.5595	74.7707	85.3302
Ada Hayden North Cell	7/26/18	0.0474			11.6929	21.6772	33.3700
Ada Hayden South Cell	7/26/18	0.0155	0.6111		0.6907	33.8941	34.5848
Ada Hayden North Cell	8/8/18	0.0016			1.8746	5.8994	7.7740
Ada Hayden South Cell	8/8/18				1.0261	54.4769	55.5030
Ada Hayden North Cell	8/28/18				1.3869	17.6305	19.0174
Ada Hayden South Cell	8/28/18				2.9772	2.5766	5.5538
Ada Hayden North Cell	9/12/18				12.1579	3.3505	15.5084
Ada Hayden South Cell	9/12/18				21.1470	7.2461	28.3931
Ada Hayden North Cell	9/27/18			3.8509	29.0478	1.5801	34.4788
Ada Hayden South Cell	9/27/18				27.4562	4.2337	31.6899



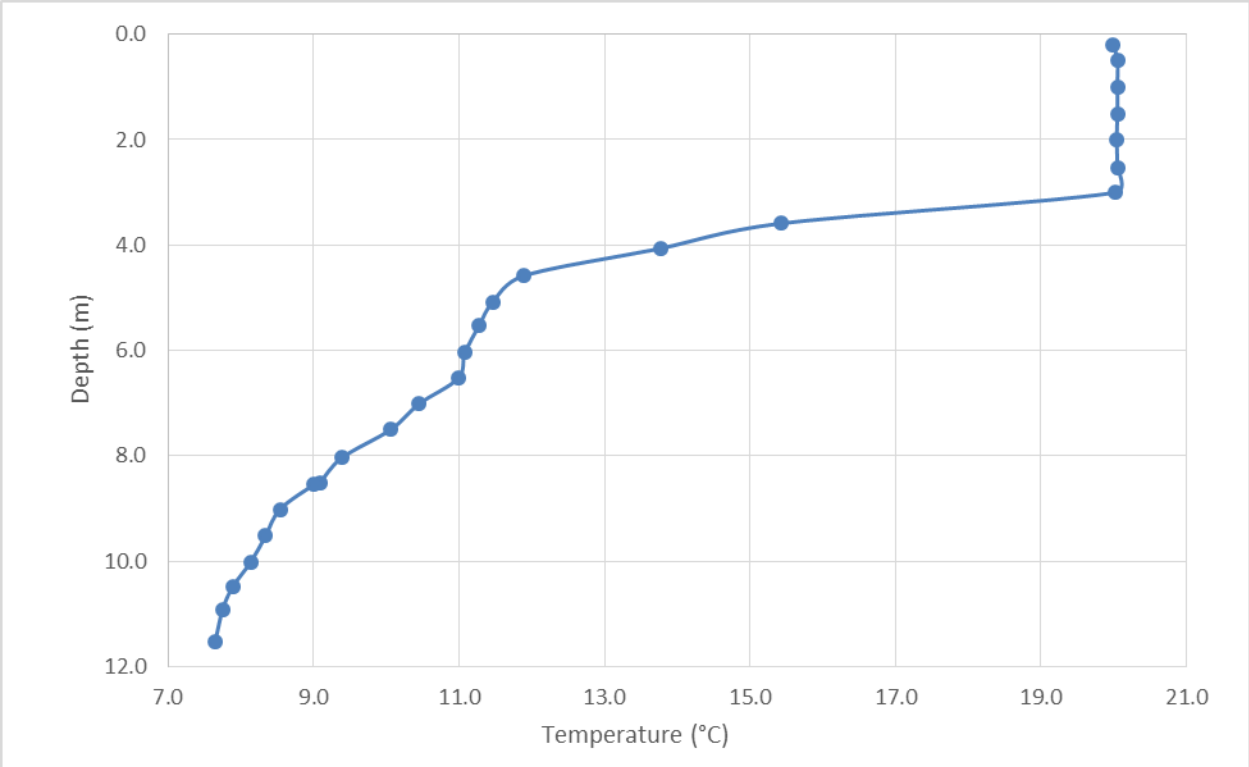


Figure 26. Dissolved oxygen (mg/L) and temperature (°C) measured at approximately 0.5 m depth intervals in the north cell of Ada Hayden Lake on May 18, 2017.

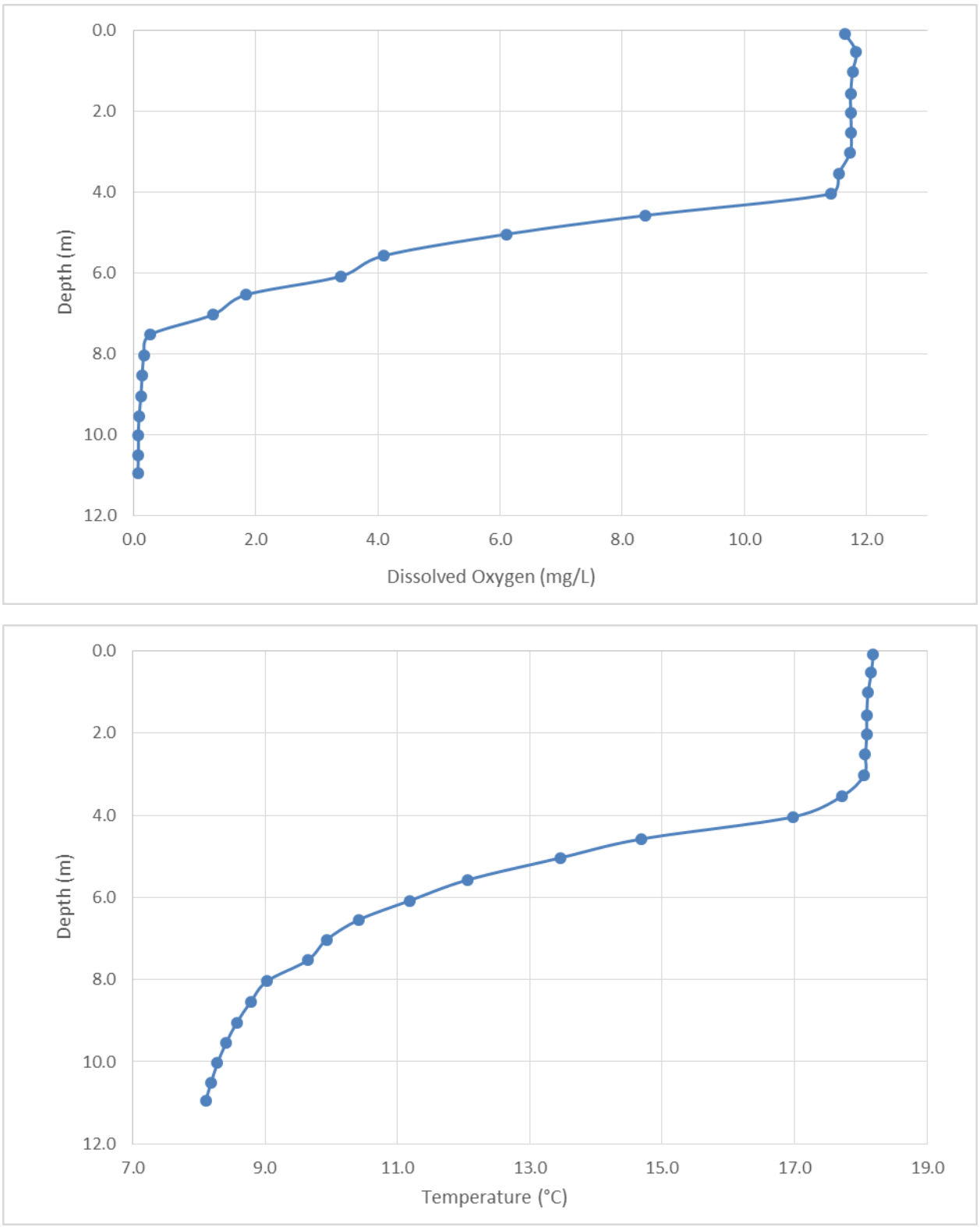


Figure 27. Dissolved oxygen (mg/L) and temperature (°C) measured at approximately 0.5 m depth intervals in the north cell of Ada Hayden Lake on May 31, 2017.

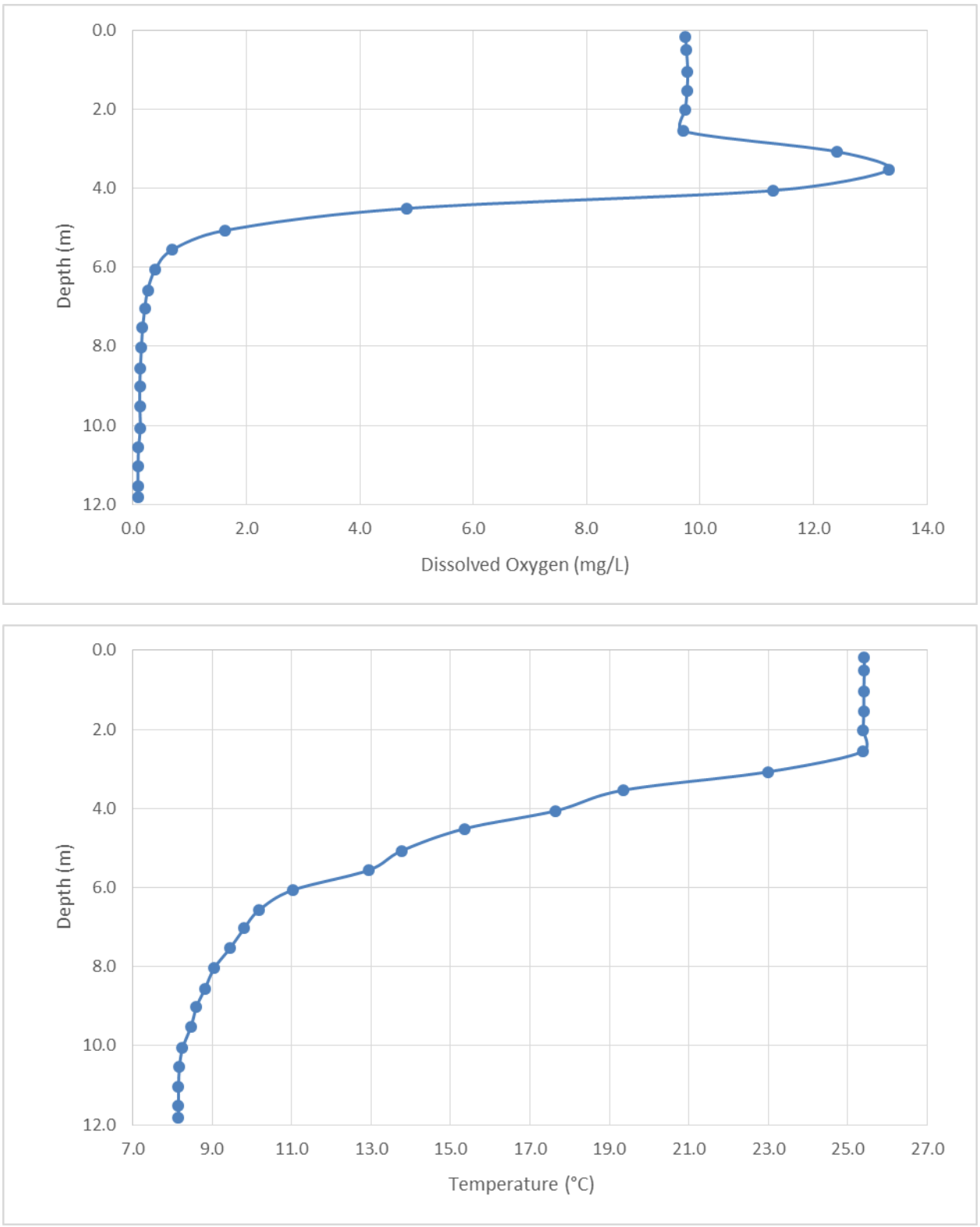
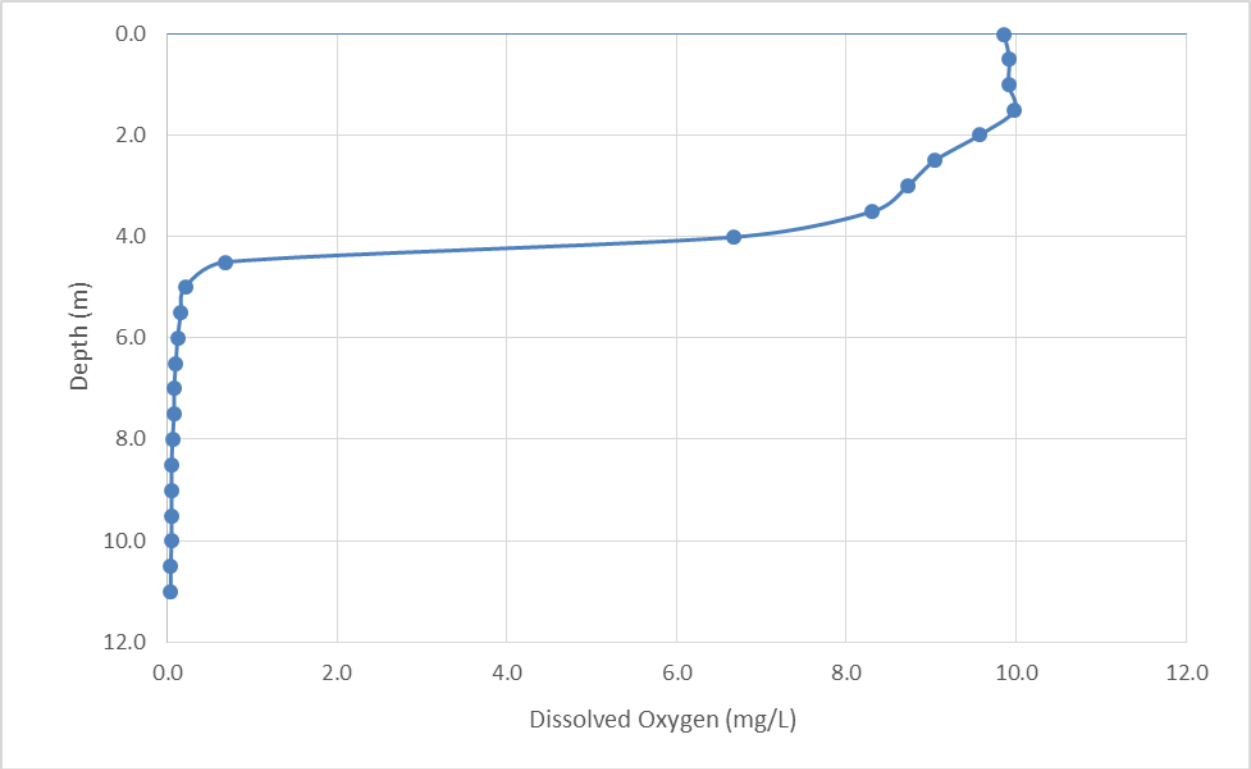


Figure 28. Dissolved oxygen (mg/L) and temperature (°C) measured at approximately 0.5 m depth intervals in the north cell of Ada Hayden Lake on June 13, 2017.



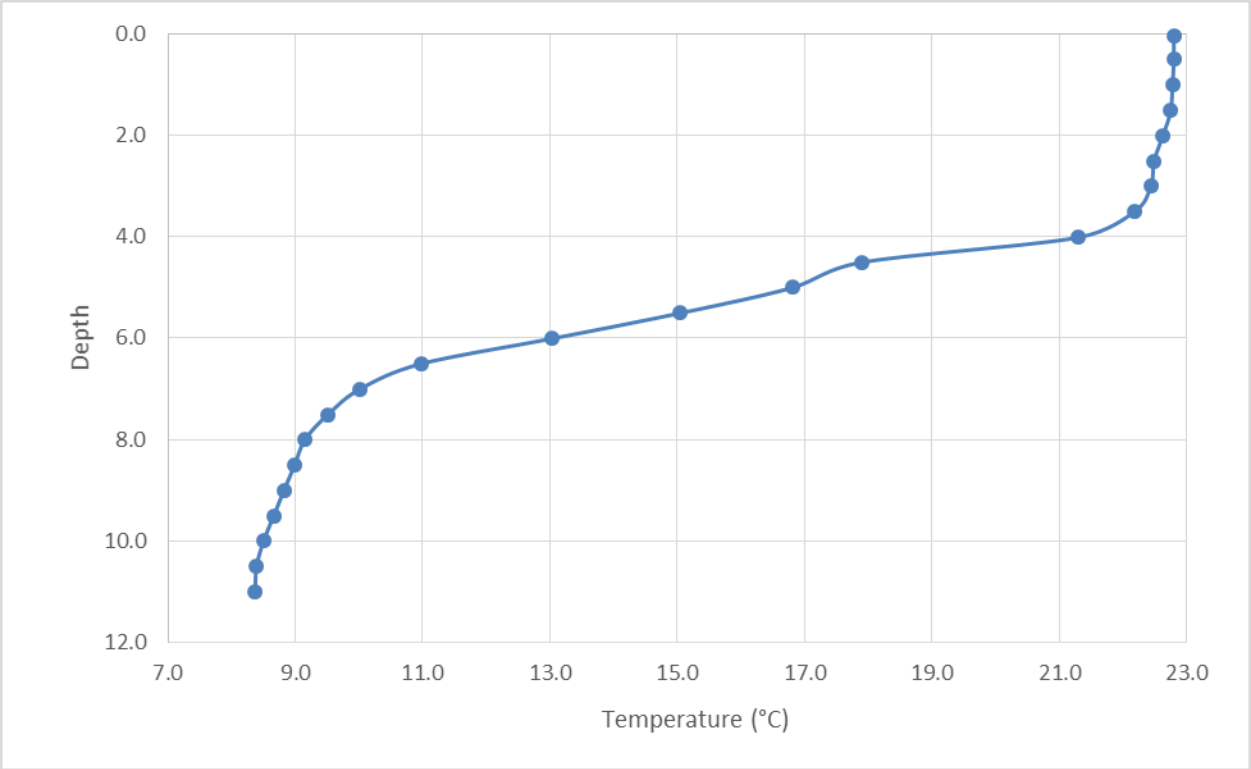
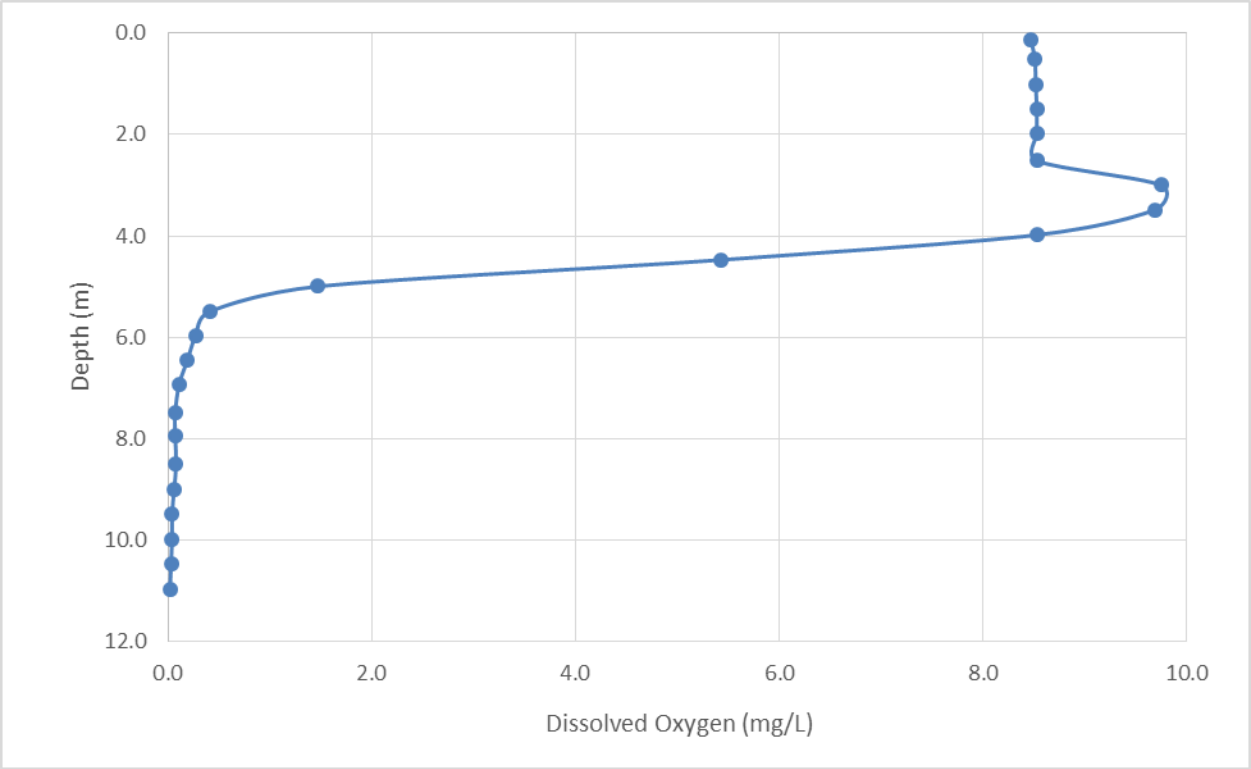


Figure 29. Dissolved oxygen (mg/L) and temperature (°C) measured at approximately 0.5 m depth intervals in the north cell of Ada Hayden Lake on June 27, 2017.



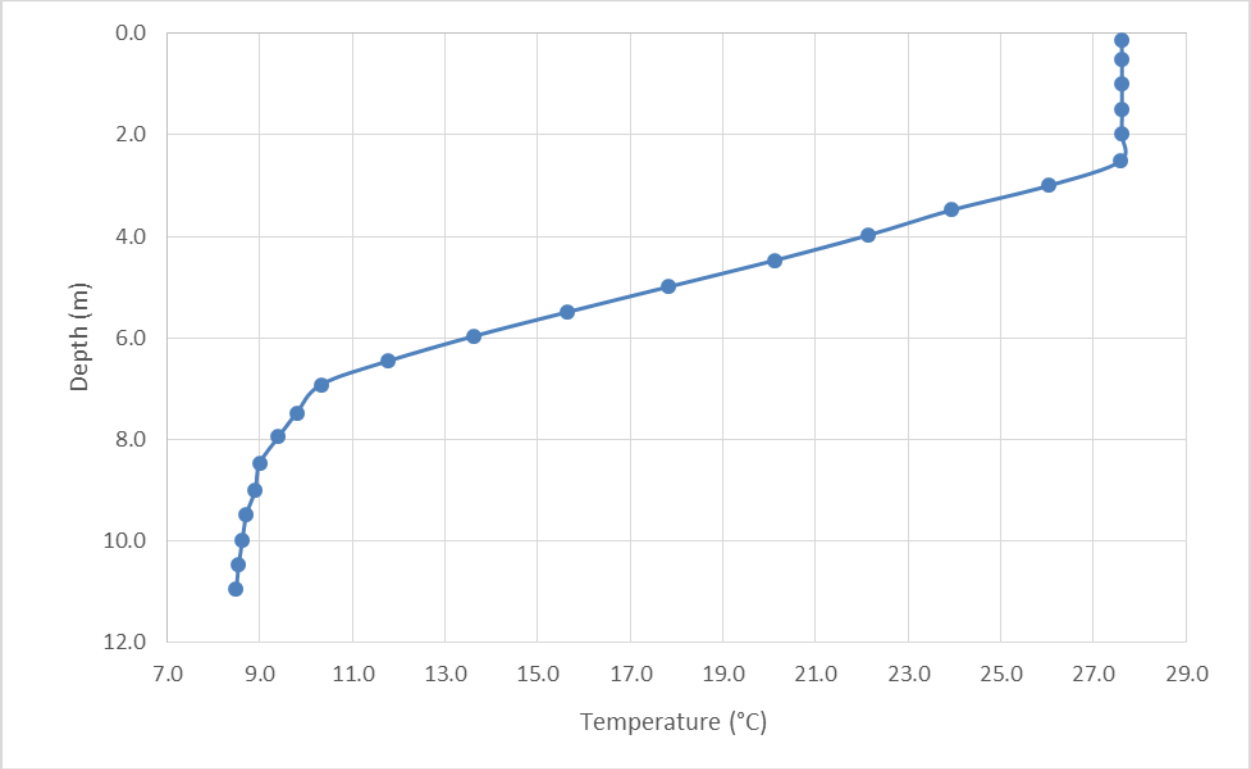
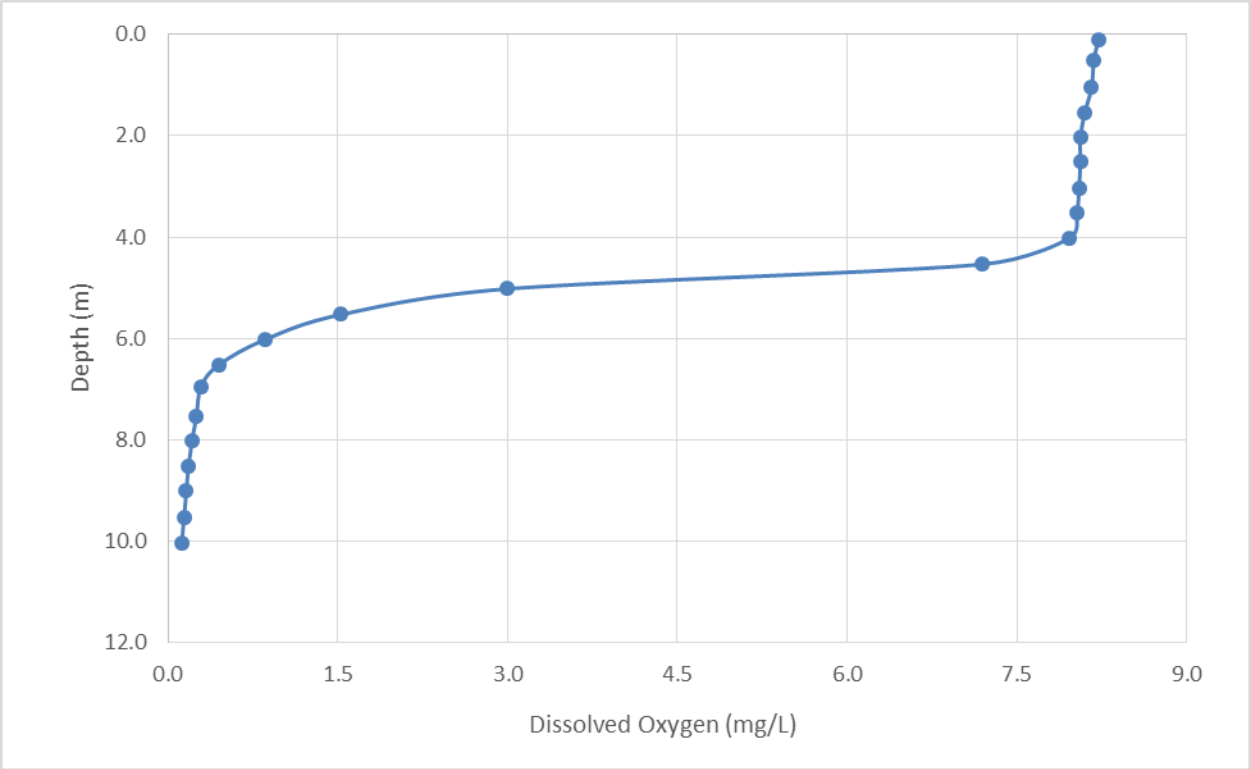


Figure 30. Dissolved oxygen (mg/L) and temperature (°C) measured at approximately 0.5 m depth intervals in the north cell of Ada Hayden Lake on July 11, 2017.



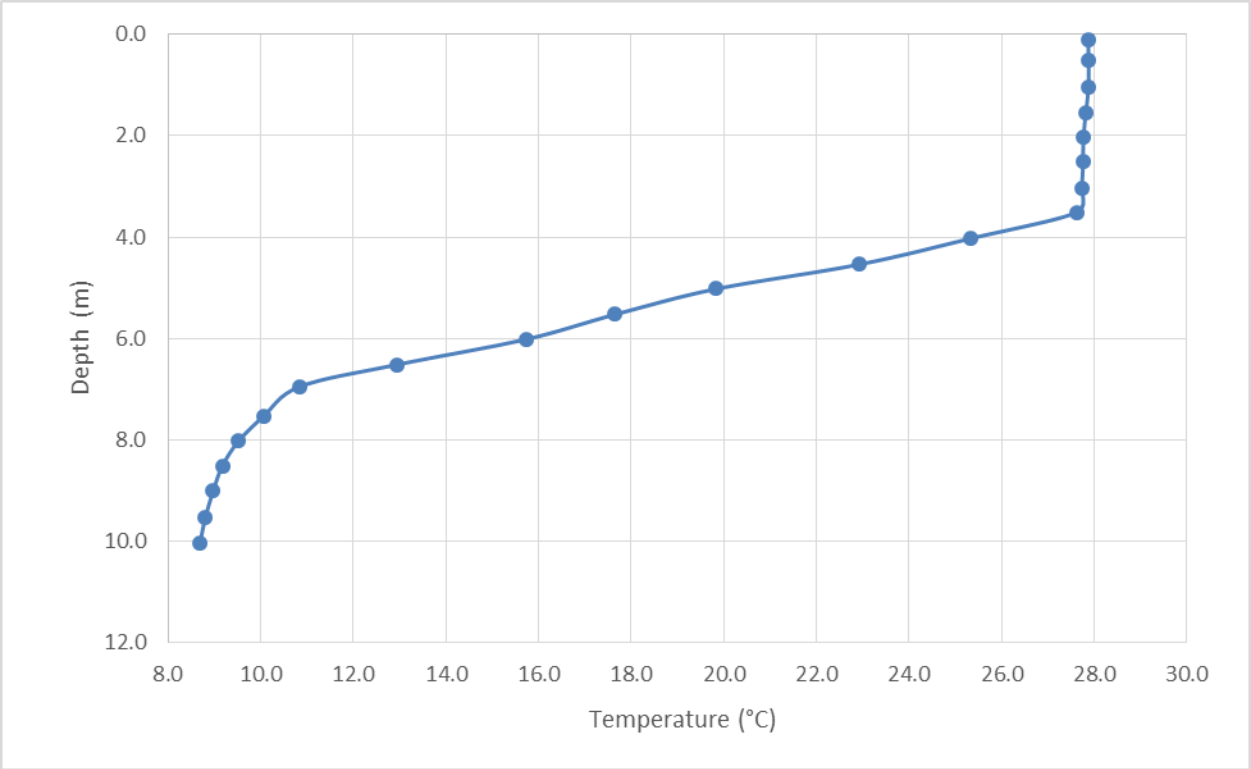
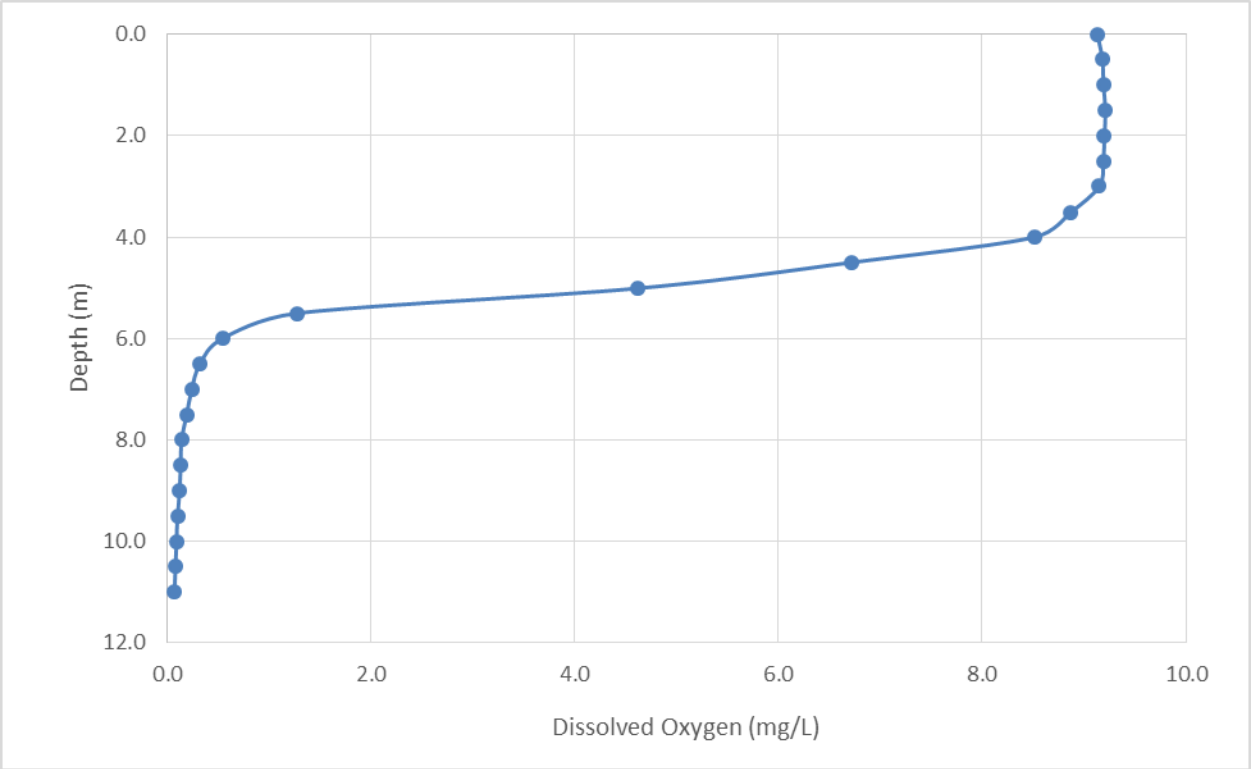


Figure 31. Dissolved oxygen (mg/L) and temperature (°C) measured at approximately 0.5 m depth intervals in the north cell of Ada Hayden Lake on July 26, 2017.



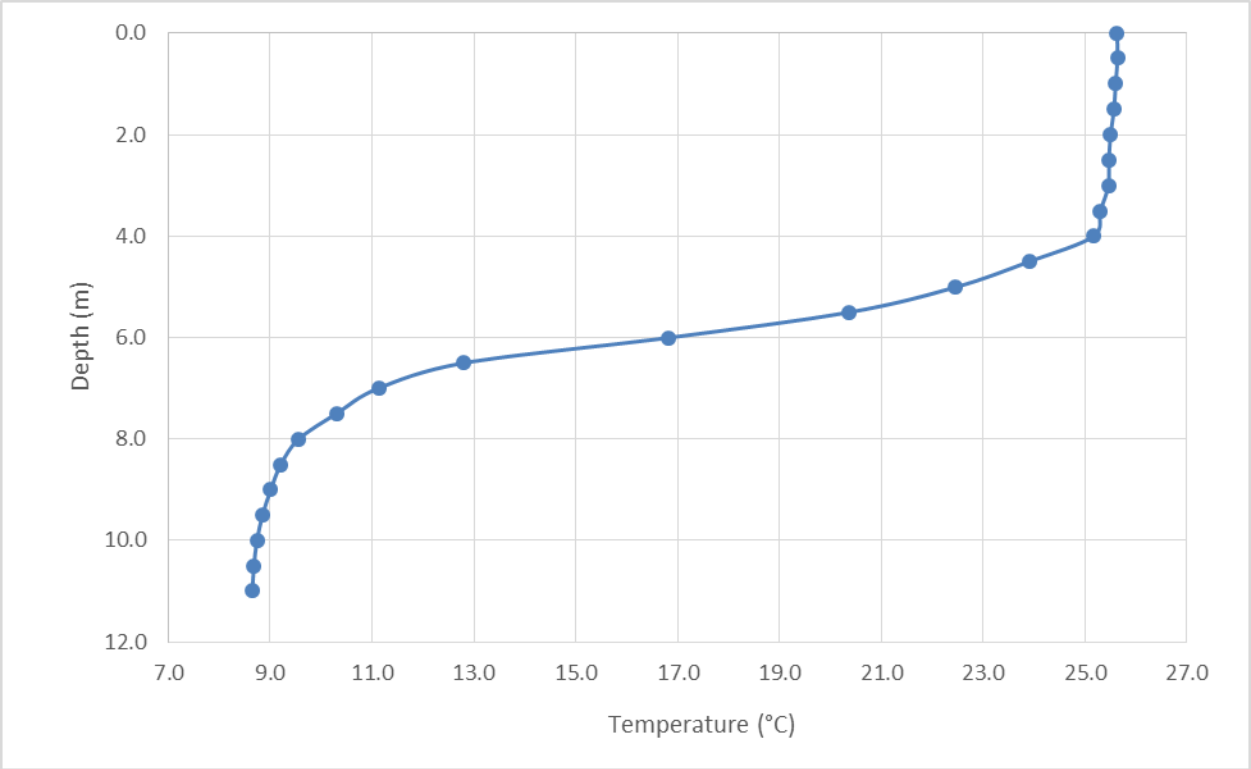
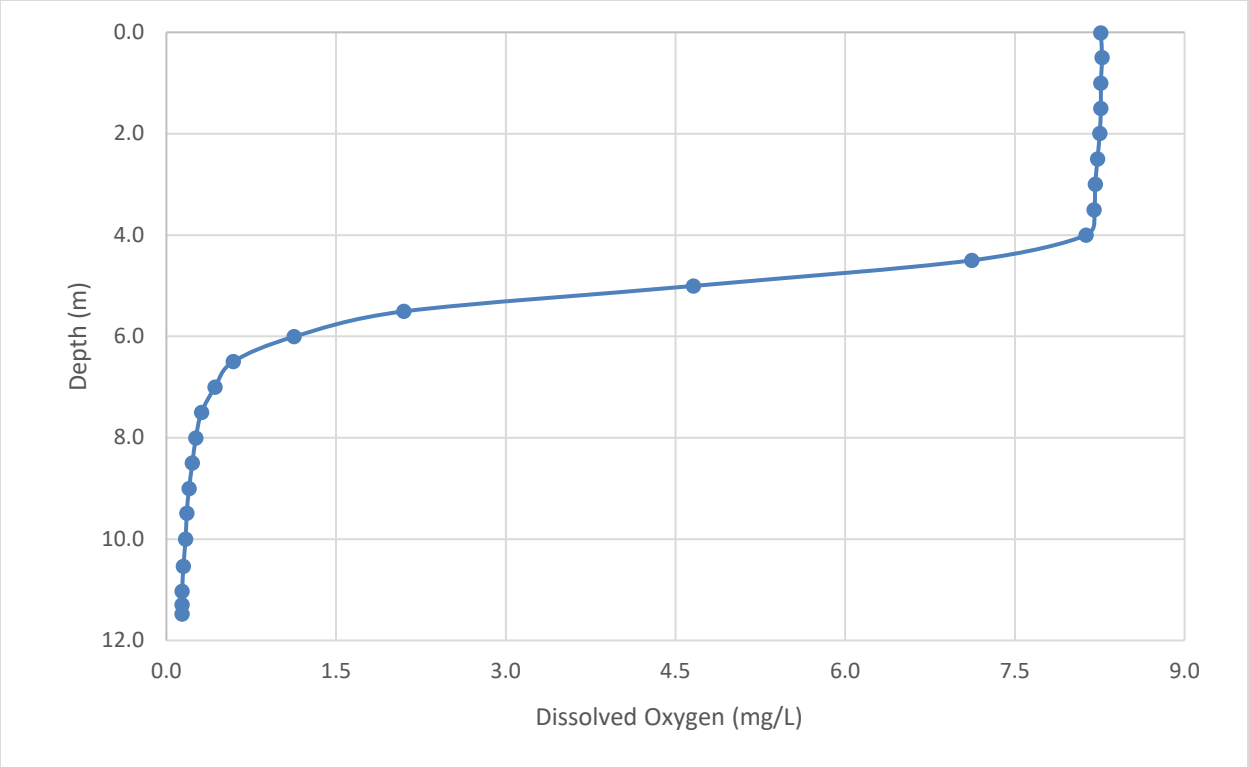


Figure 32. Dissolved oxygen (mg/L) and temperature (°C) measured at approximately 0.5 m depth intervals in the north cell of Ada Hayden Lake on August 9, 2017.



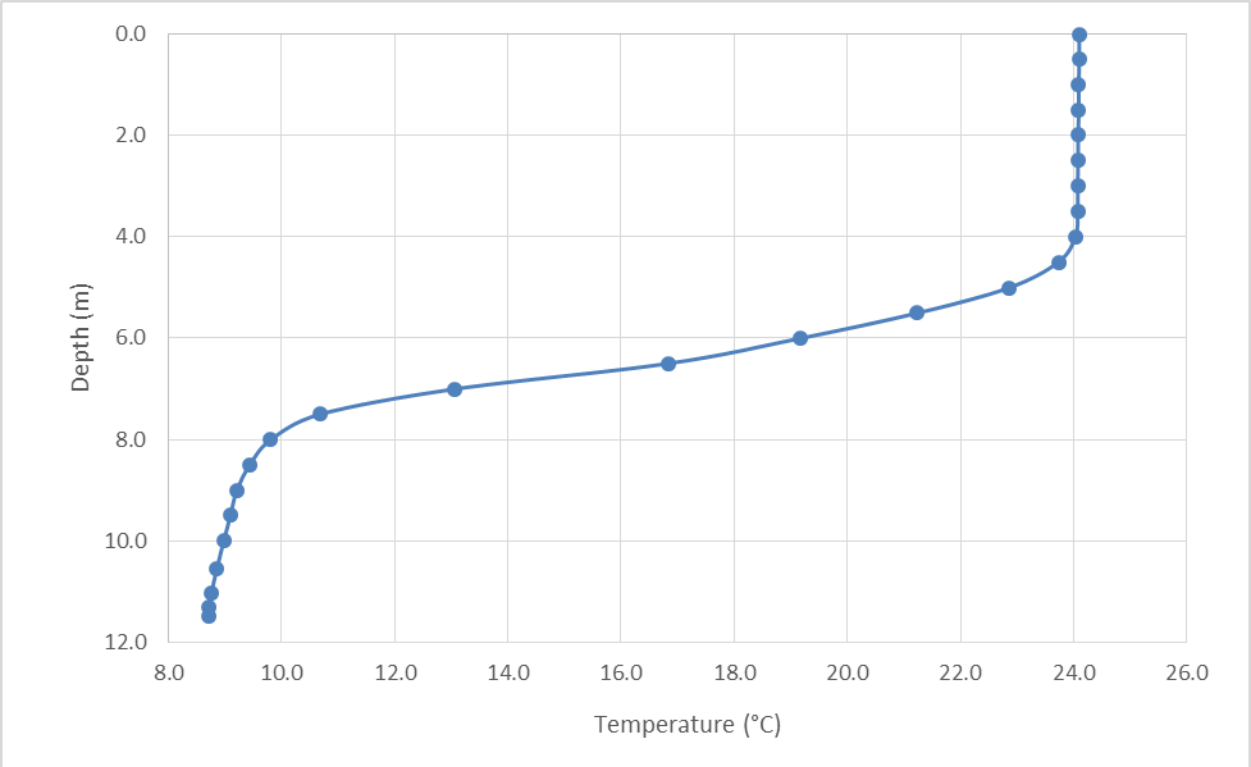
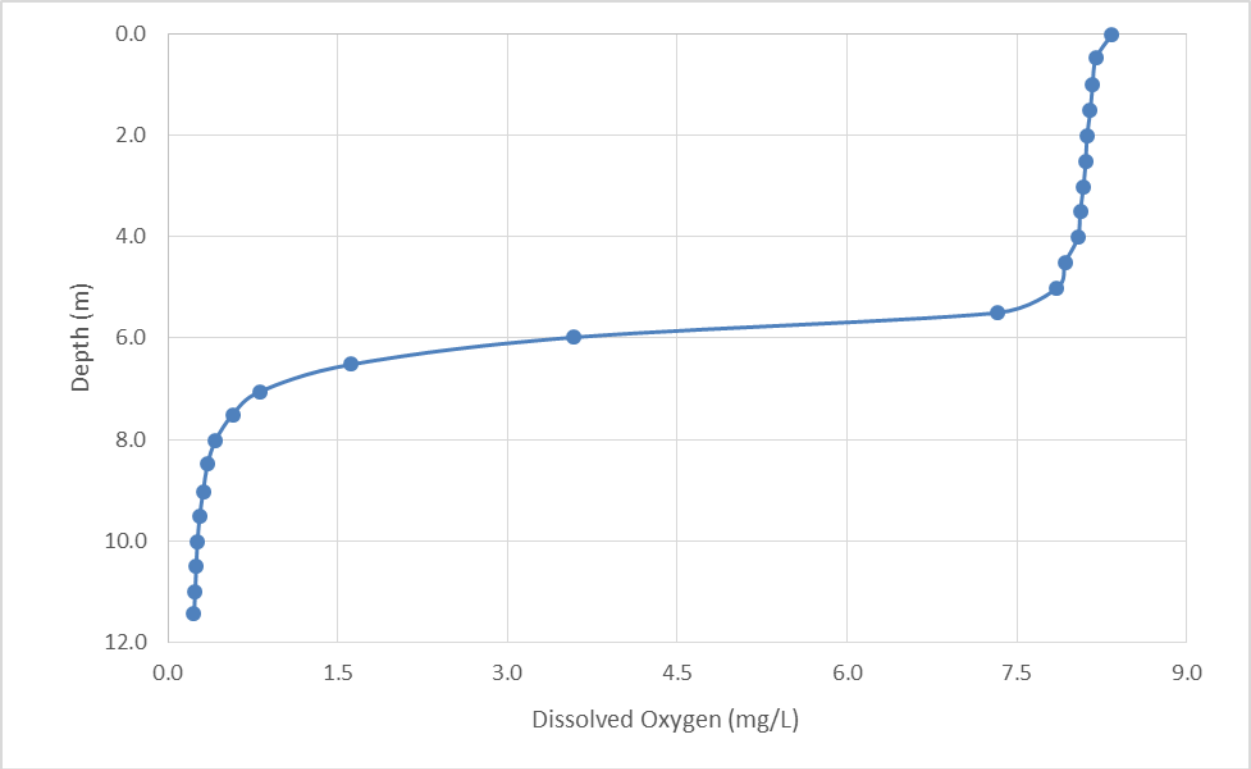


Figure 33. Dissolved oxygen (mg/L) and temperature (°C) measured at approximately 0.5 m depth intervals in the north cell of Ada Hayden Lake on August 22, 2017.



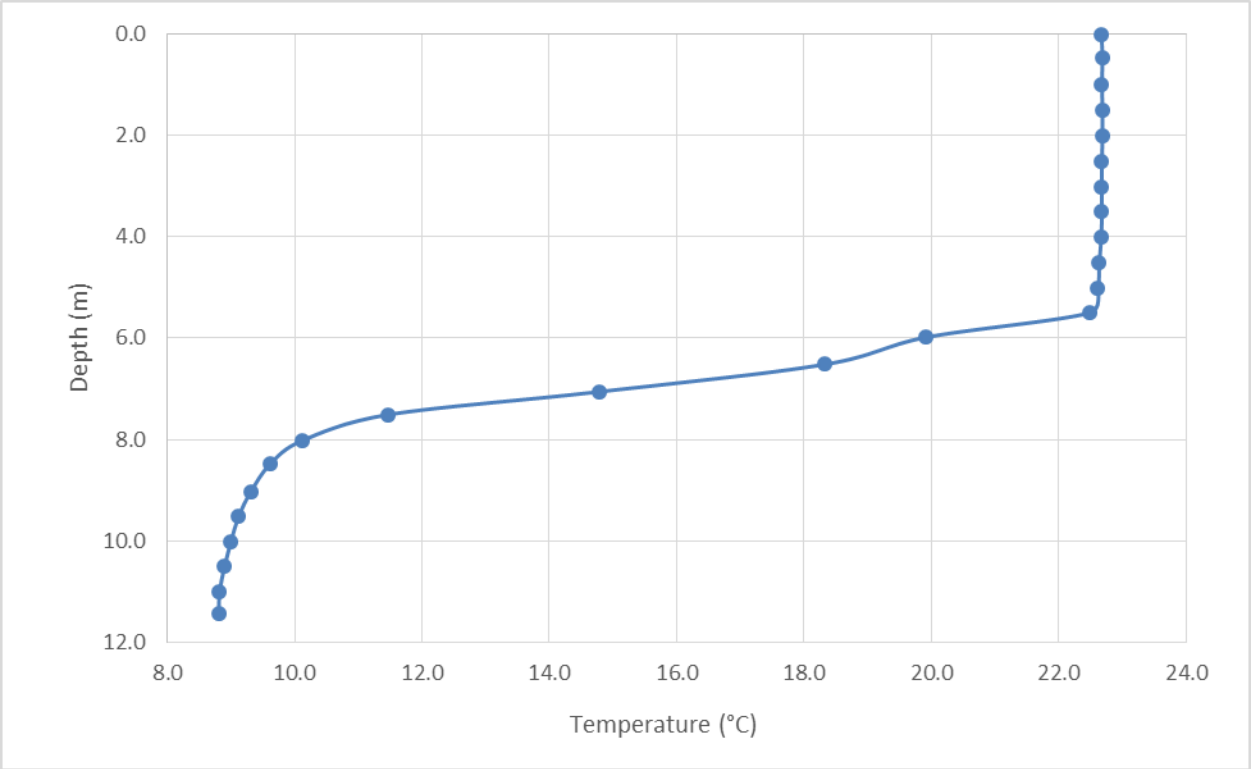


Figure 34. Dissolved oxygen (mg/L) and temperature (°C) measured at approximately 0.5 m depth intervals in the north cell of Ada Hayden Lake on September 5, 2017.

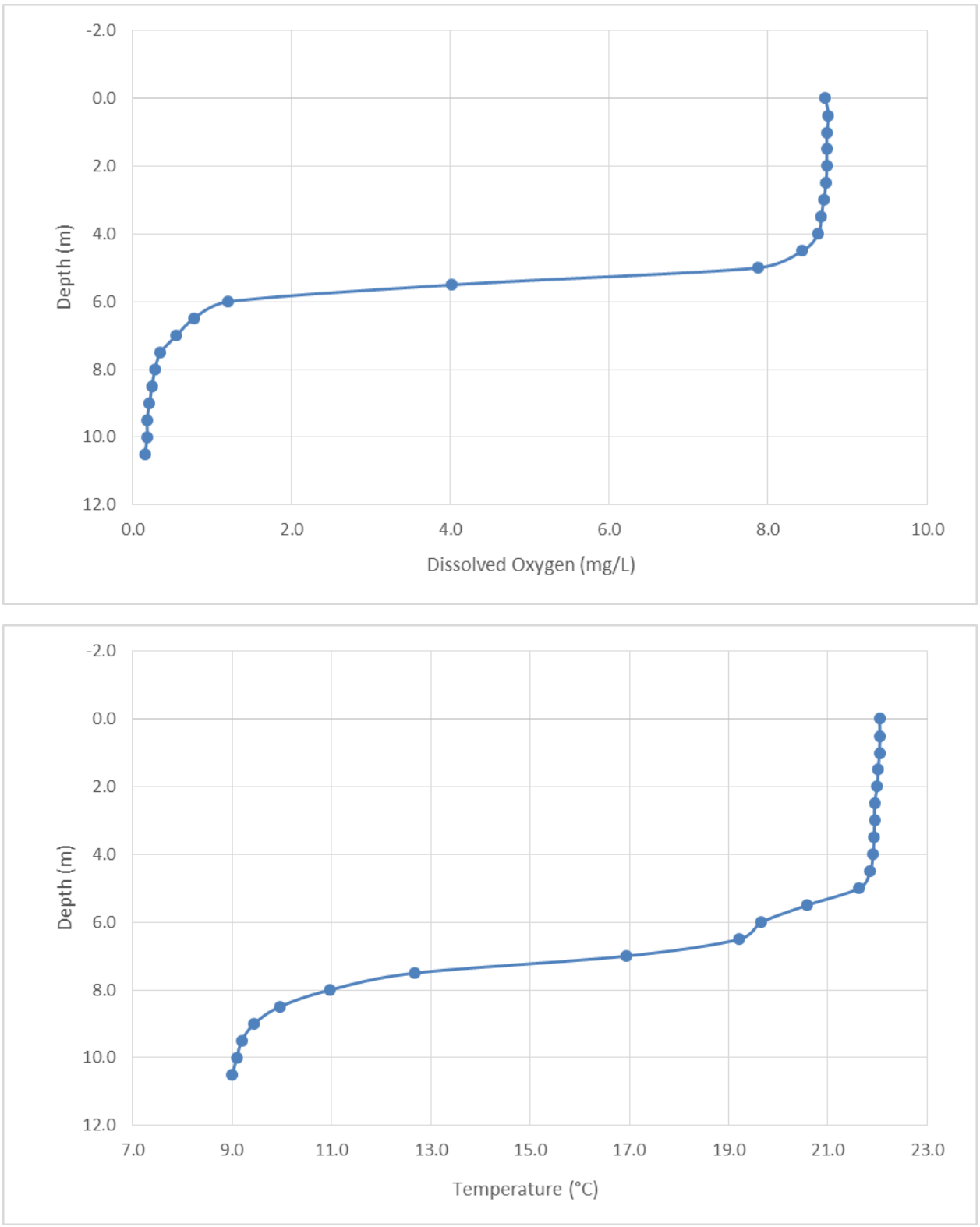


Figure 35. Dissolved oxygen (mg/L) and temperature (°C) measured at approximately 0.5 m depth intervals in the north cell of Ada Hayden Lake on September 19, 2017.

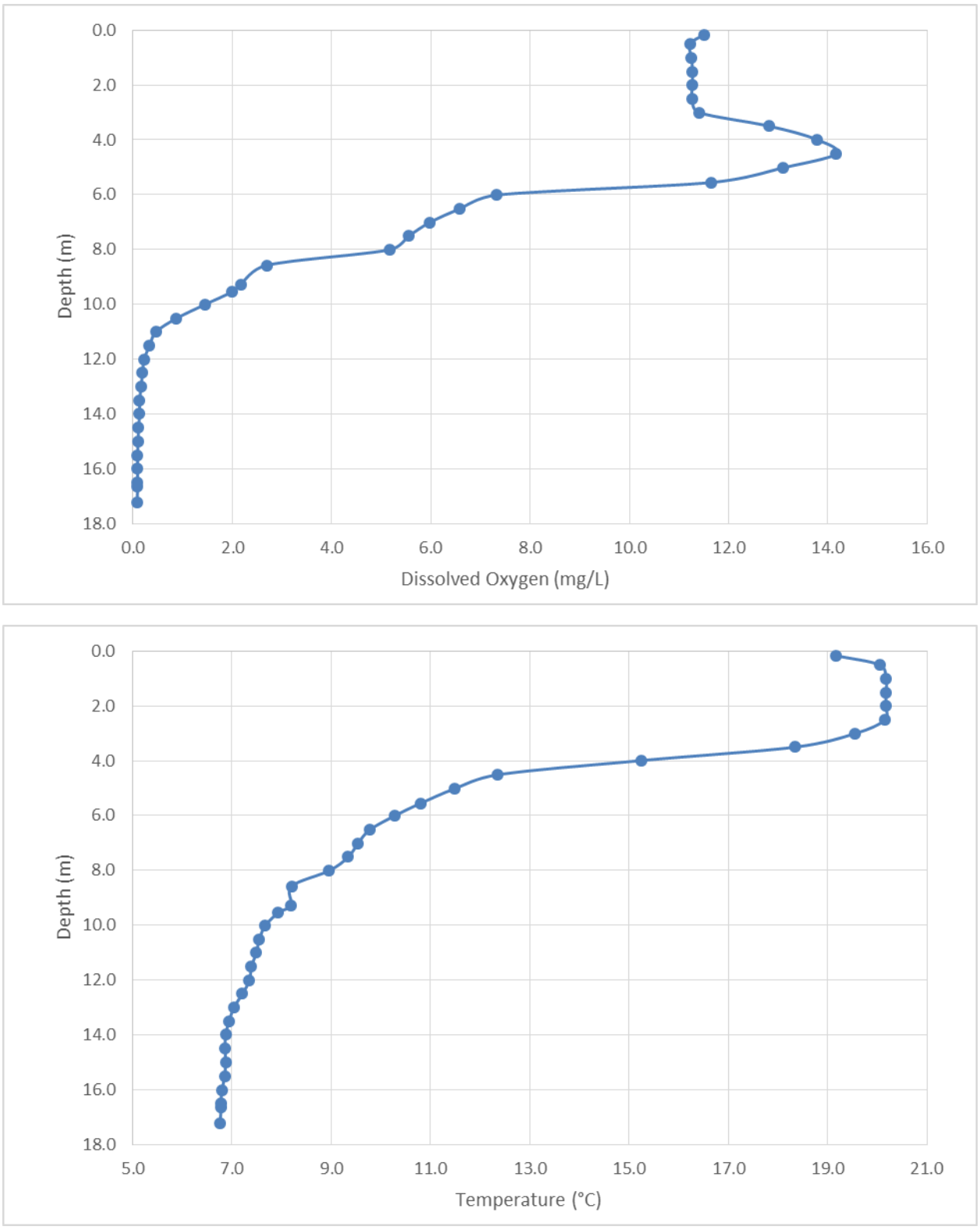
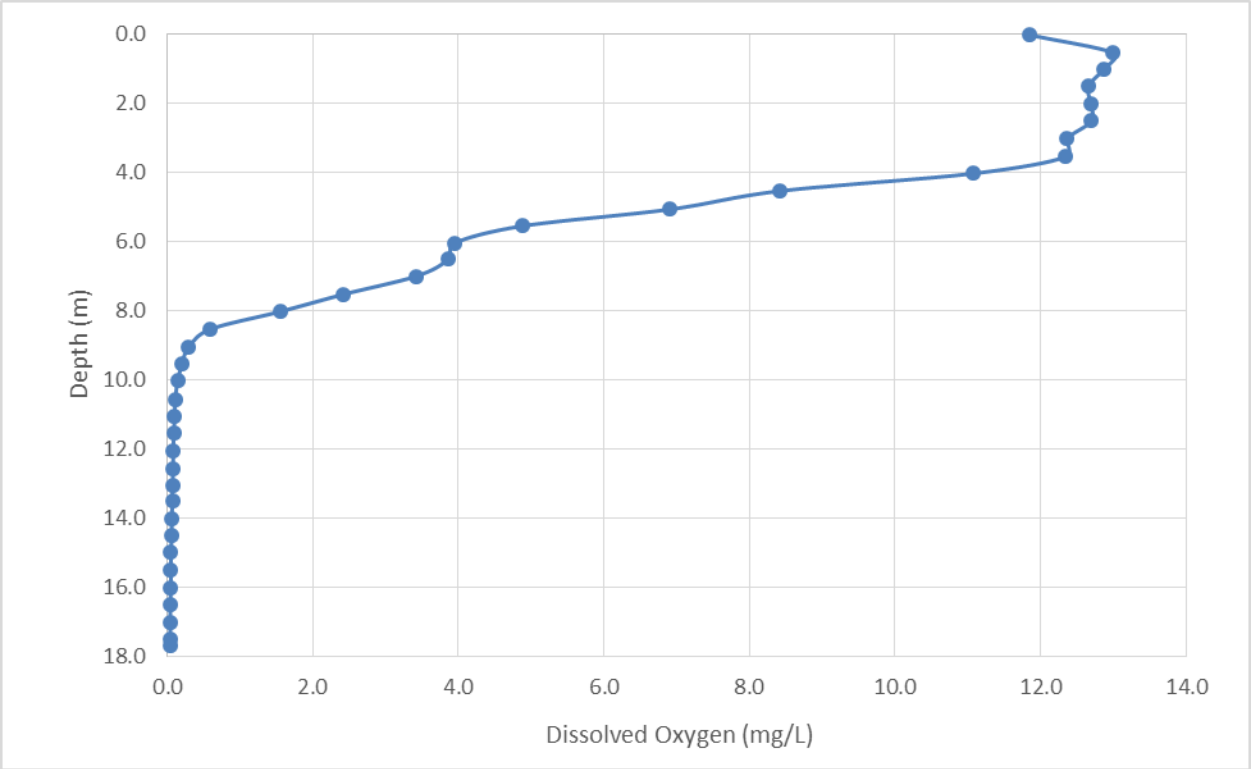


Figure 36. Dissolved oxygen (mg/L) and temperature (°C) measured at approximately 0.5 m depth intervals in the south cell of Ada Hayden Lake on May 18, 2017.



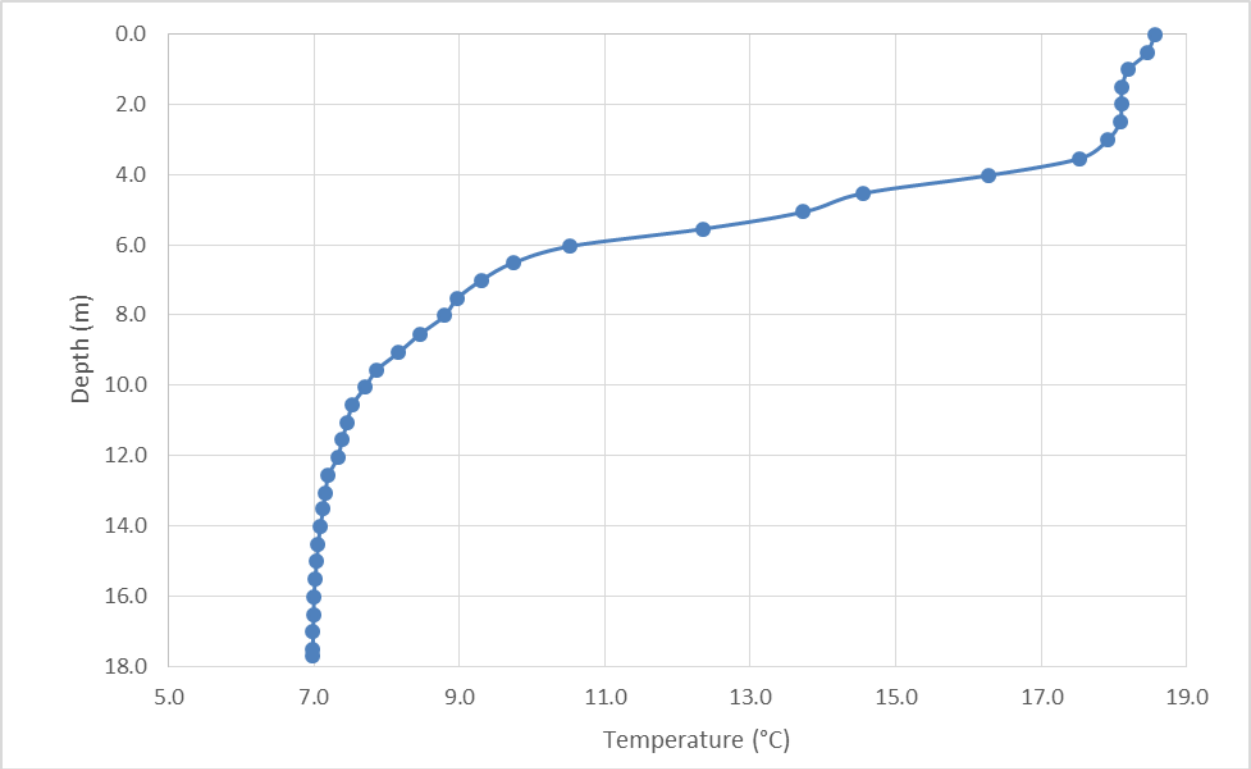
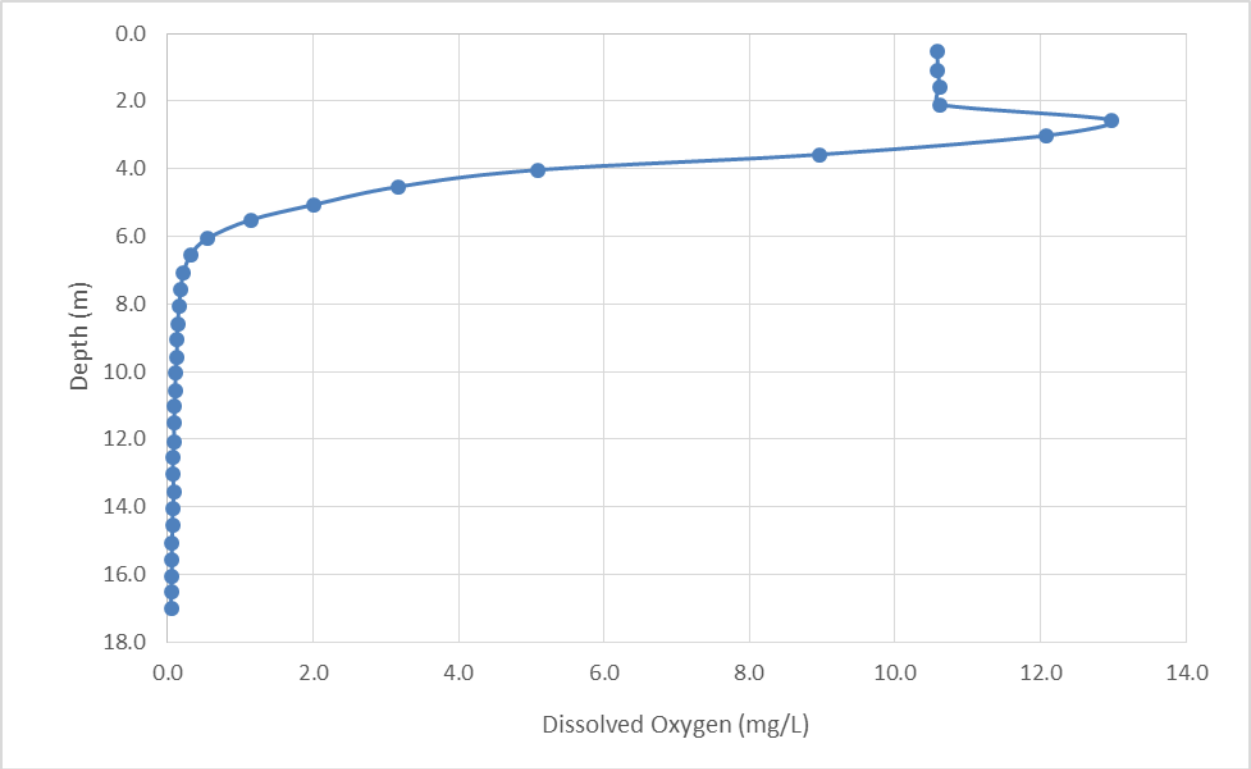


Figure 37. Dissolved oxygen (mg/L) and temperature (°C) measured at approximately 0.5 m depth intervals in the south cell of Ada Hayden Lake on May 31, 2017.



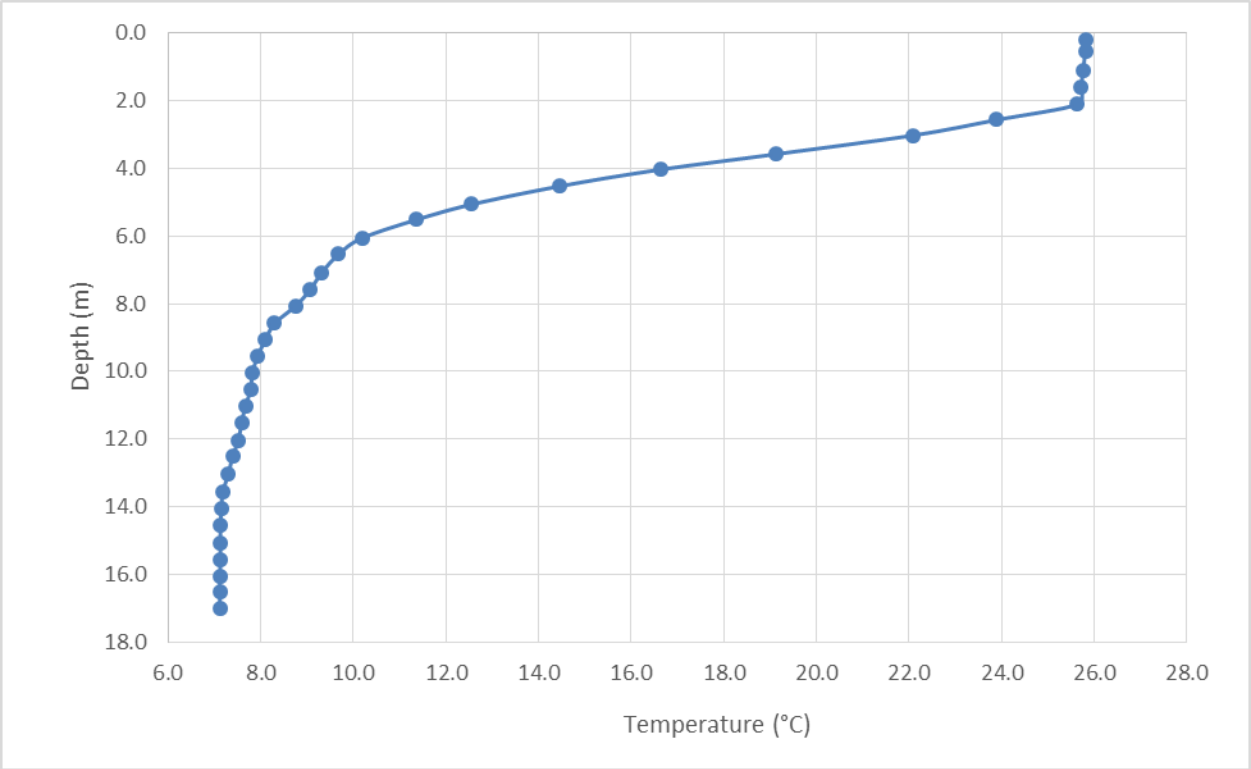
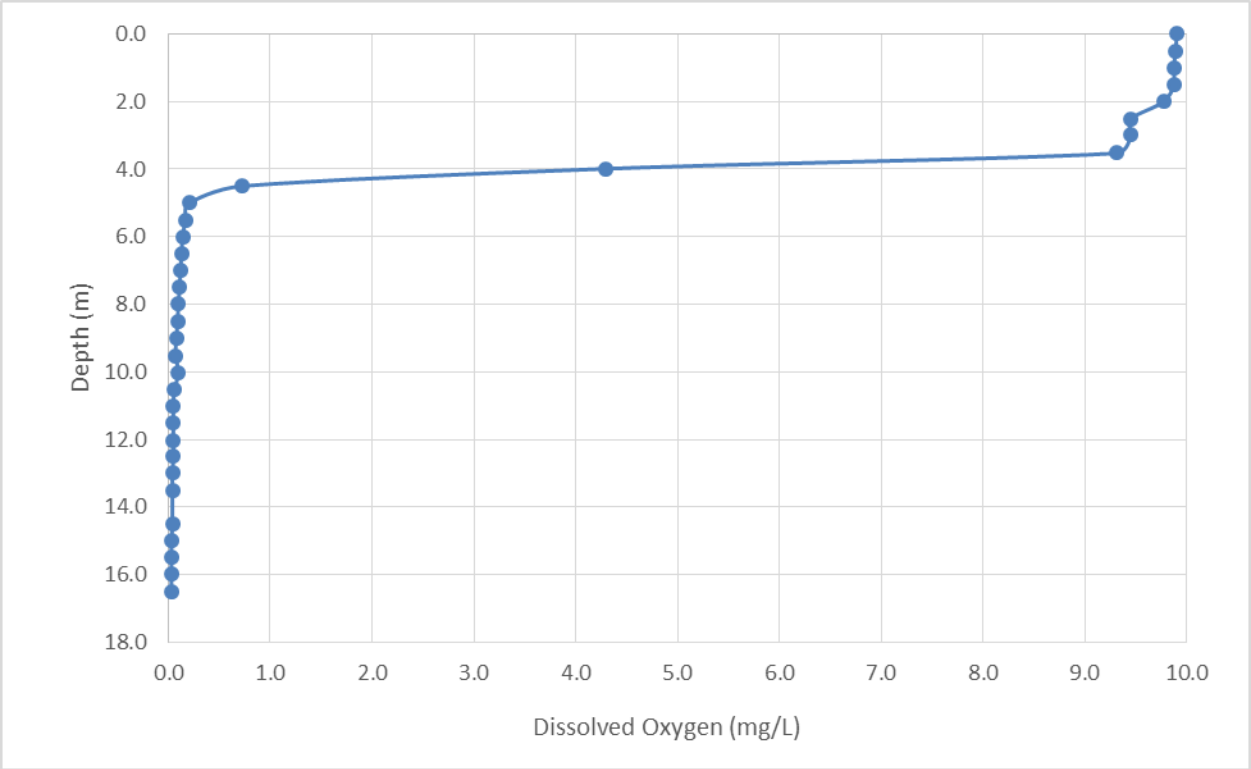


Figure 38. Dissolved oxygen (mg/L) and temperature (°C) measured at approximately 0.5 m depth intervals in the south cell of Ada Hayden Lake on June 13, 2017.



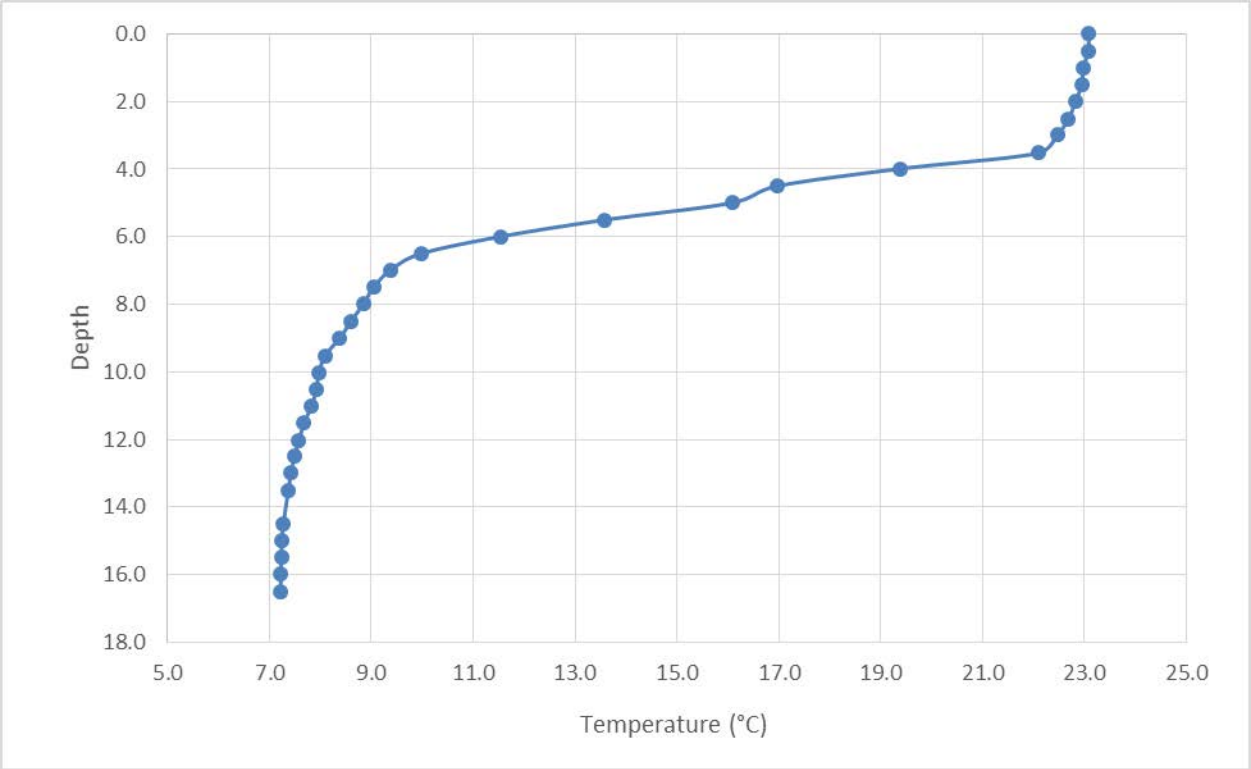


Figure 39. Dissolved oxygen (mg/L) and temperature (°C) measured at approximately 0.5 m depth intervals in the south cell of Ada Hayden Lake on June 27, 2017.

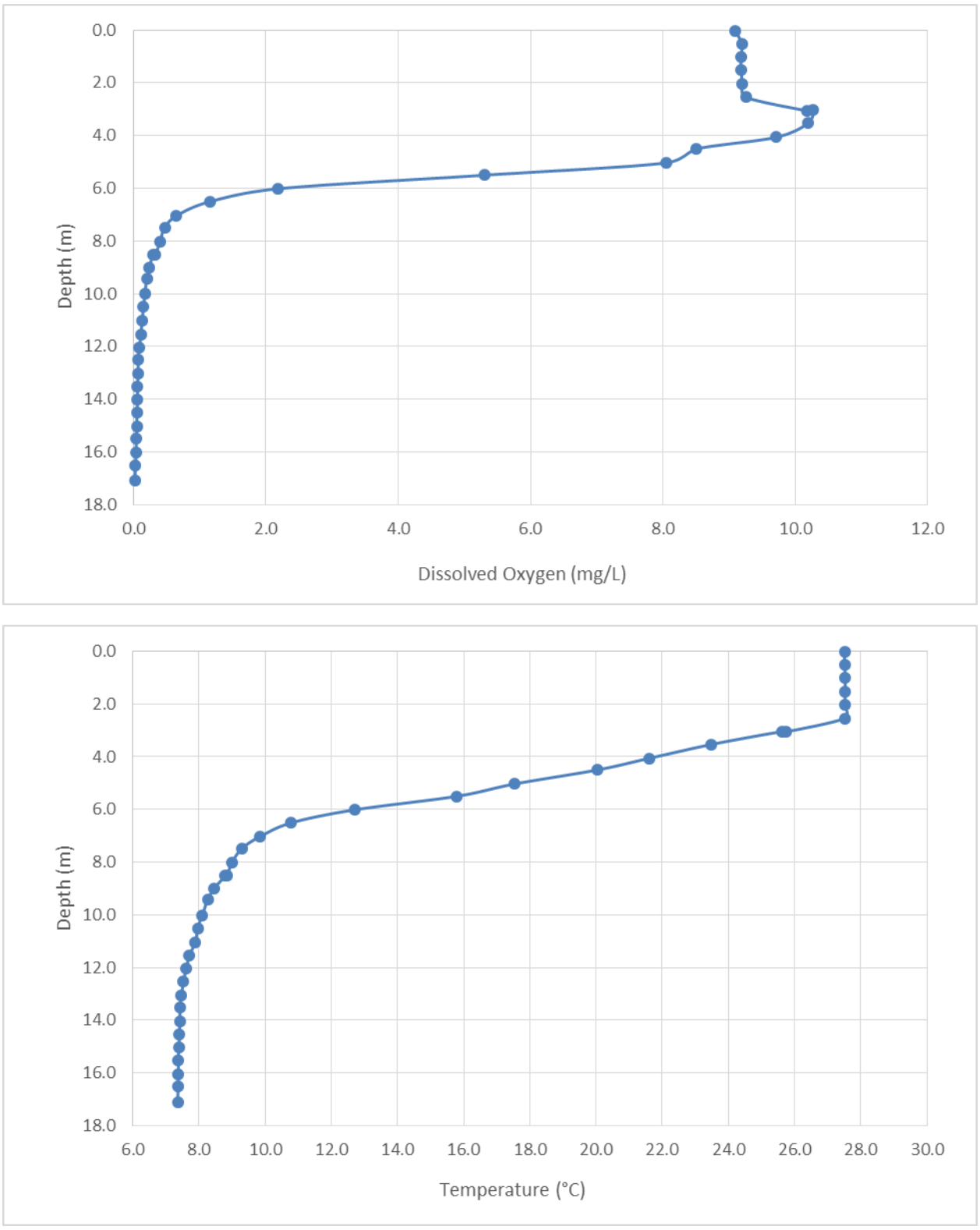


Figure 40. Dissolved oxygen (mg/L) and temperature (°C) measured at approximately 0.5 m depth intervals in the south cell of Ada Hayden Lake on July 11, 2017.

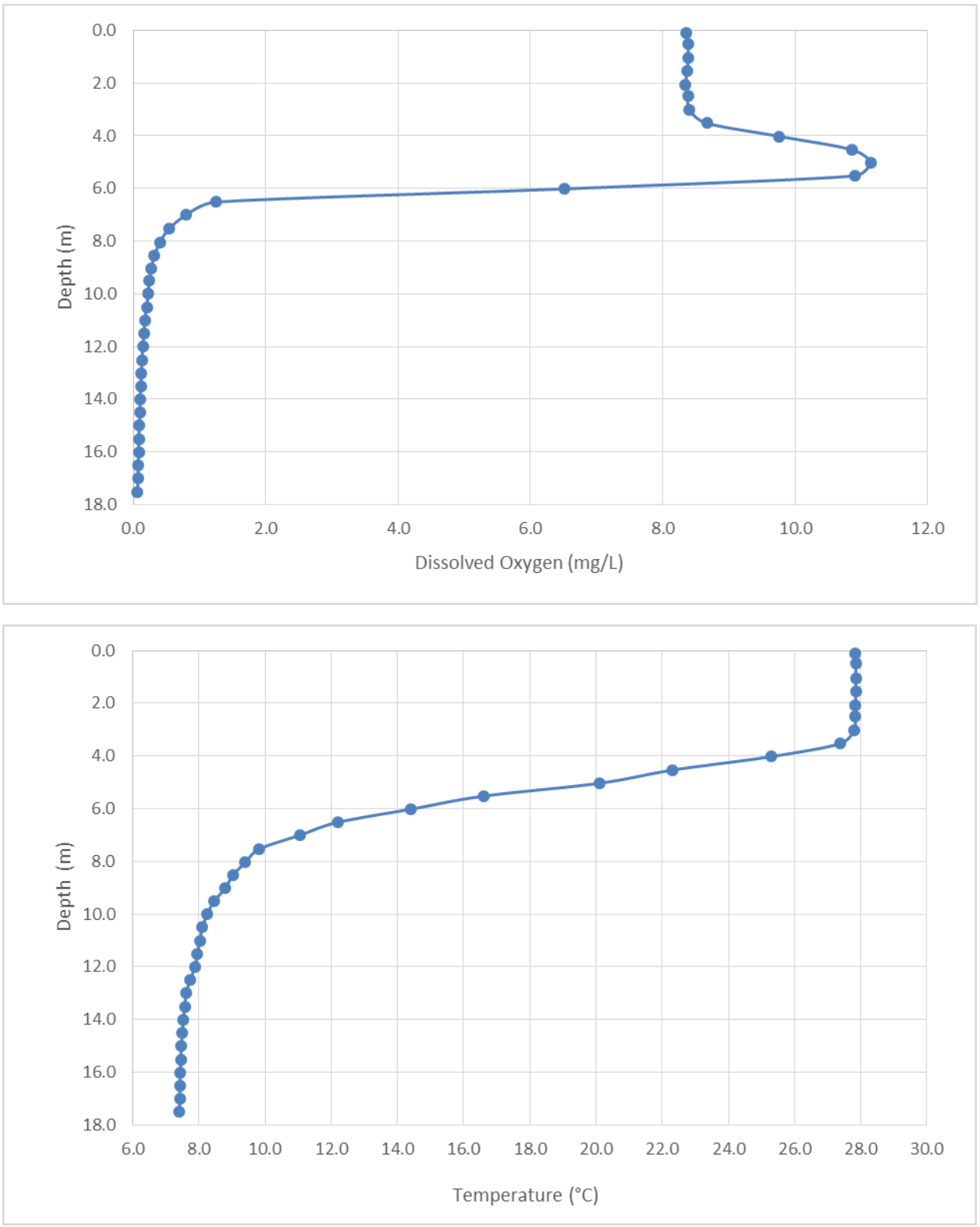
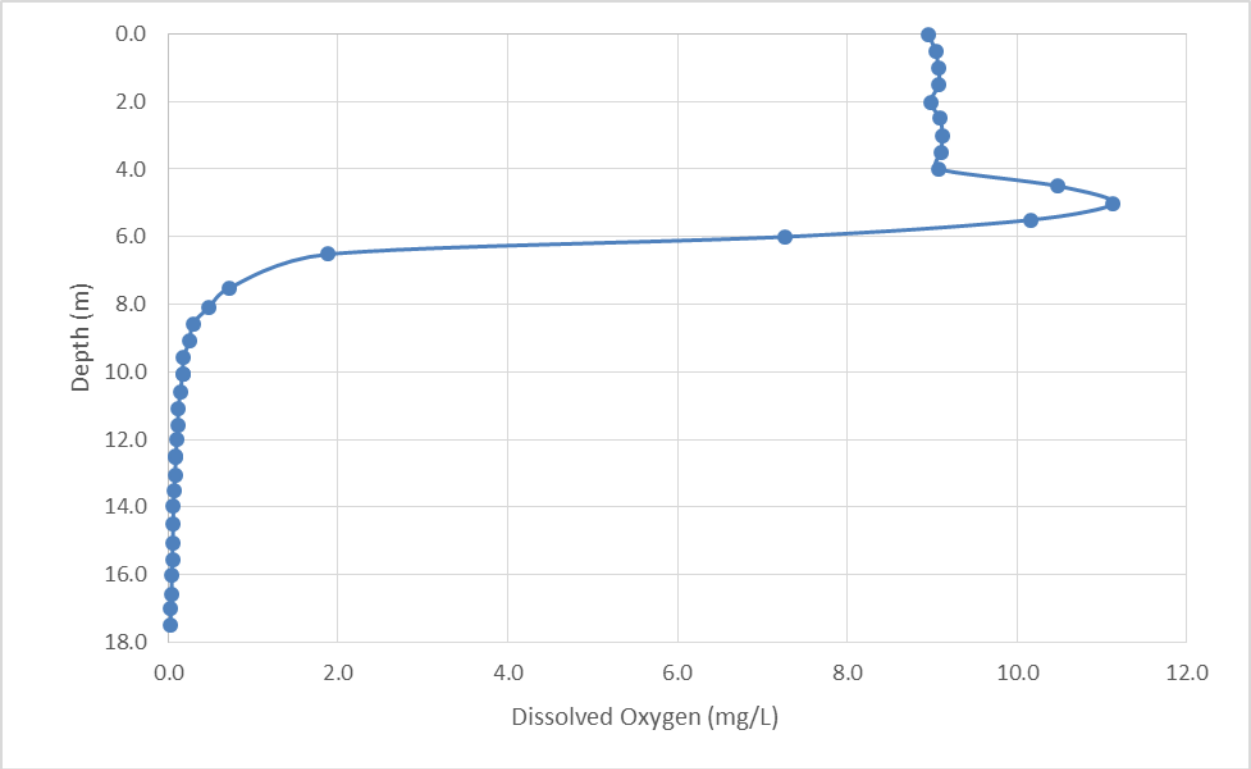


Figure 41. Dissolved oxygen (mg/L) and temperature (°C) measured at approximately 0.5 m depth intervals in the south cell of Ada Hayden Lake on July 26, 2017.



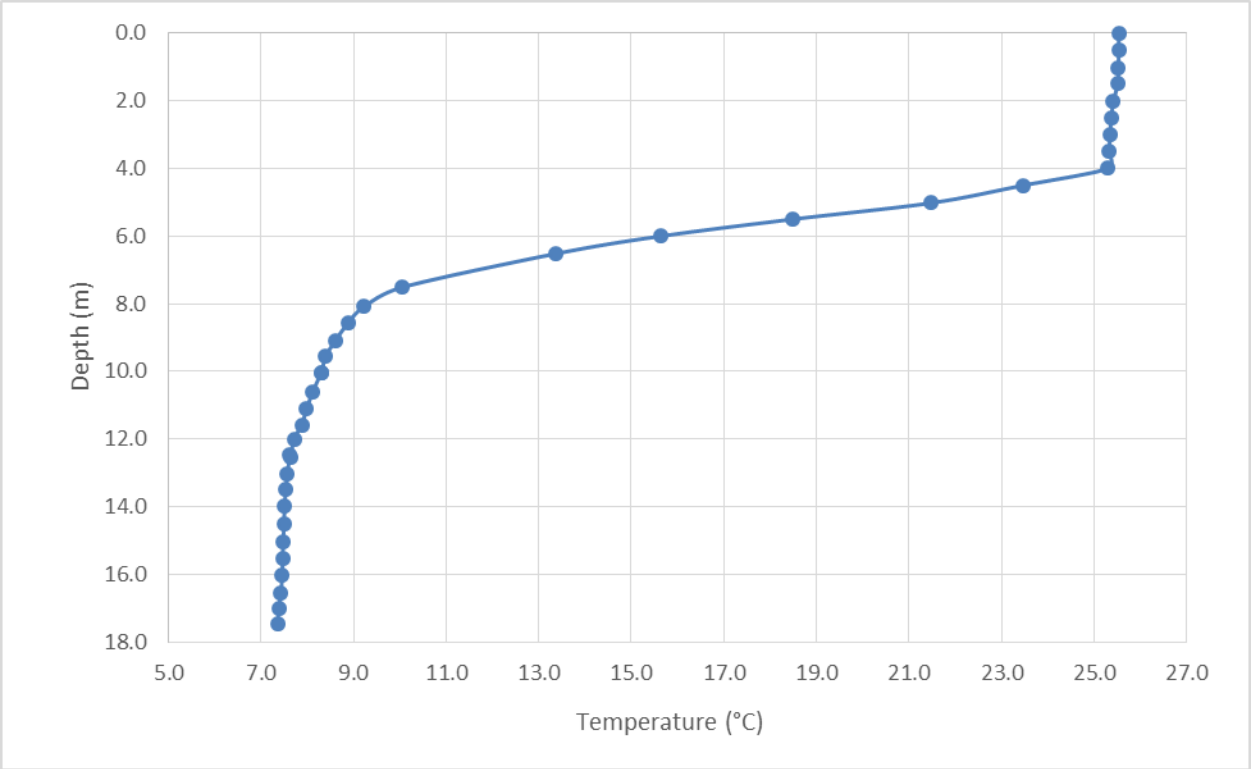
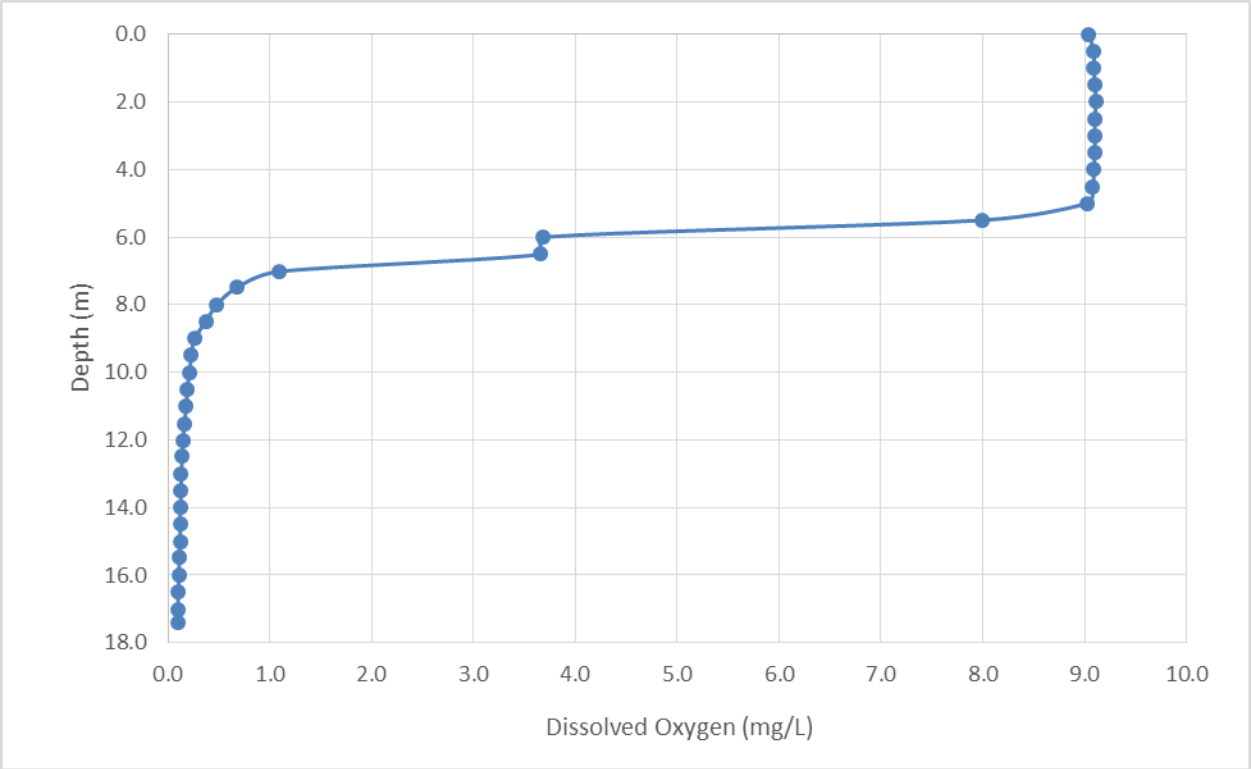


Figure 42. Dissolved oxygen (mg/L) and temperature (°C) measured at approximately 0.5 m depth intervals in the south cell of Ada Hayden Lake on August 9, 2017.



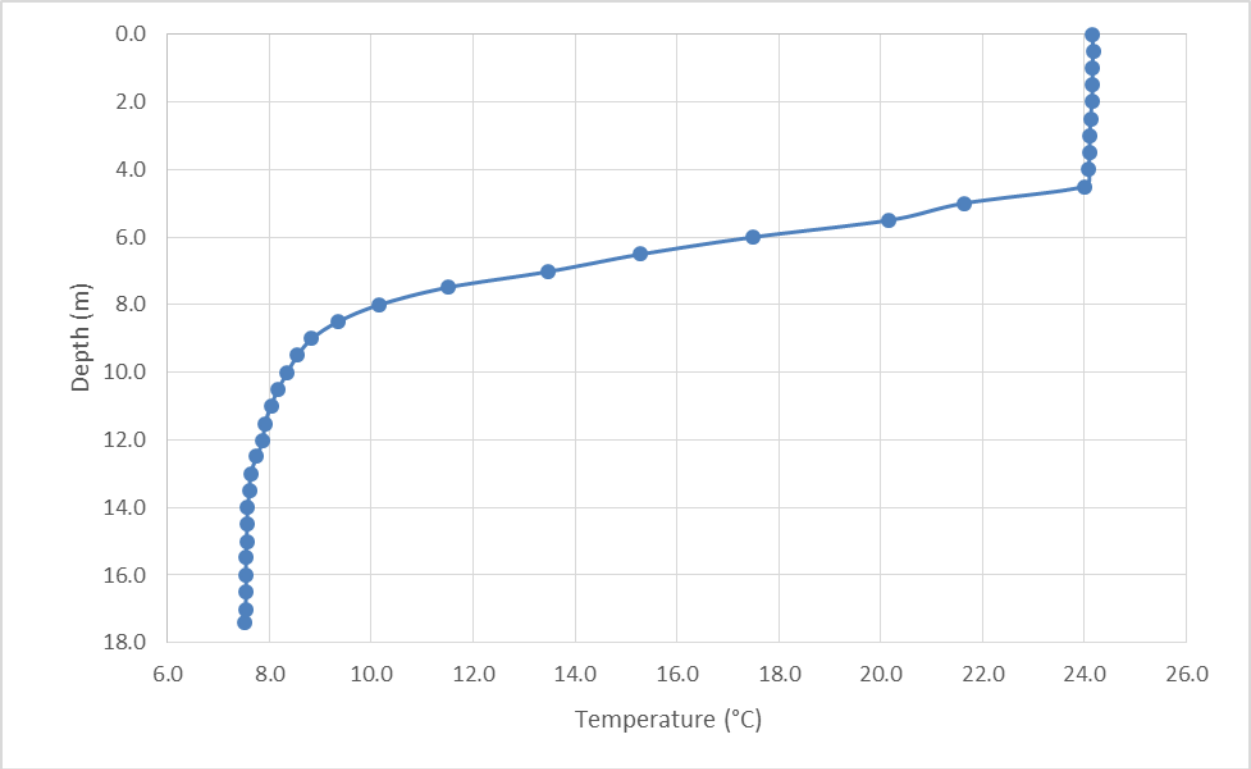


Figure 43. Dissolved oxygen (mg/L) and temperature (°C) measured at approximately 0.5 m depth intervals in the south cell of Ada Hayden Lake on August 22, 2017.

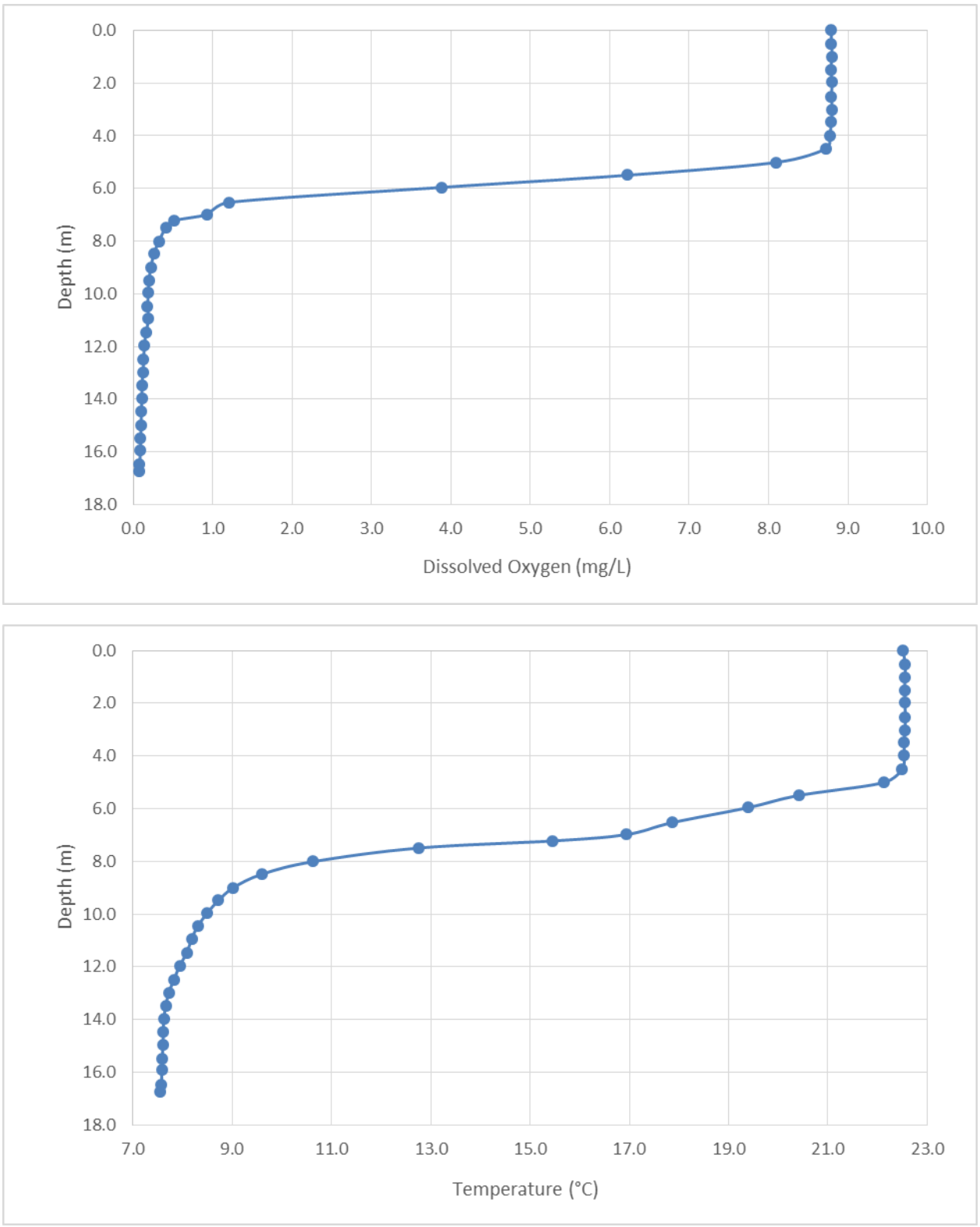
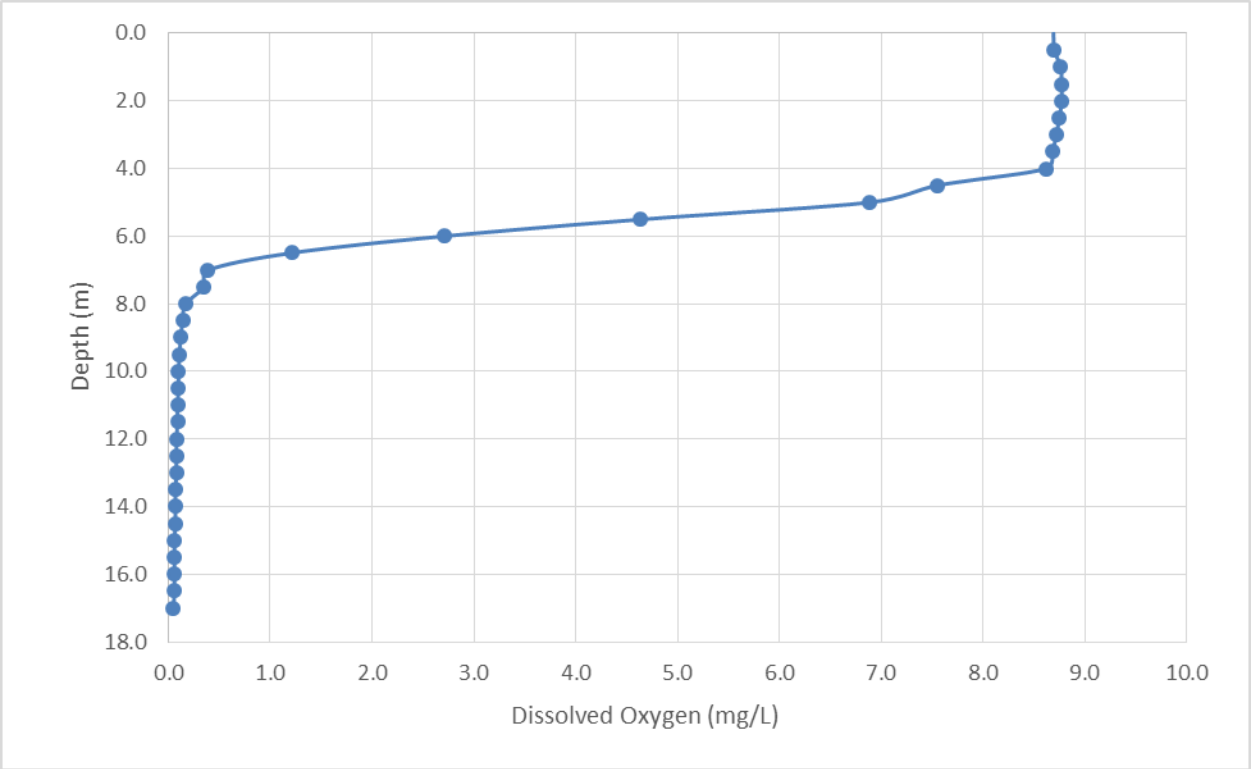


Figure 44. Dissolved oxygen (mg/L) and temperature (°C) measured at approximately 0.5 m depth intervals in the south cell of Ada Hayden Lake on September 5, 2017.



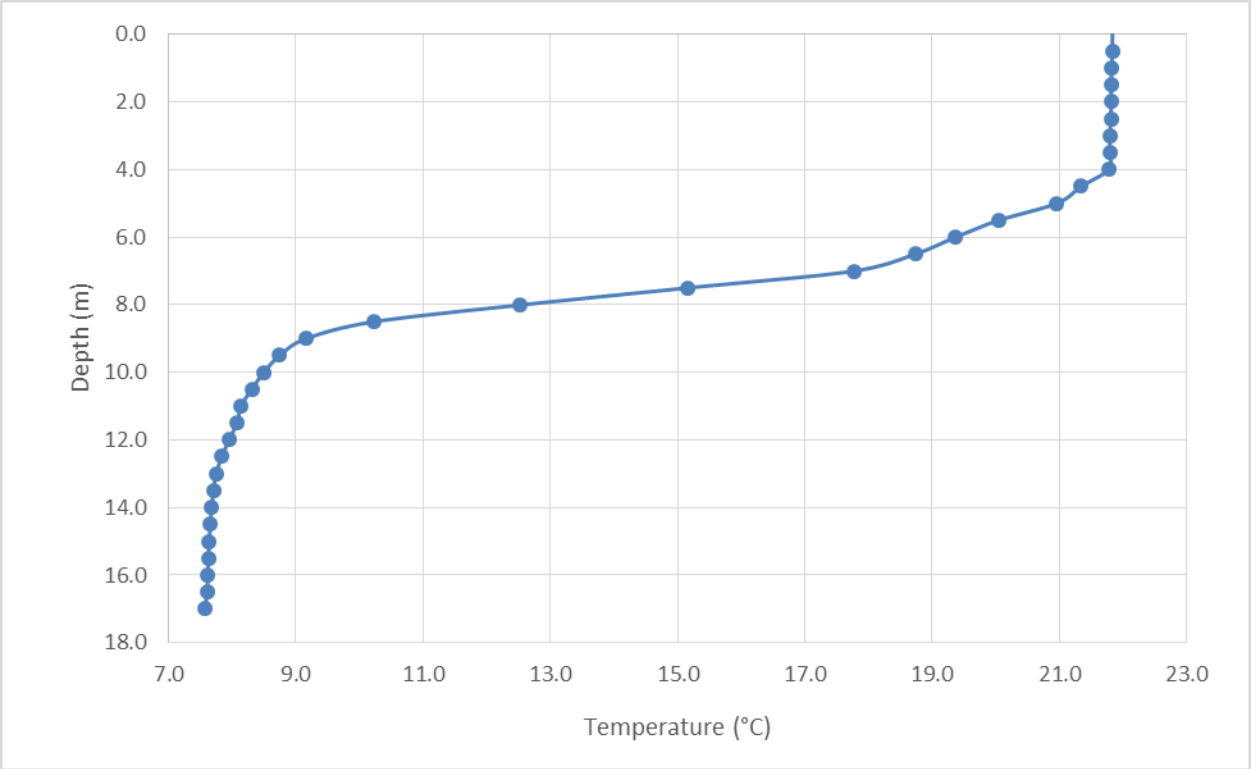
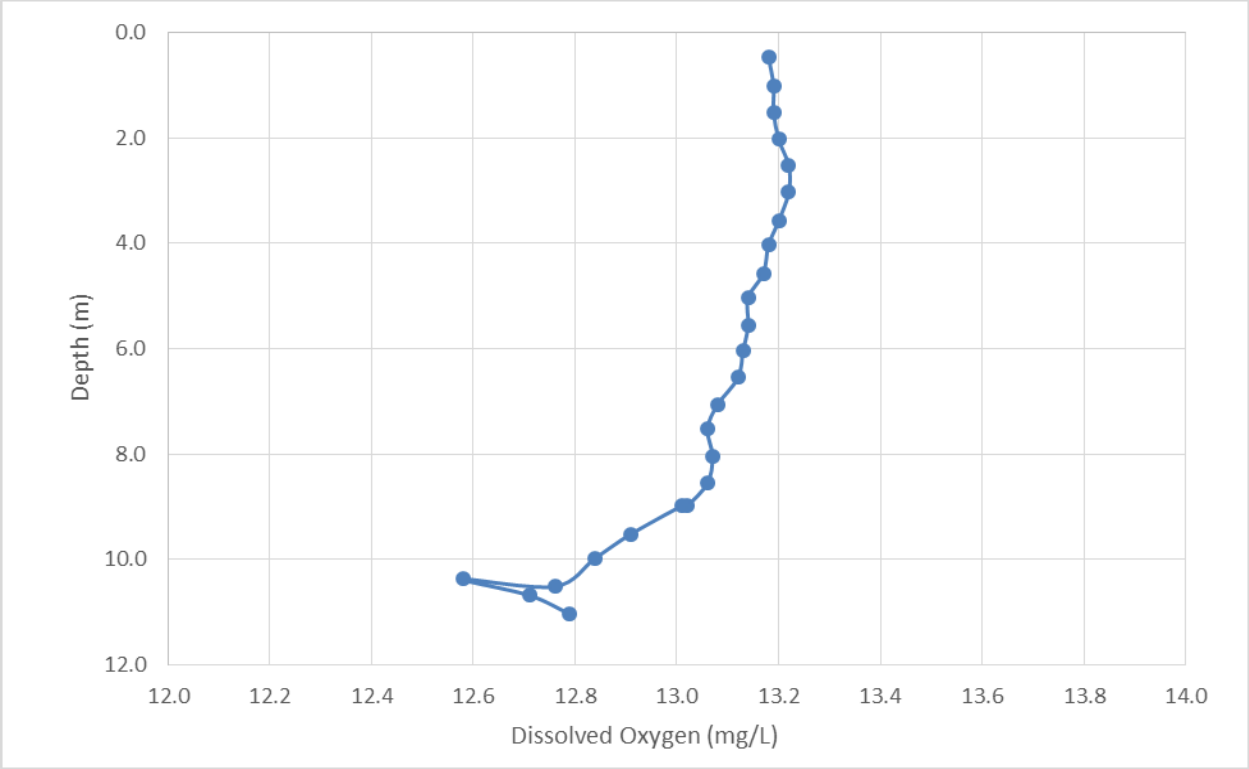


Figure 45. Dissolved oxygen (mg/L) and temperature (°C) measured at approximately 0.5 m depth intervals in the south cell of Ada Hayden Lake on September 19, 2017.



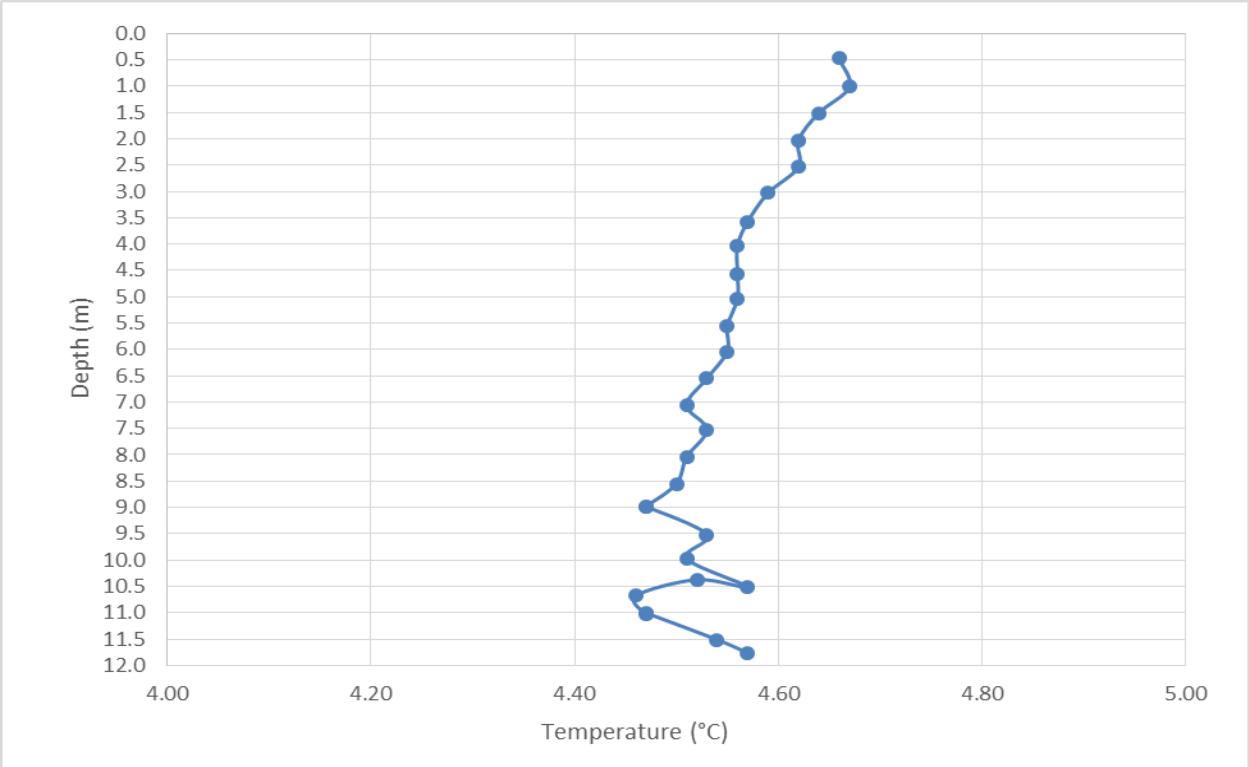
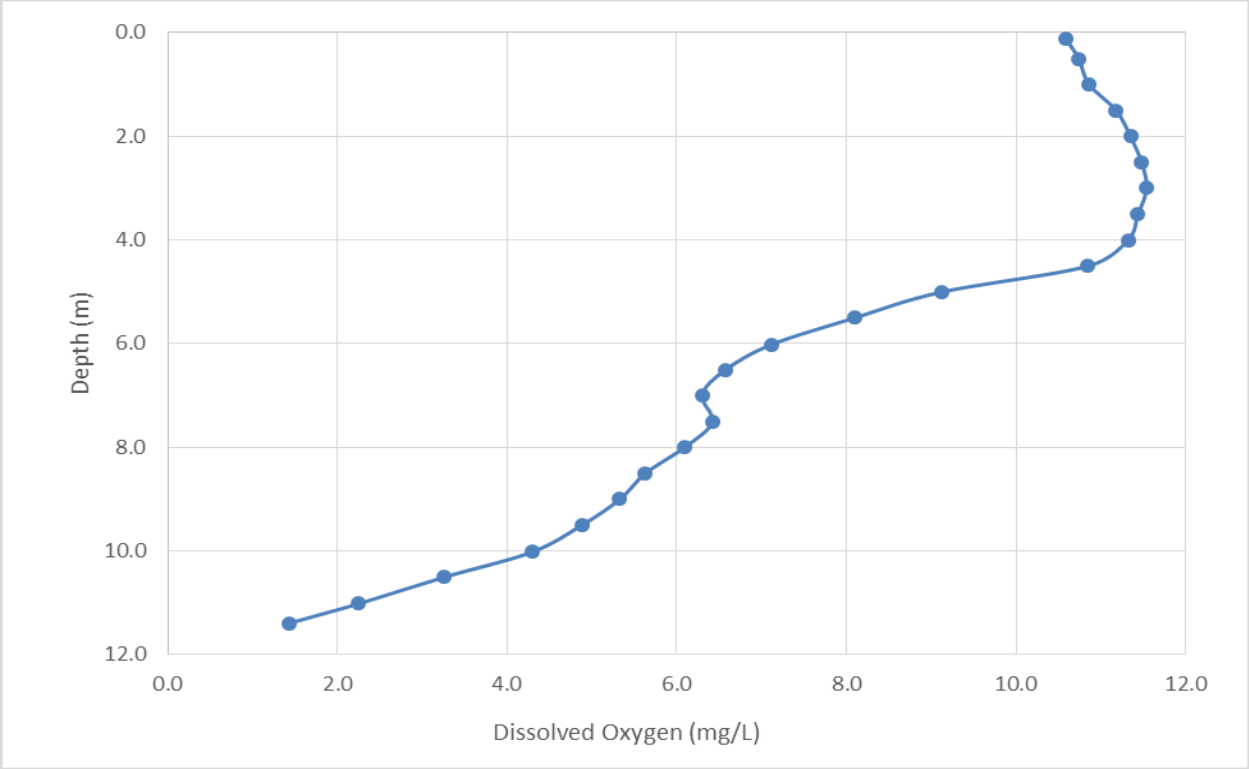


Figure 46. Dissolved oxygen (mg/L) and temperature (°C) measured at approximately 0.5 m depth intervals in the north cell of Ada Hayden Lake on April 5, 2018.



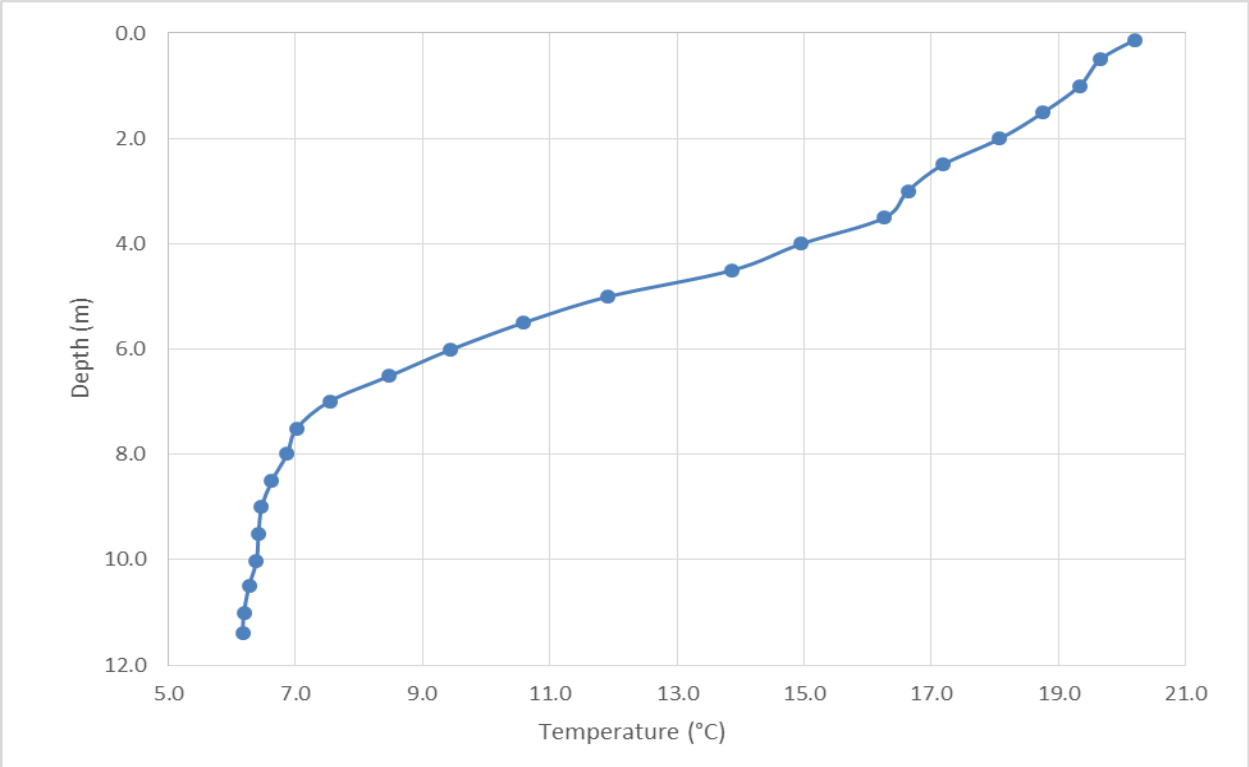


Figure 47. Dissolved oxygen (mg/L) and temperature (°C) measured at approximately 0.5 m depth intervals in the north cell of Ada Hayden Lake on May 16, 2018.

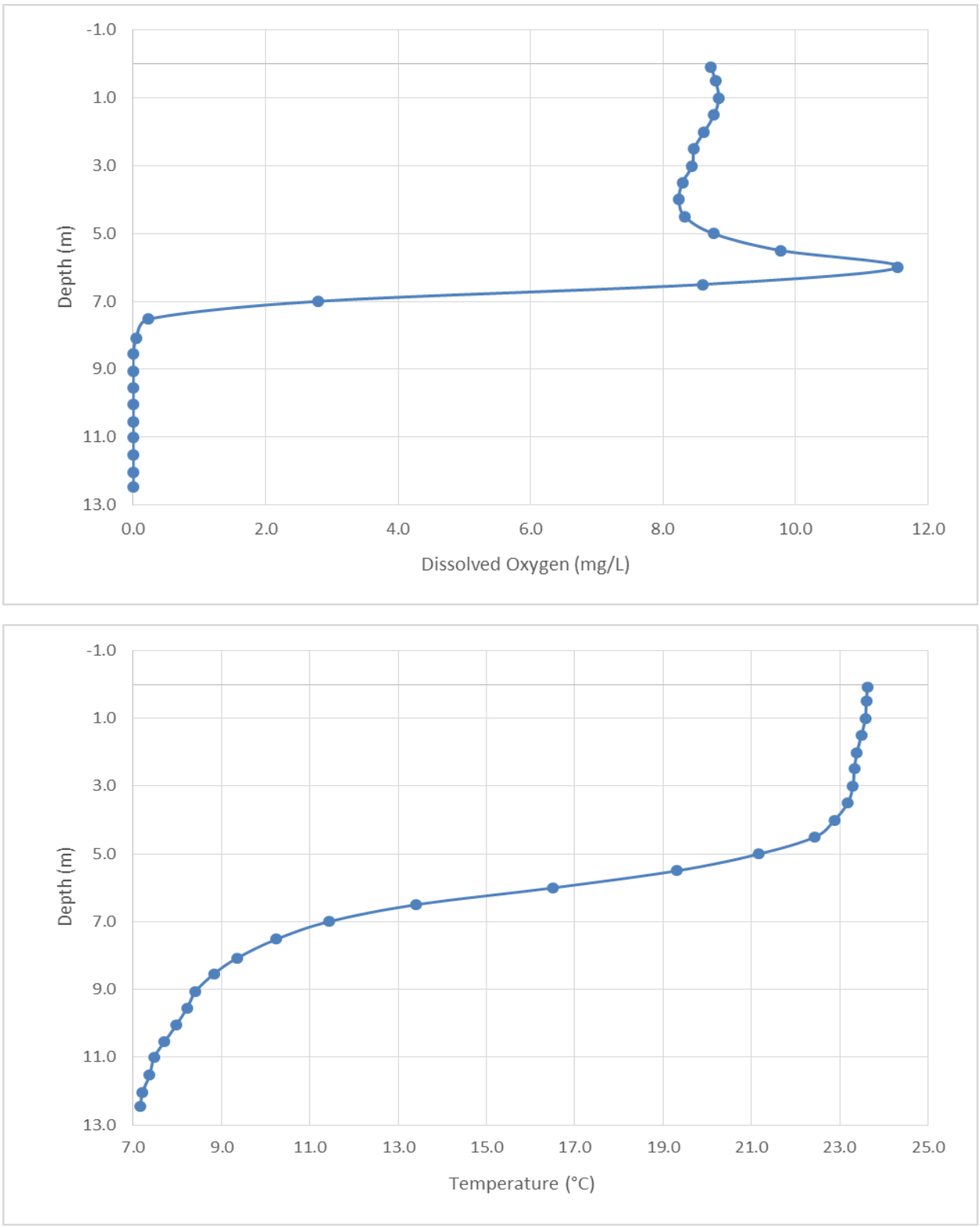
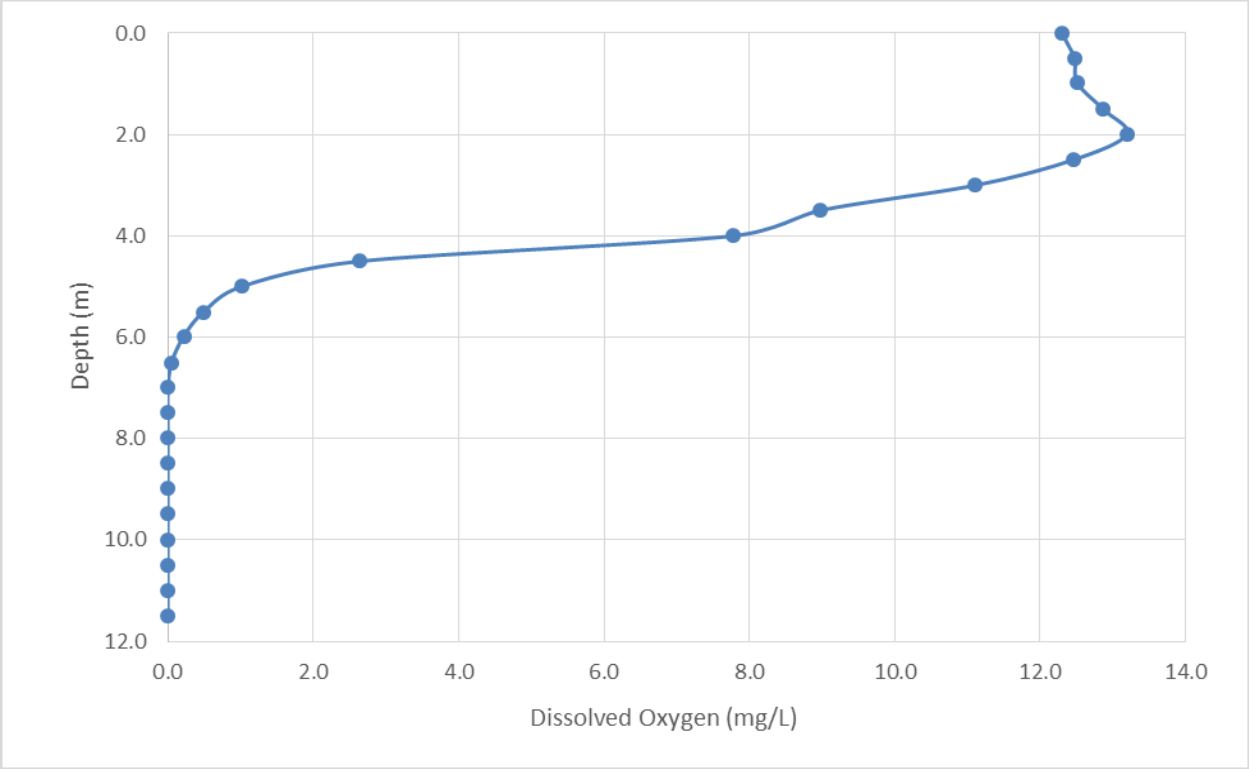


Figure 48. Dissolved oxygen (mg/L) and temperature (°C) measured at approximately 0.5 m depth intervals in the north cell of Ada Hayden Lake on June 15, 2018.



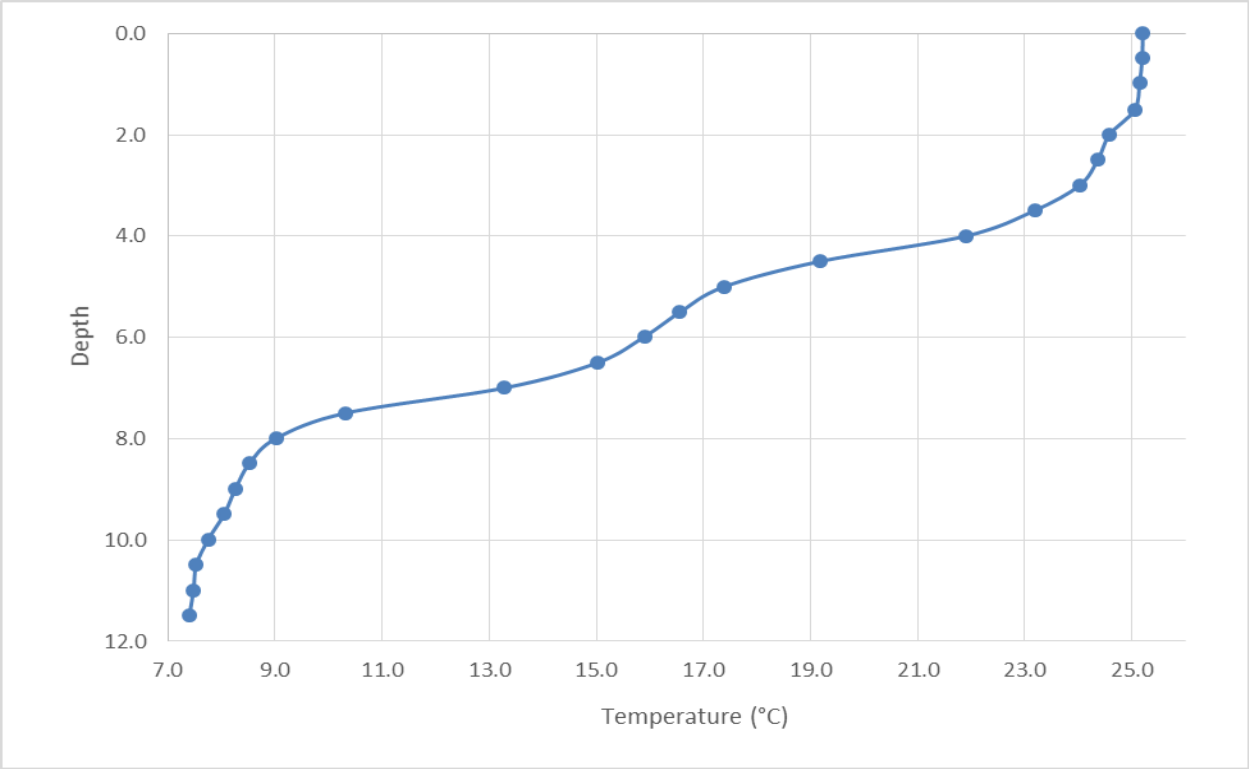


Figure 49. Dissolved oxygen (mg/L) and temperature (°C) measured at approximately 0.5 m depth intervals in the north cell of Ada Hayden Lake on June 28, 2018.

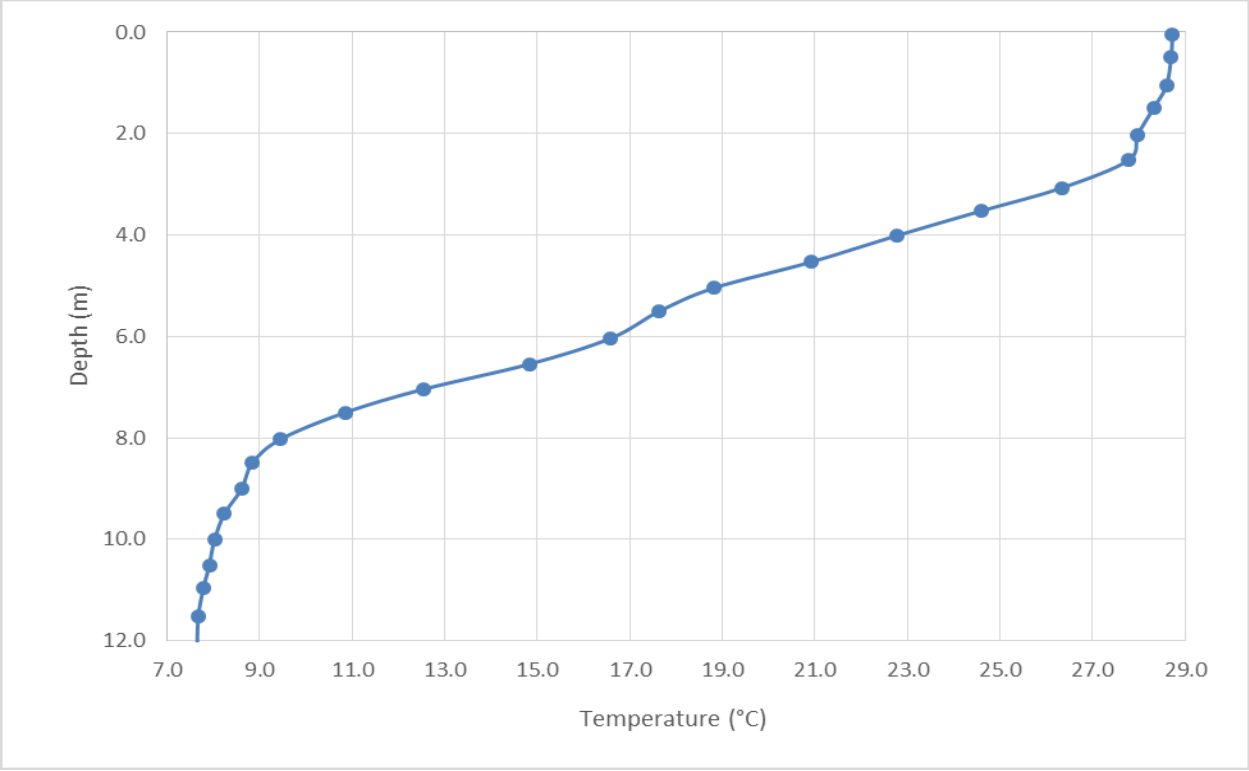
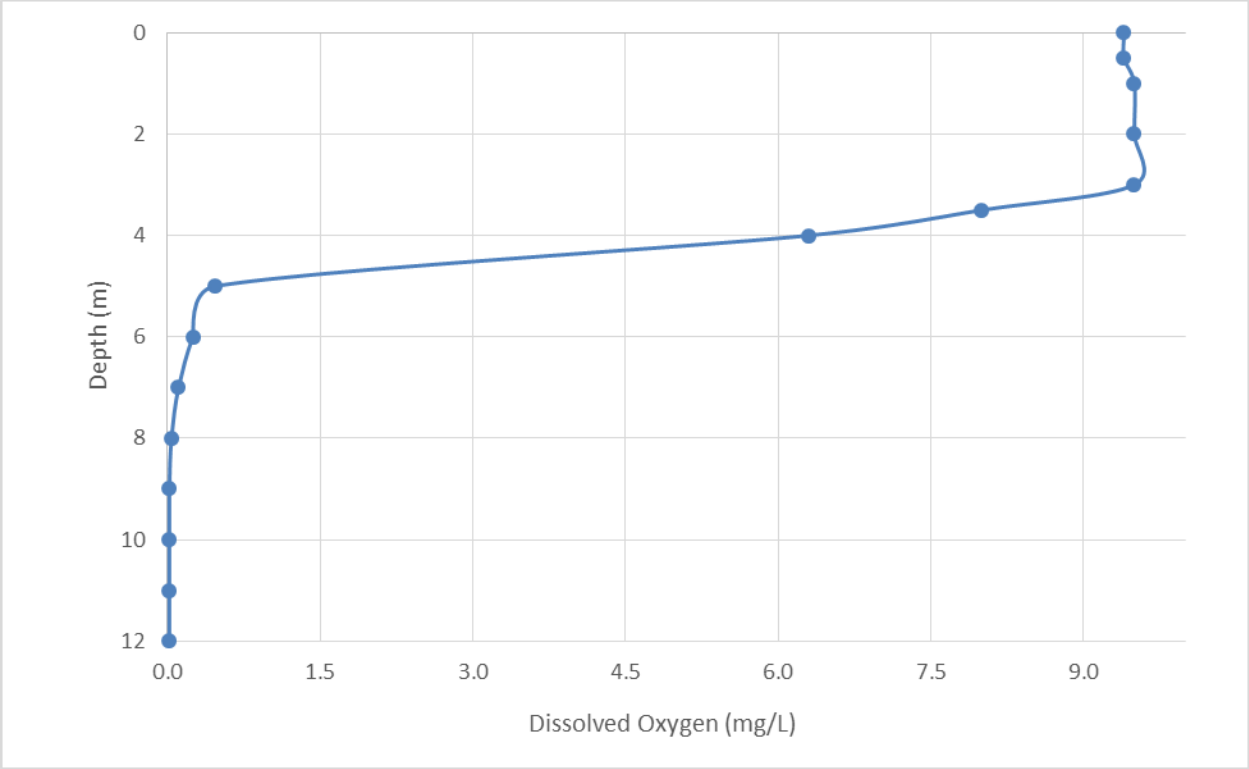


Figure 50. Temperature (°C) measured at approximately 0.5 m depth intervals in the north cell of Ada Hayden Lake on July 11, 2018. A profile for dissolved oxygen is not available due to equipment failure.



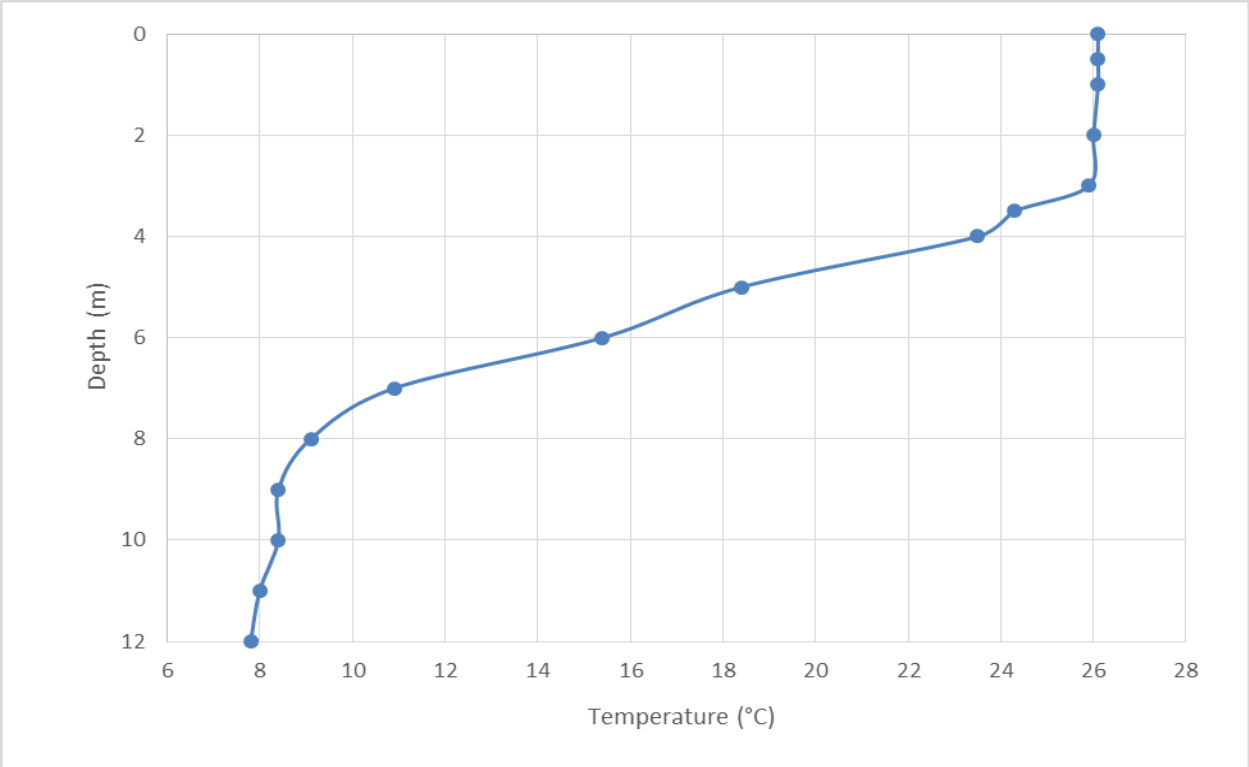
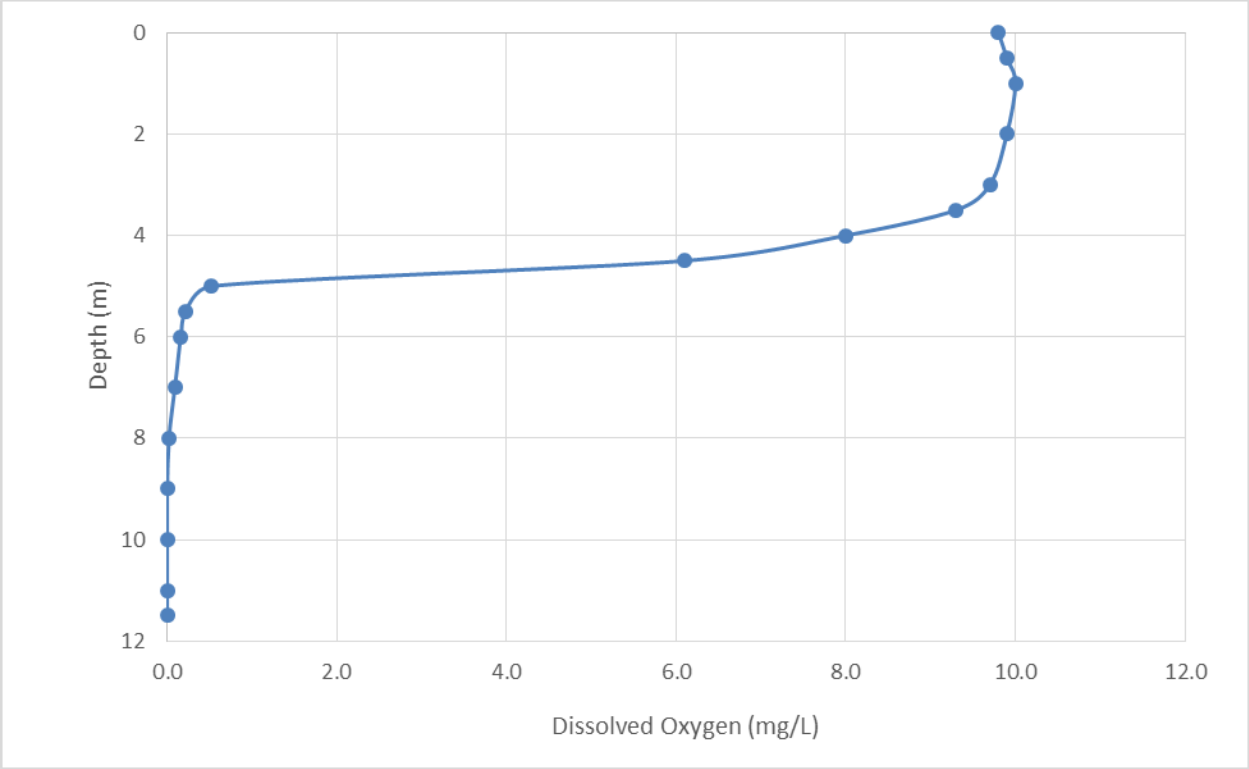


Figure 51. Dissolved oxygen (mg/L) and temperature (°C) measured at approximately 0.5 m depth intervals in the north cell of Ada Hayden Lake on July 26, 2018.



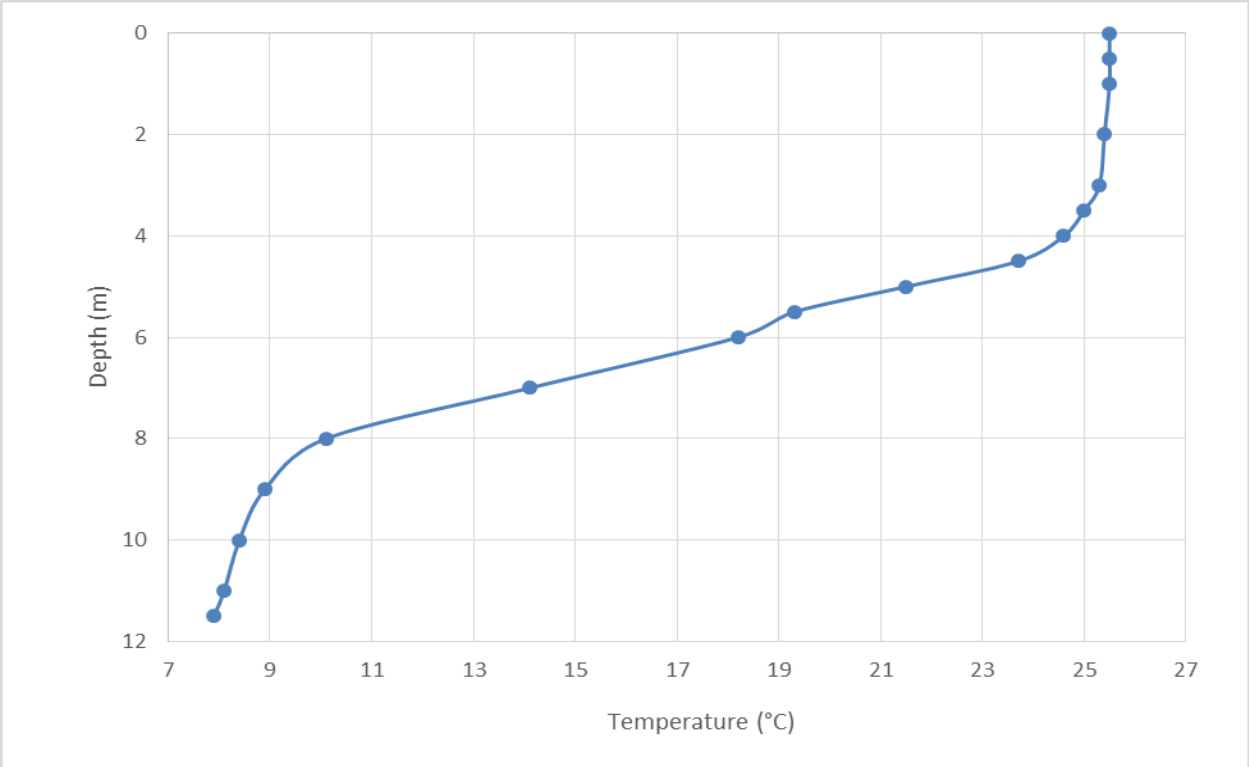
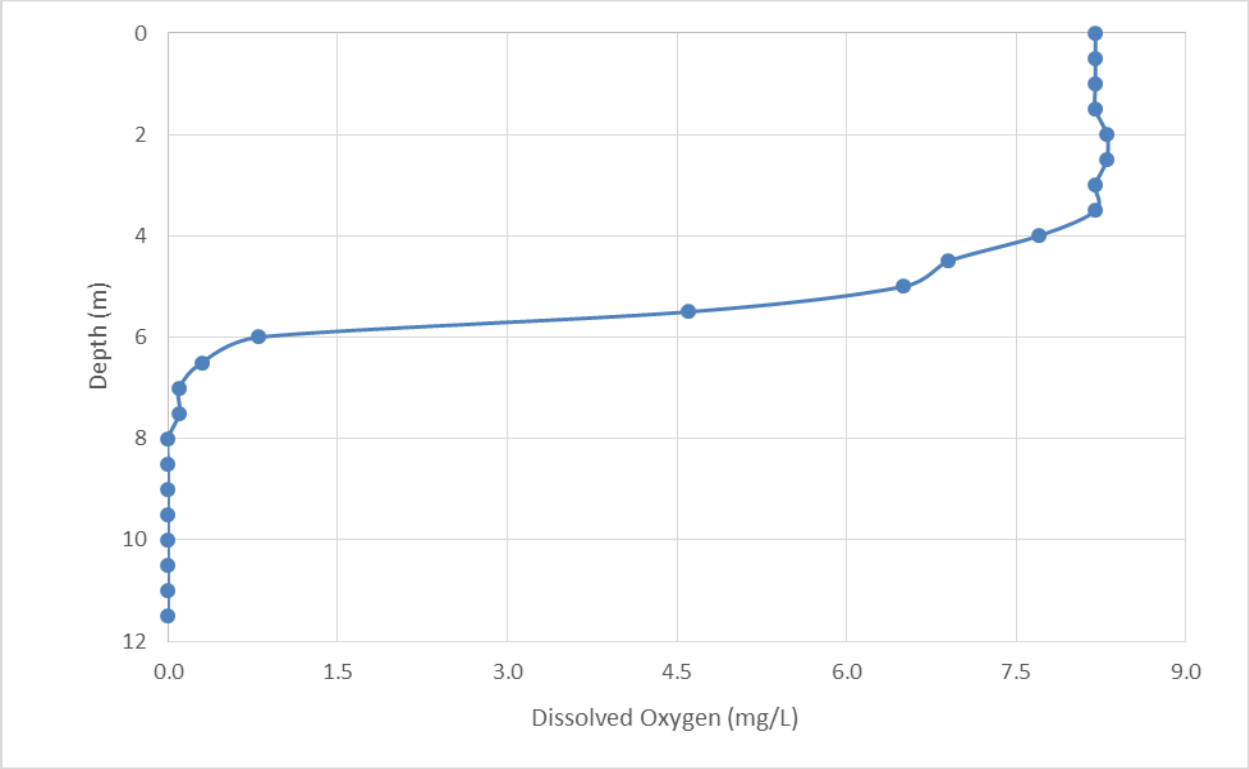


Figure 52. Dissolved oxygen (mg/L) and temperature (°C) measured at approximately 0.5 m depth intervals in the north cell of Ada Hayden Lake on August 8, 2018.



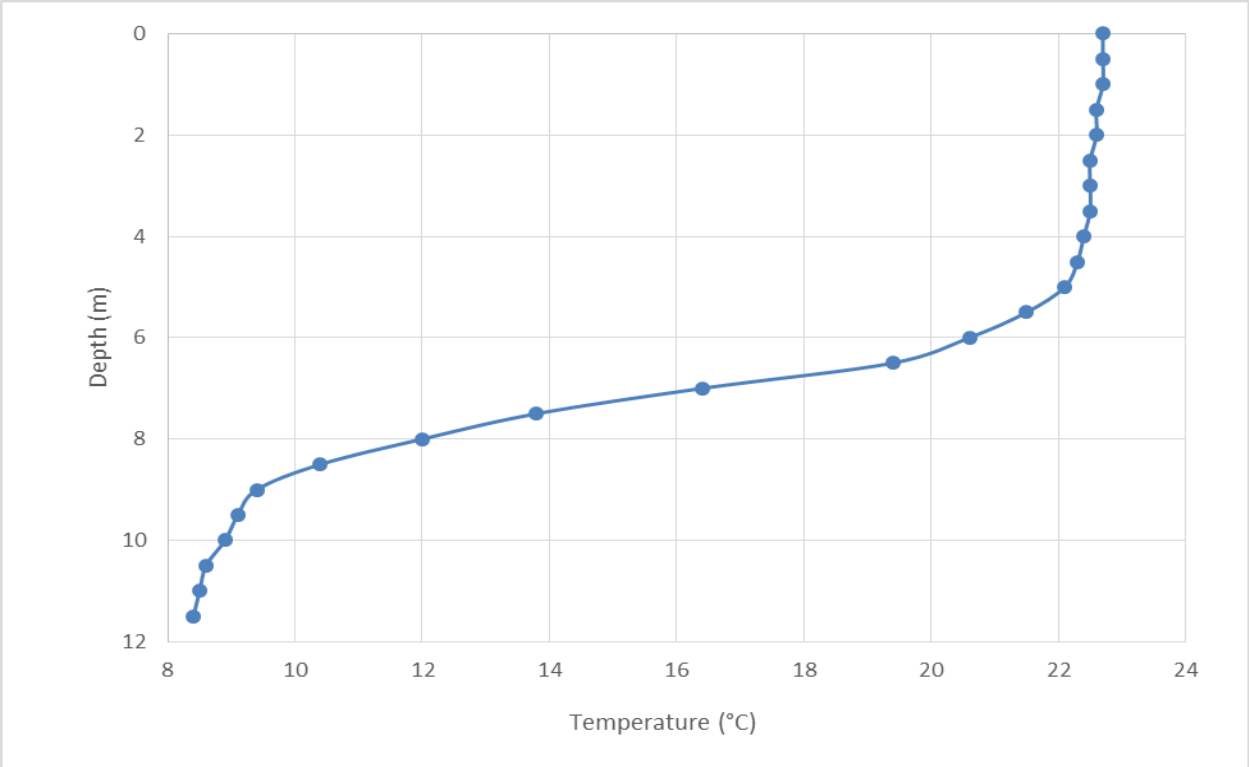
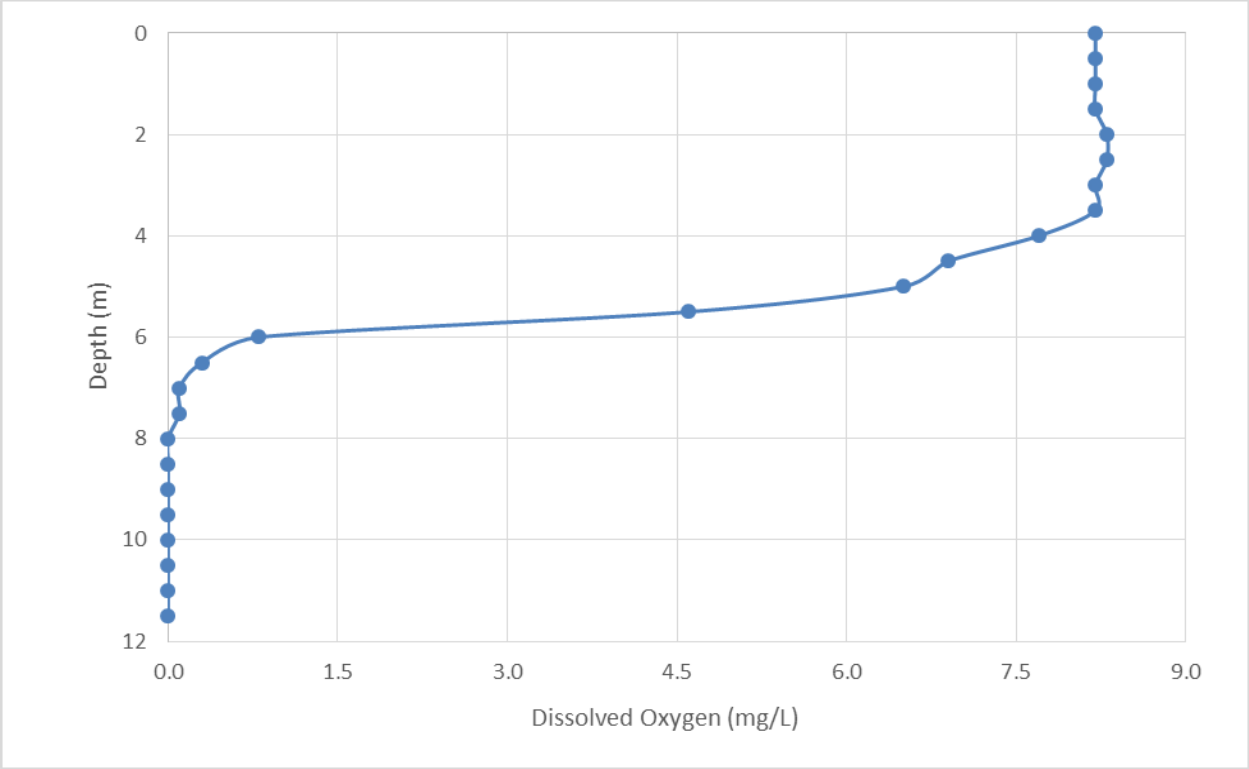


Figure 53. Dissolved oxygen (mg/L) and temperature (°C) measured at approximately 0.5 m depth intervals in the north cell of Ada Hayden Lake on August 28, 2018.



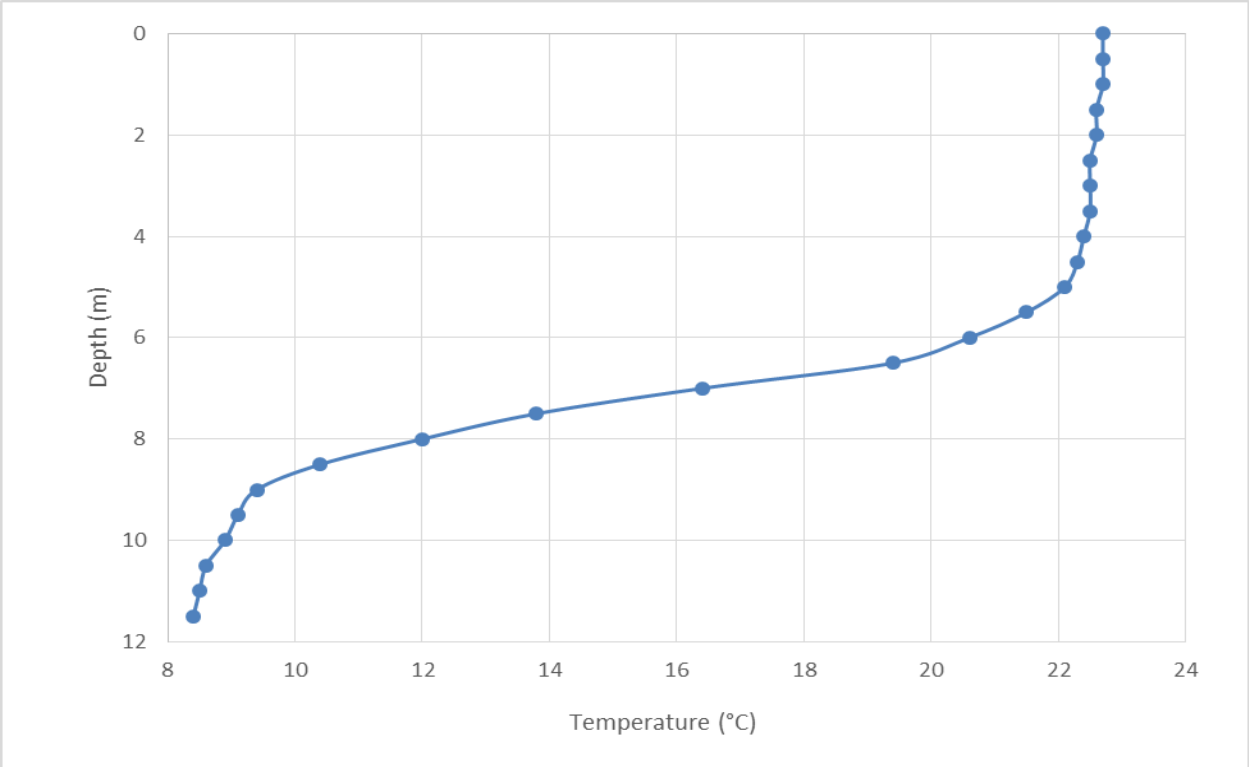
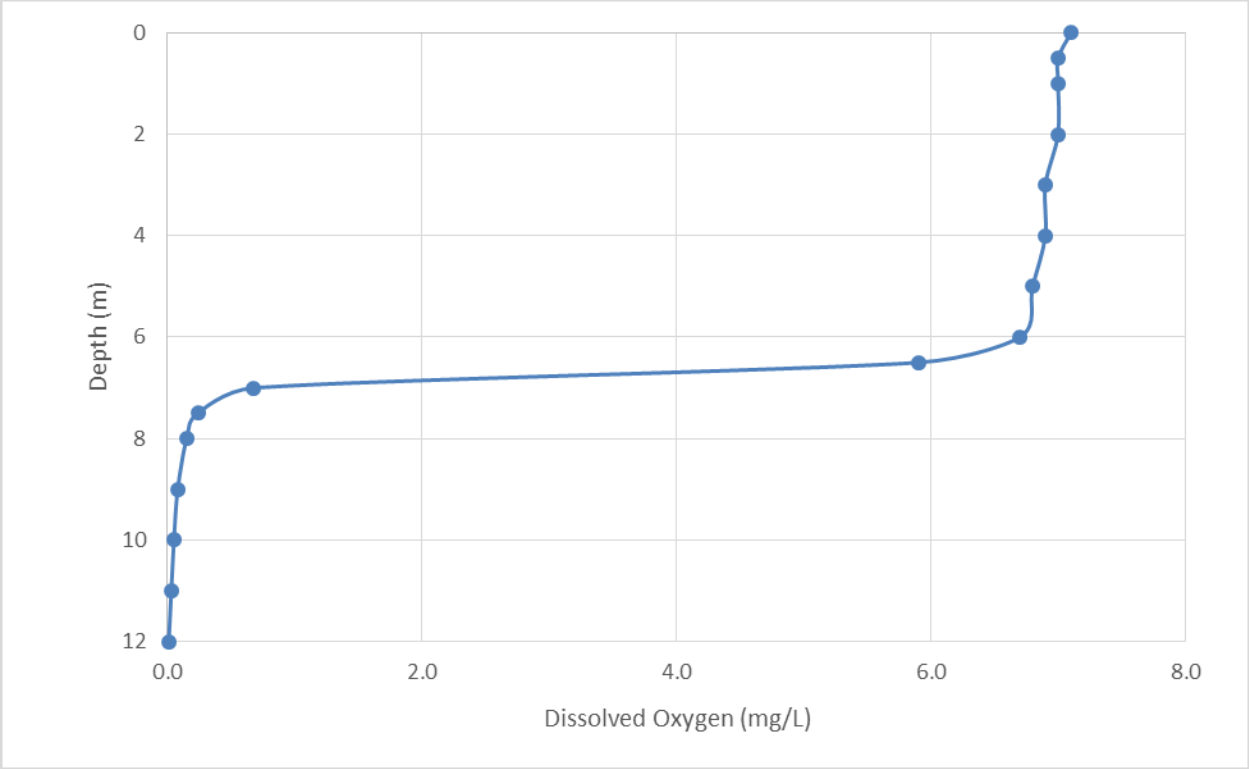


Figure 54. Dissolved oxygen (mg/L) and temperature (°C) measured at approximately 0.5 m depth intervals in the north cell of Ada Hayden Lake on September 12, 2018.



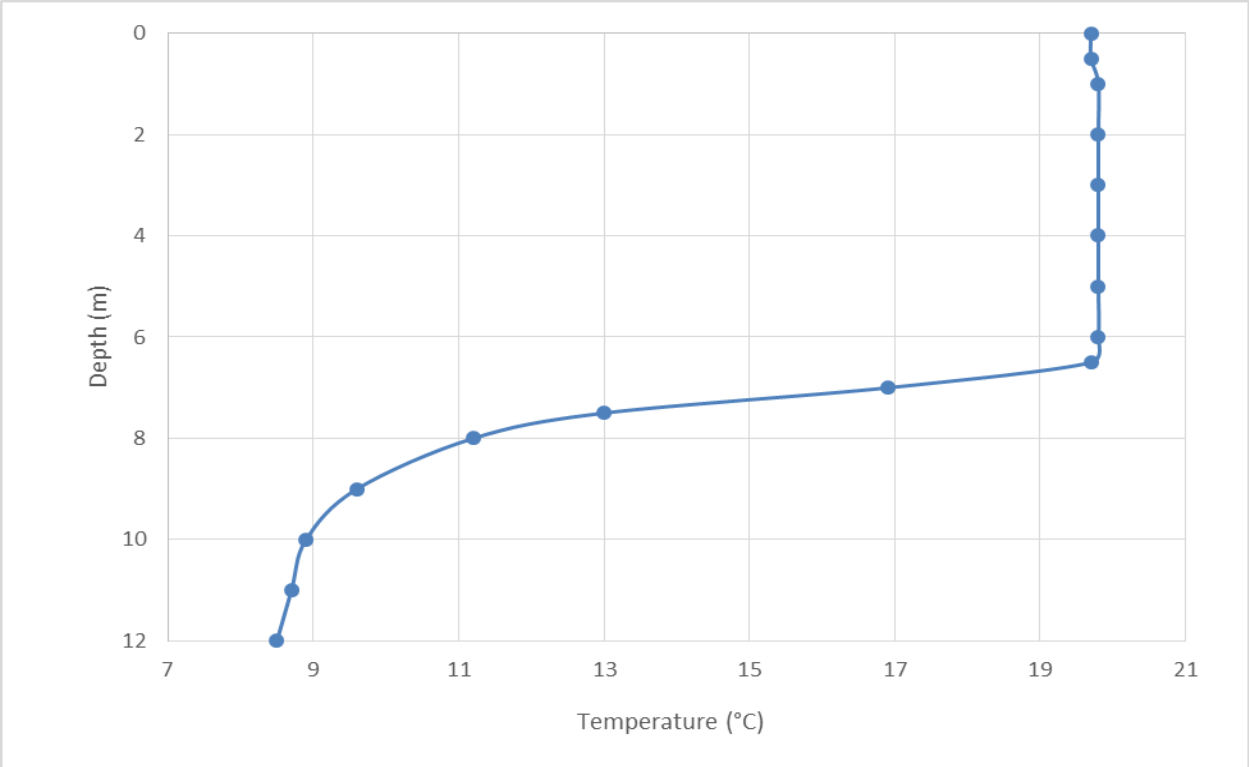
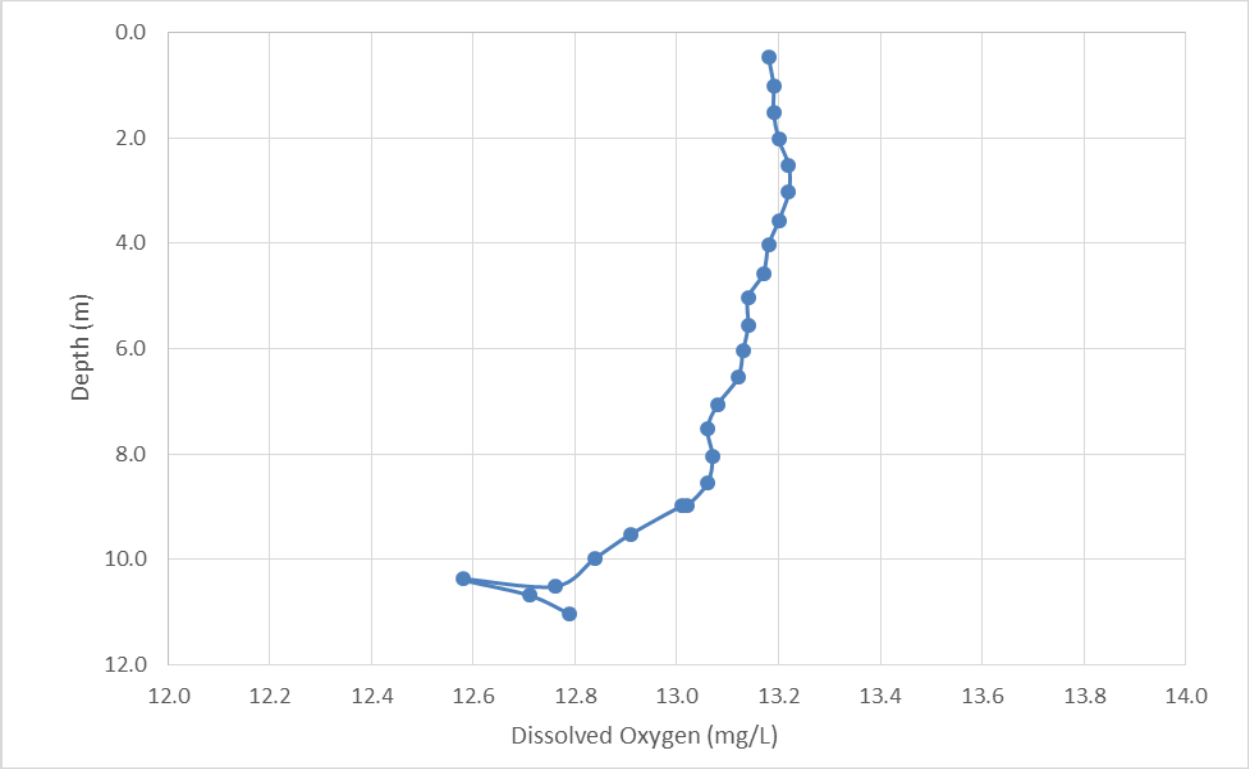


Figure 55. Dissolved oxygen (mg/L) and temperature (°C) measured at approximately 0.5 m depth intervals in the north cell of Ada Hayden Lake on September 27, 2018.



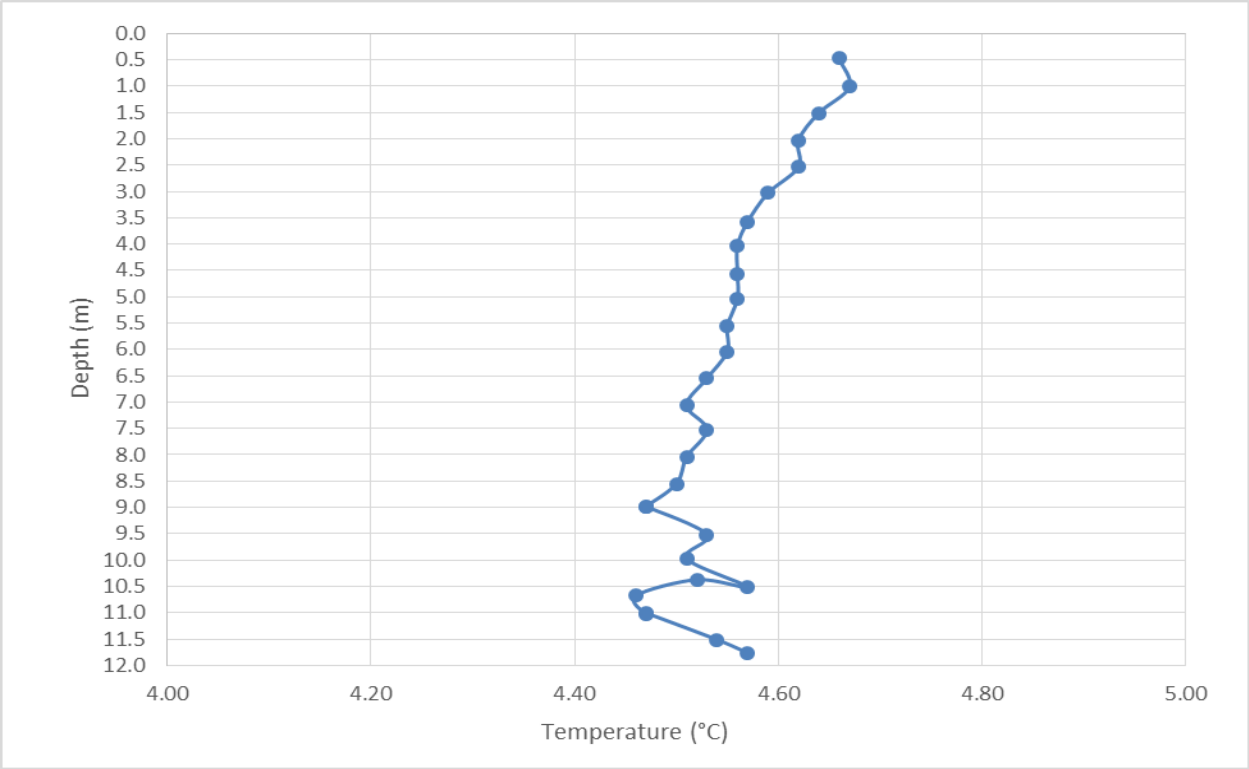
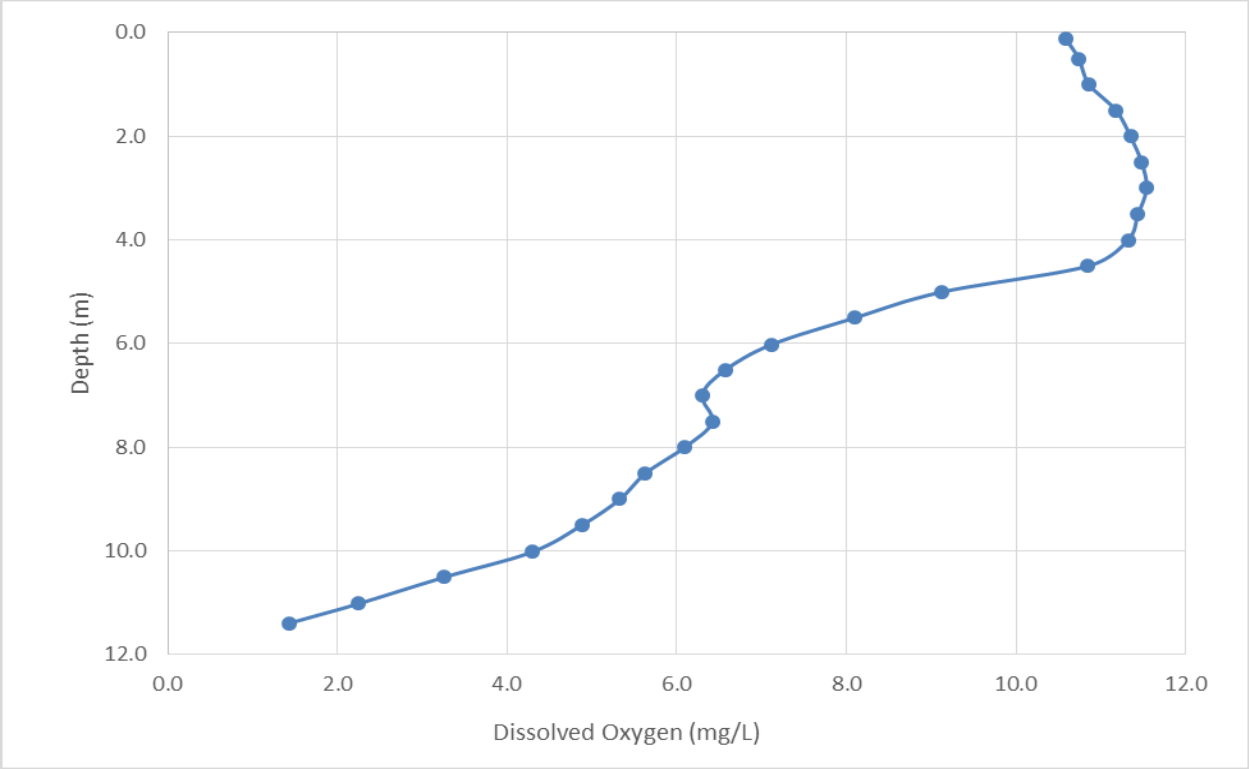


Figure 56. Dissolved oxygen (mg/L) and temperature (°C) measured at approximately 0.5 m depth intervals in the north cell of Ada Hayden Lake on April 5, 2018.



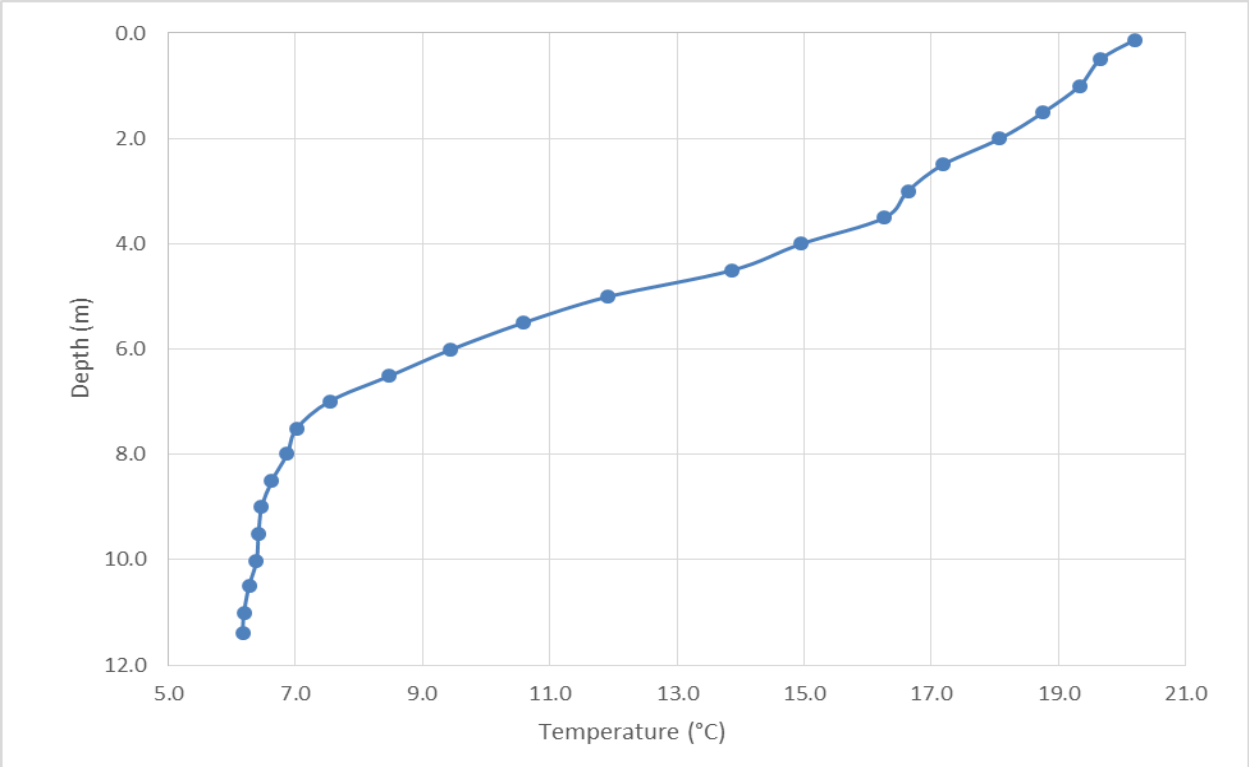
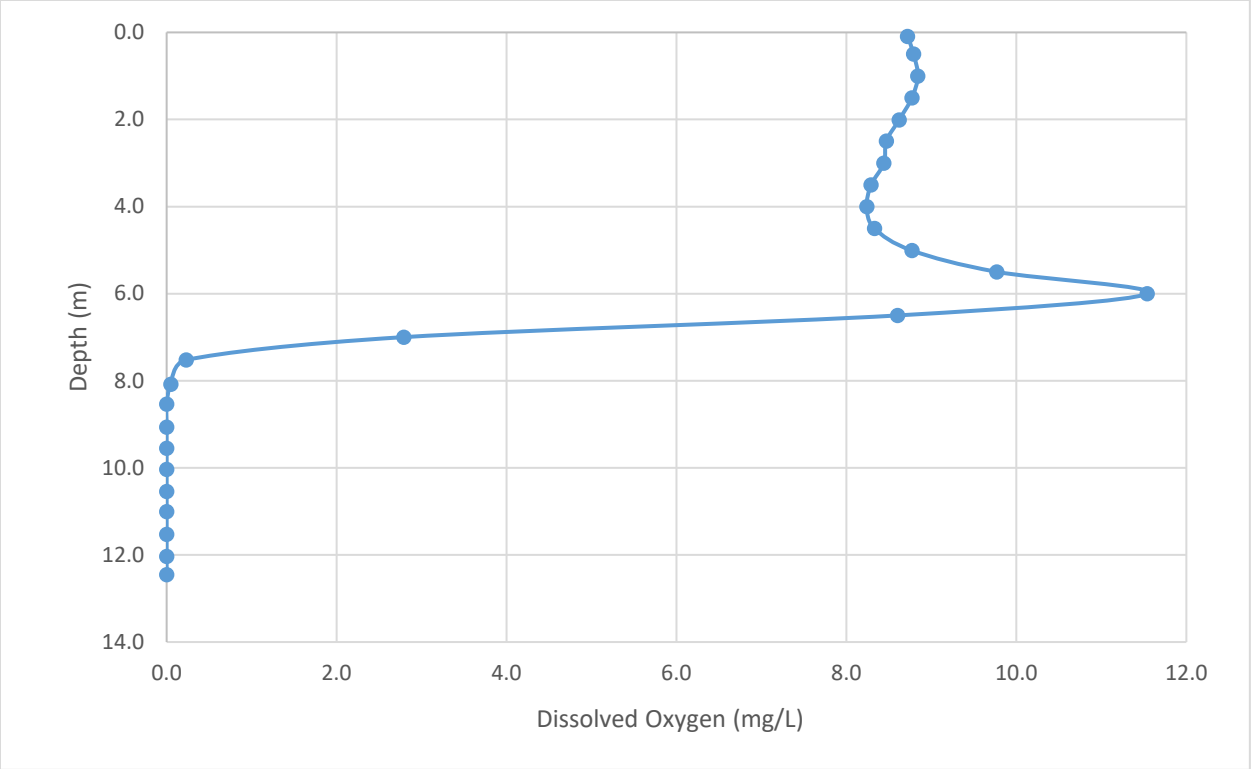


Figure 57. Dissolved oxygen (mg/L) and temperature (°C) measured at approximately 0.5 m depth intervals in the north cell of Ada Hayden Lake on May 16, 2018.



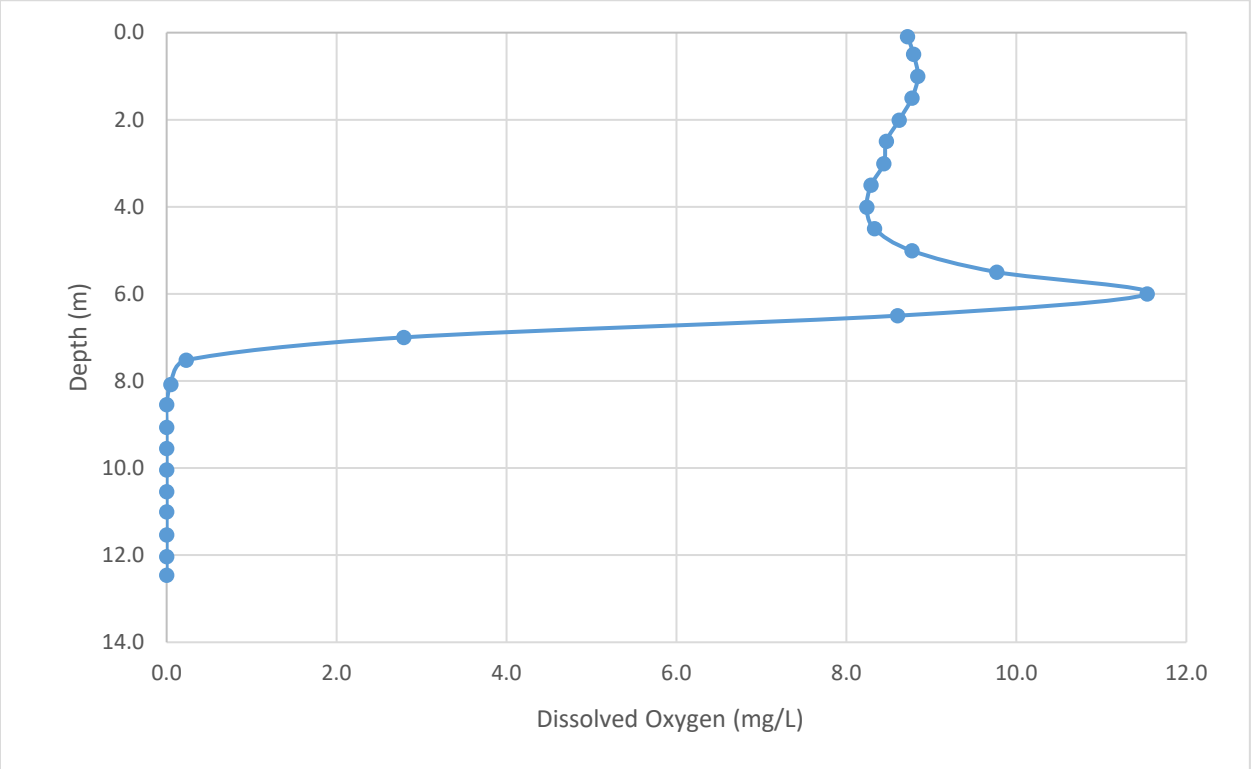
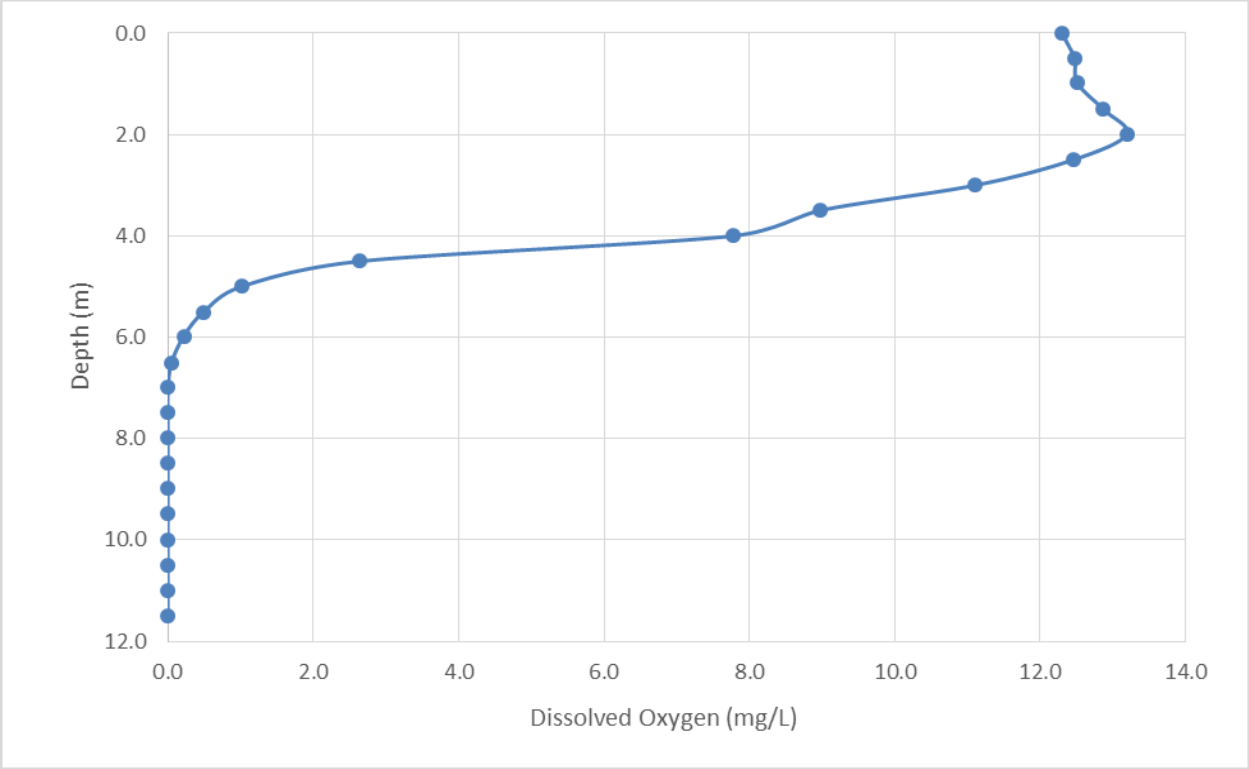


Figure 58. Dissolved oxygen (mg/L) and temperature (°C) measured at approximately 0.5 m depth intervals in the north cell of Ada Hayden Lake on June 15, 2018.



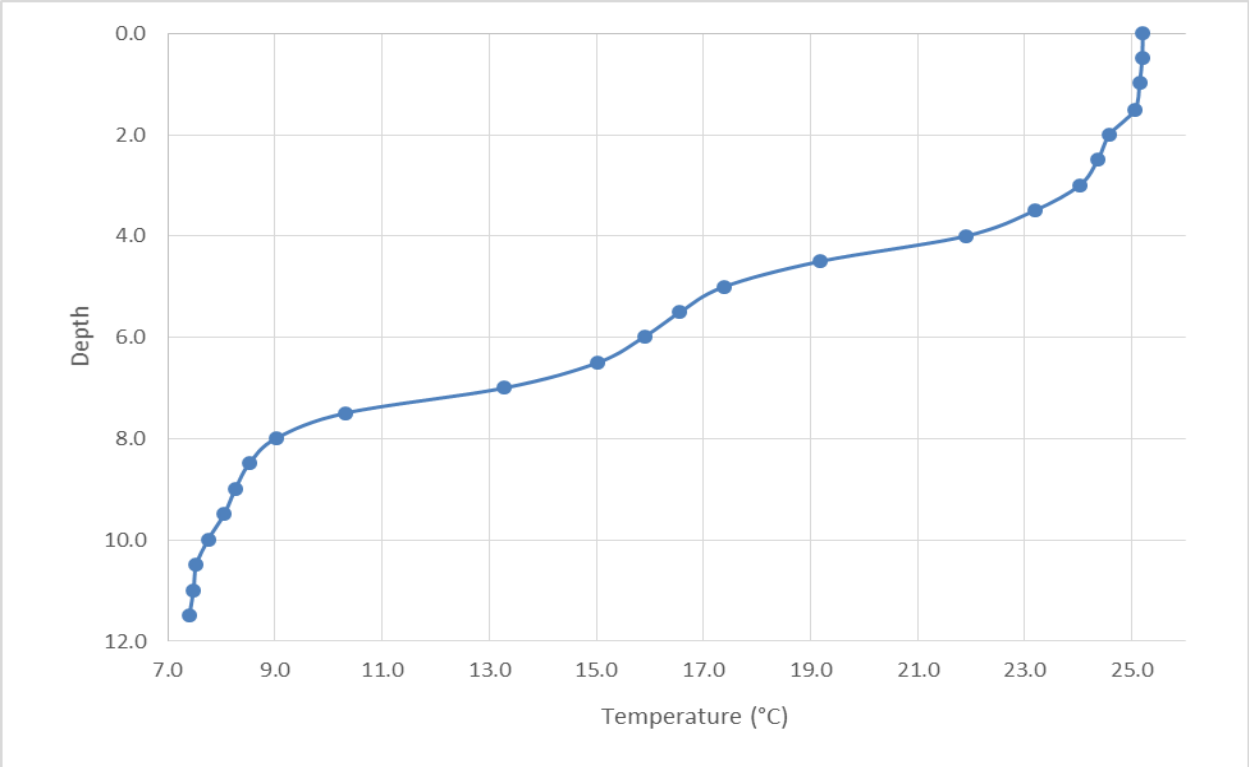
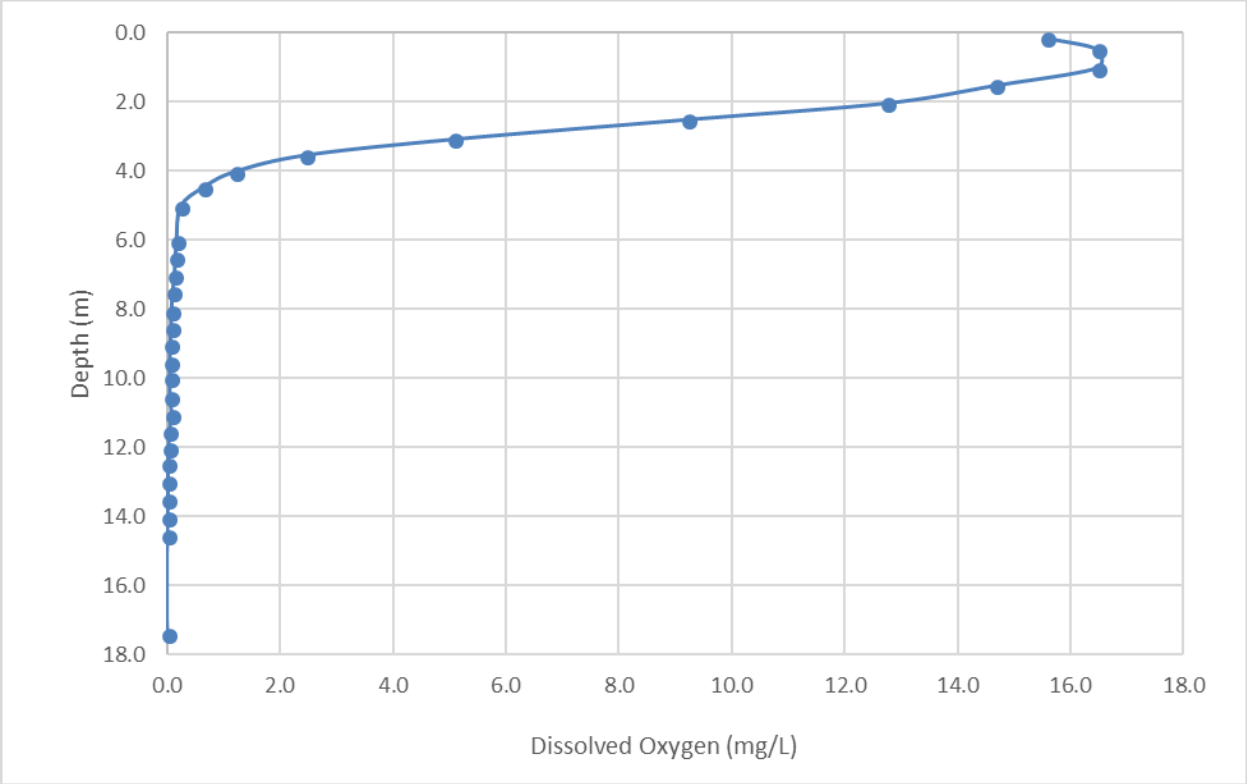


Figure 59. Dissolved oxygen (mg/L) and temperature (°C) measured at approximately 0.5 m depth intervals in the north cell of Ada Hayden Lake on June 28, 2018.



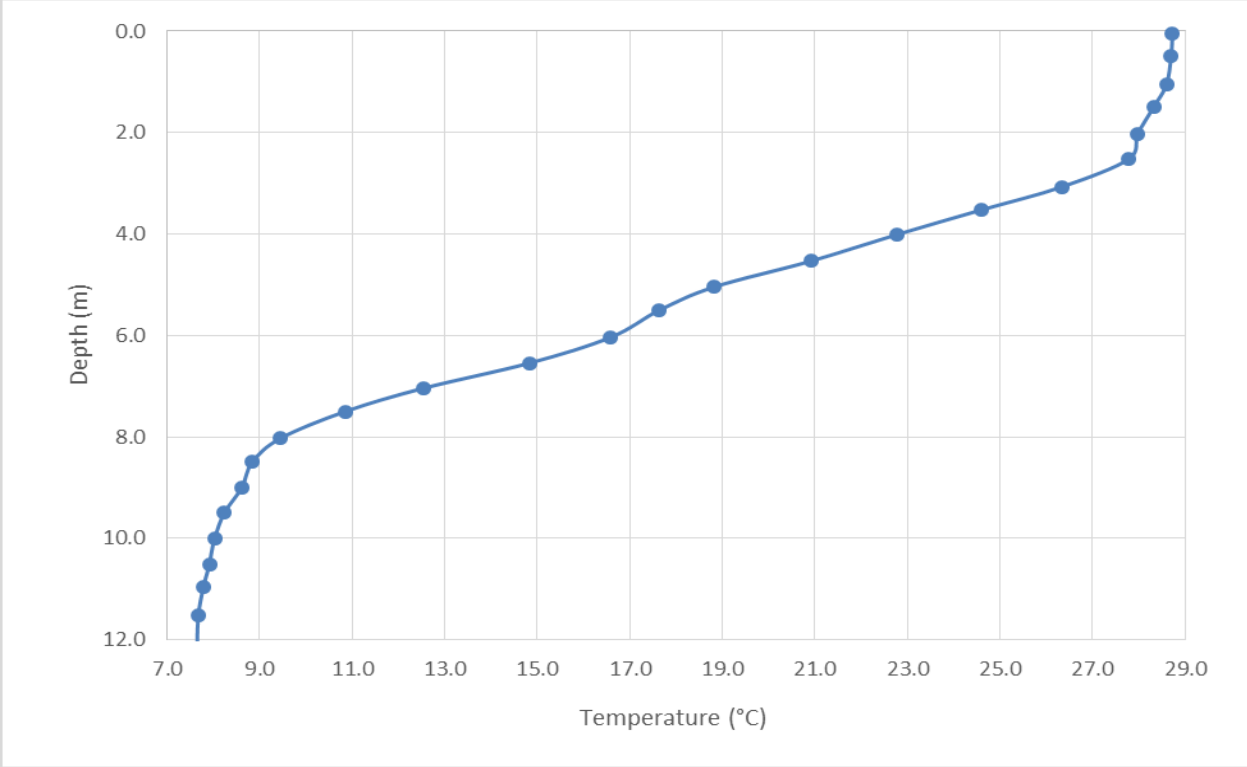
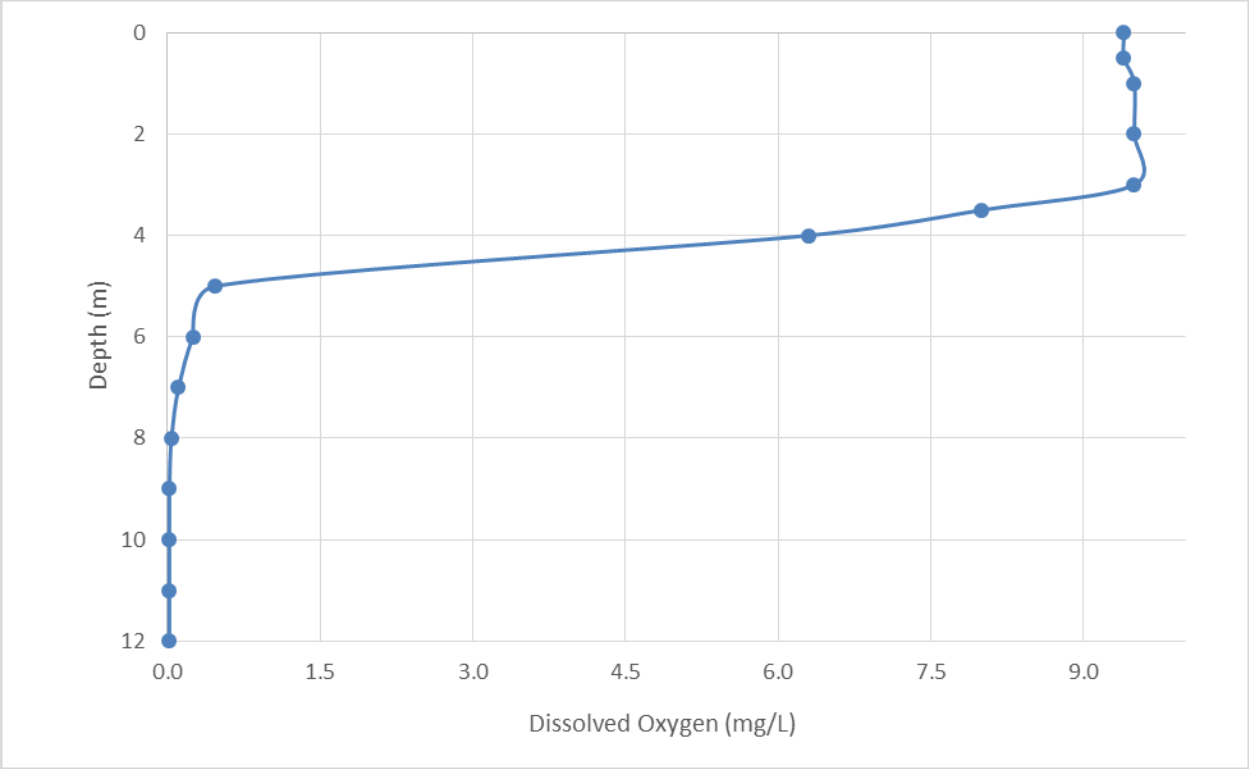


Figure 60. Dissolved oxygen (mg/L) and temperature (°C) measured at approximately 0.5 m depth intervals in the north cell of Ada Hayden Lake on July 11, 2018.



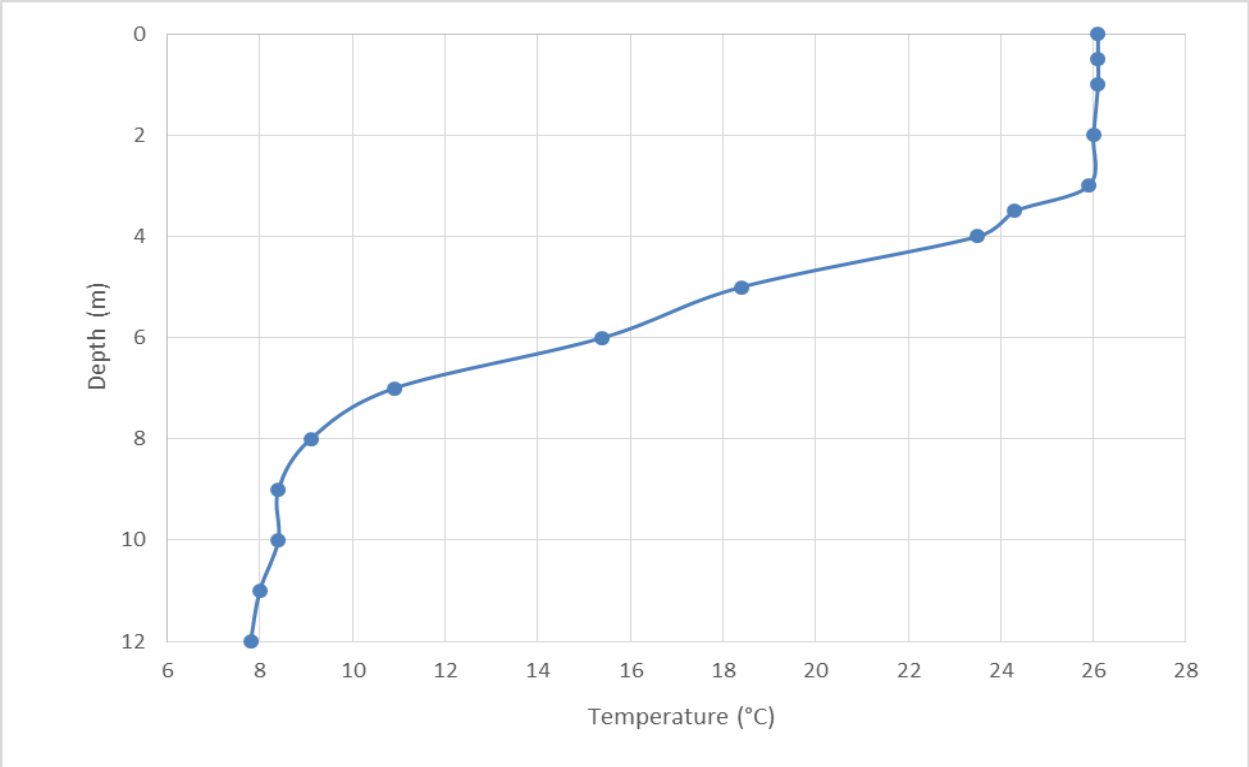
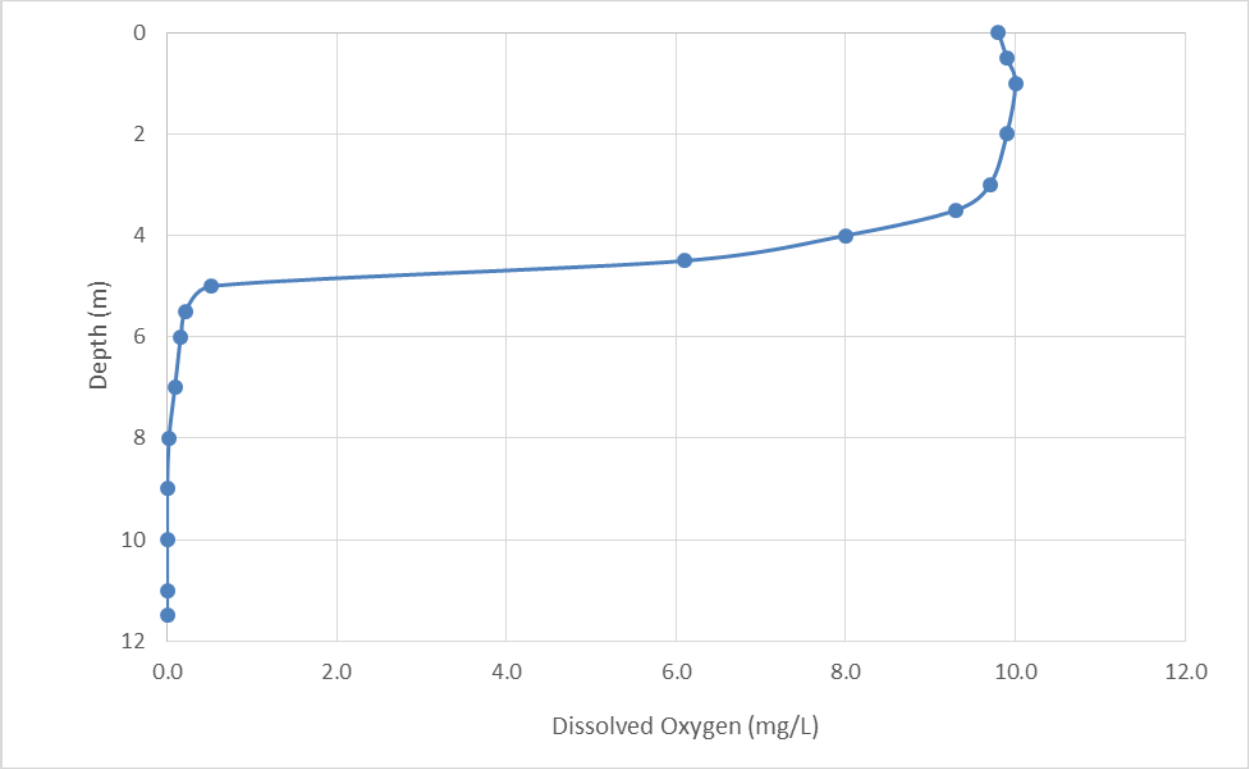


Figure 61. Dissolved oxygen (mg/L) and temperature (°C) measured at approximately 0.5 m depth intervals in the north cell of Ada Hayden Lake on July 26, 2018.



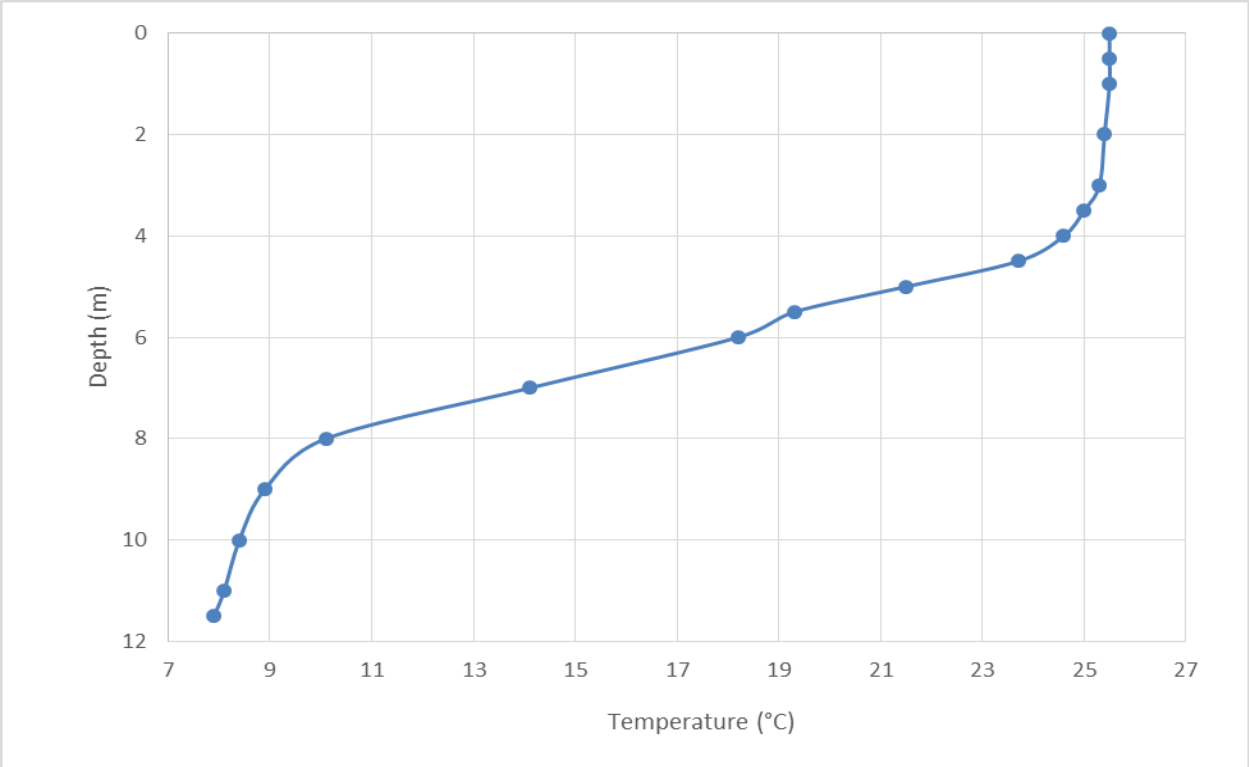
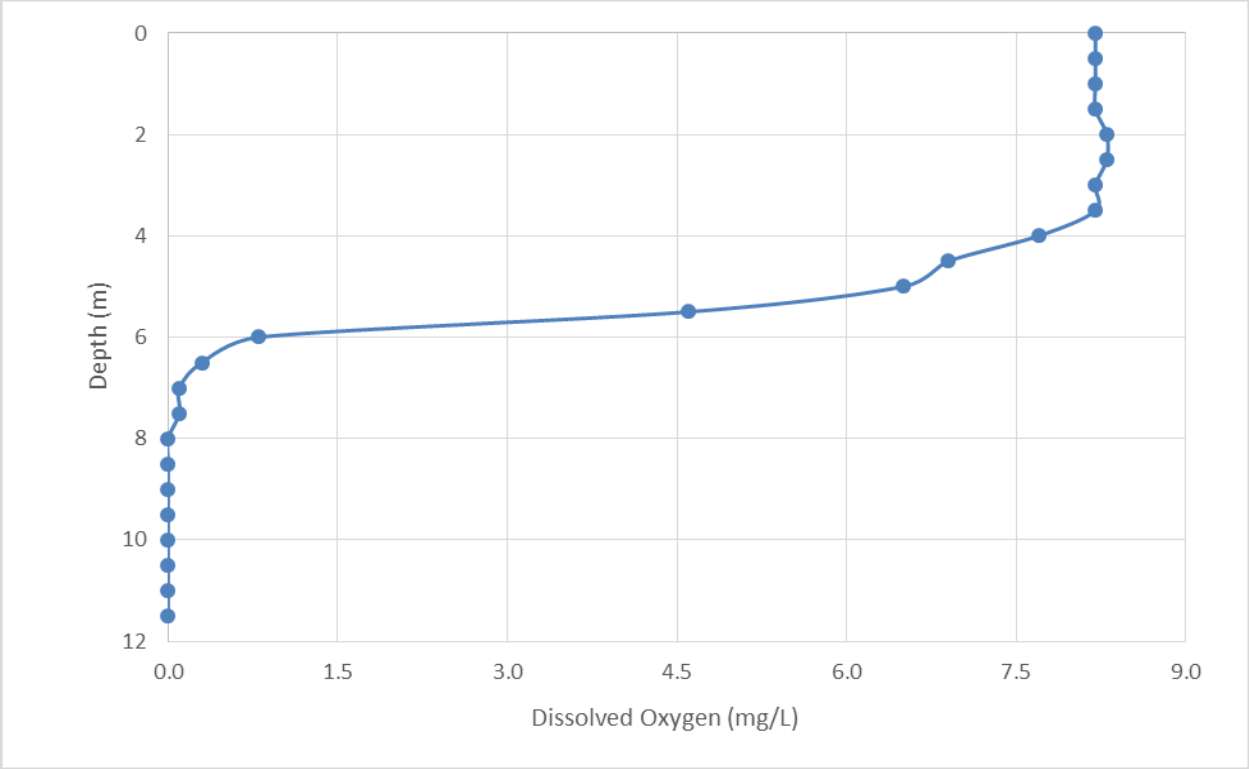


Figure 62. Dissolved oxygen (mg/L) and temperature (°C) measured at approximately 0.5 m depth intervals in the north cell of Ada Hayden Lake on August 8, 2018.



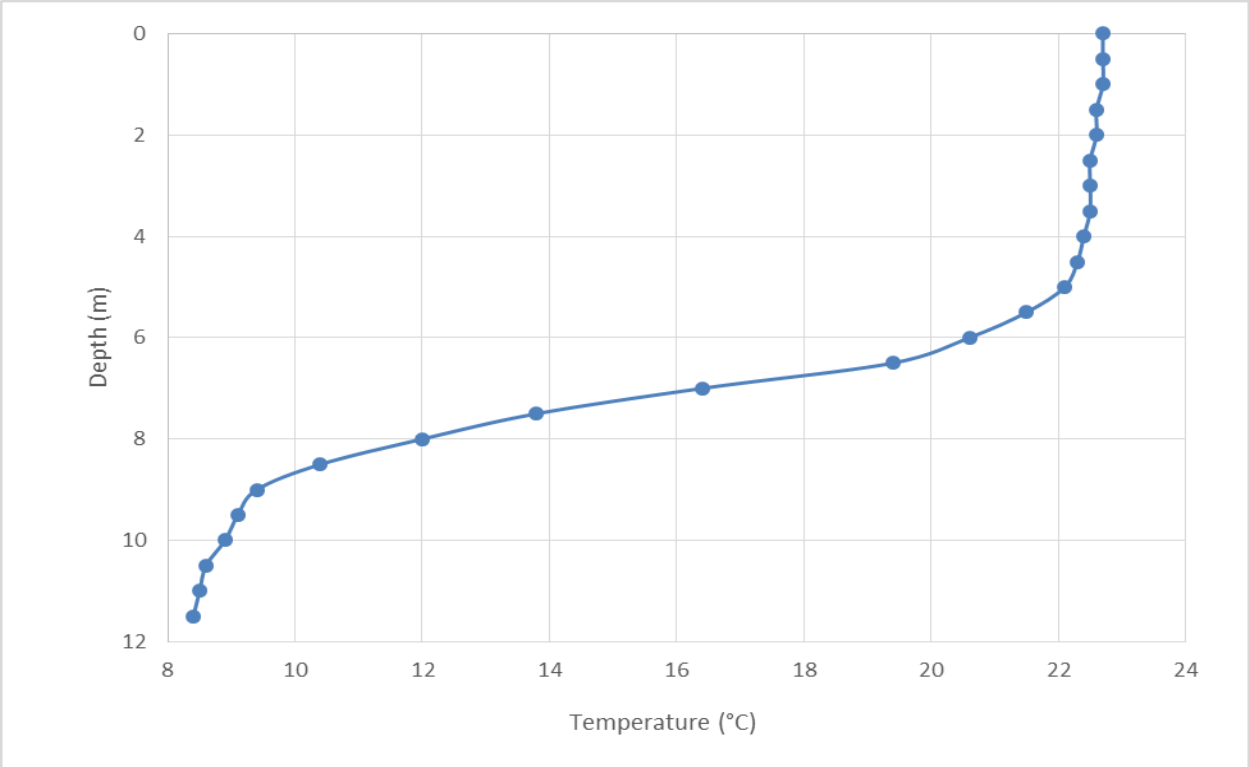
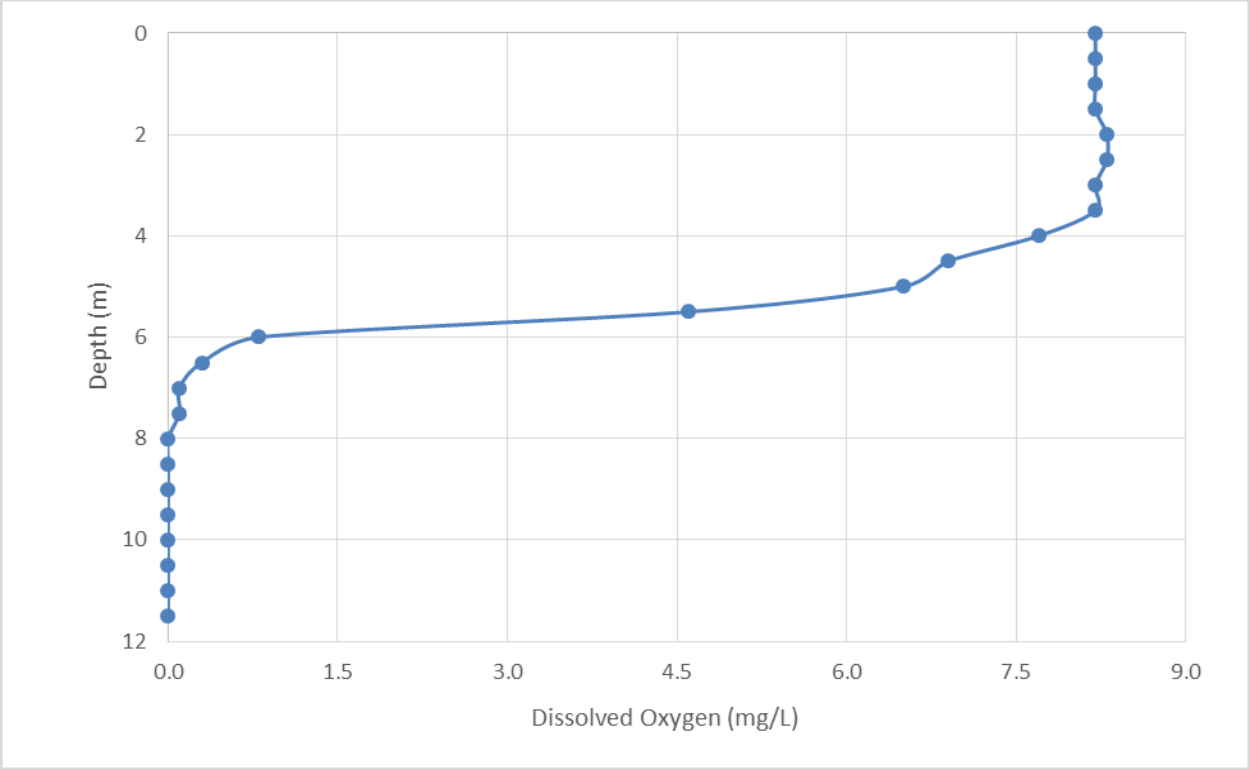


Figure 63. Dissolved oxygen (mg/L) and temperature (°C) measured at approximately 0.5 m depth intervals in the north cell of Ada Hayden Lake on August 28, 2018.



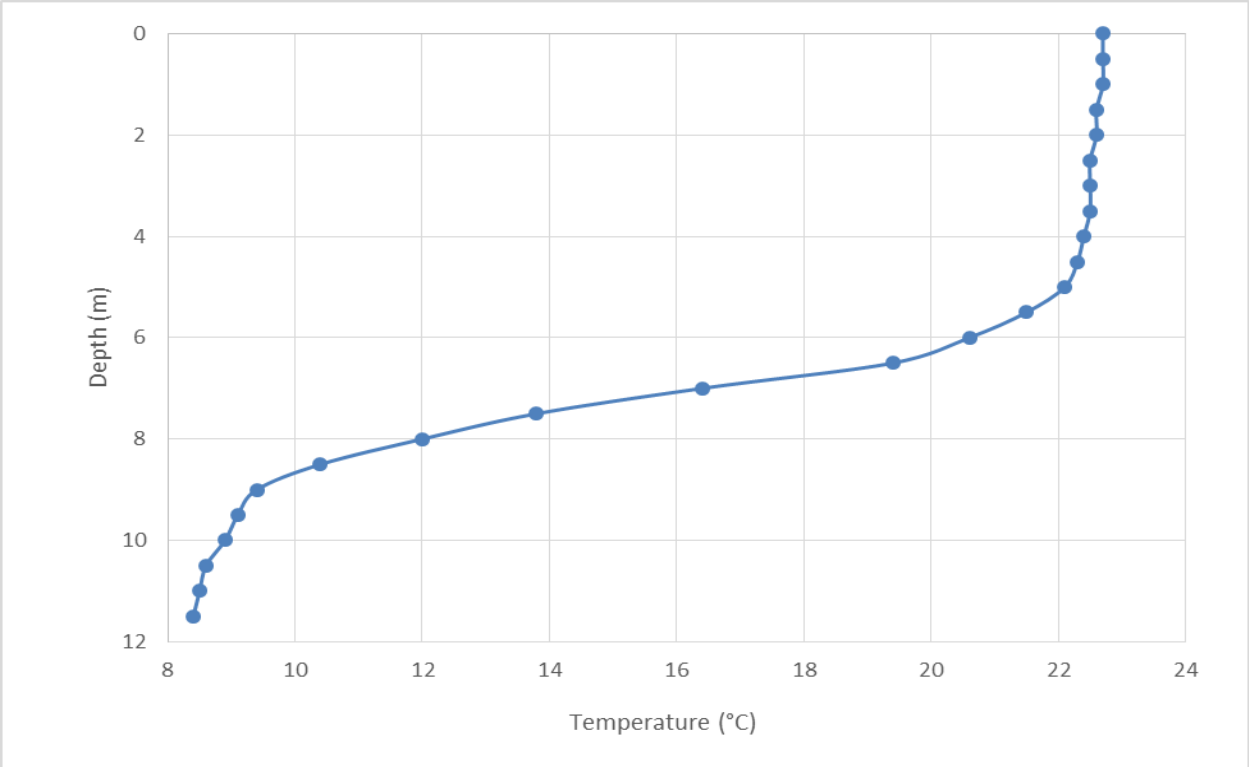
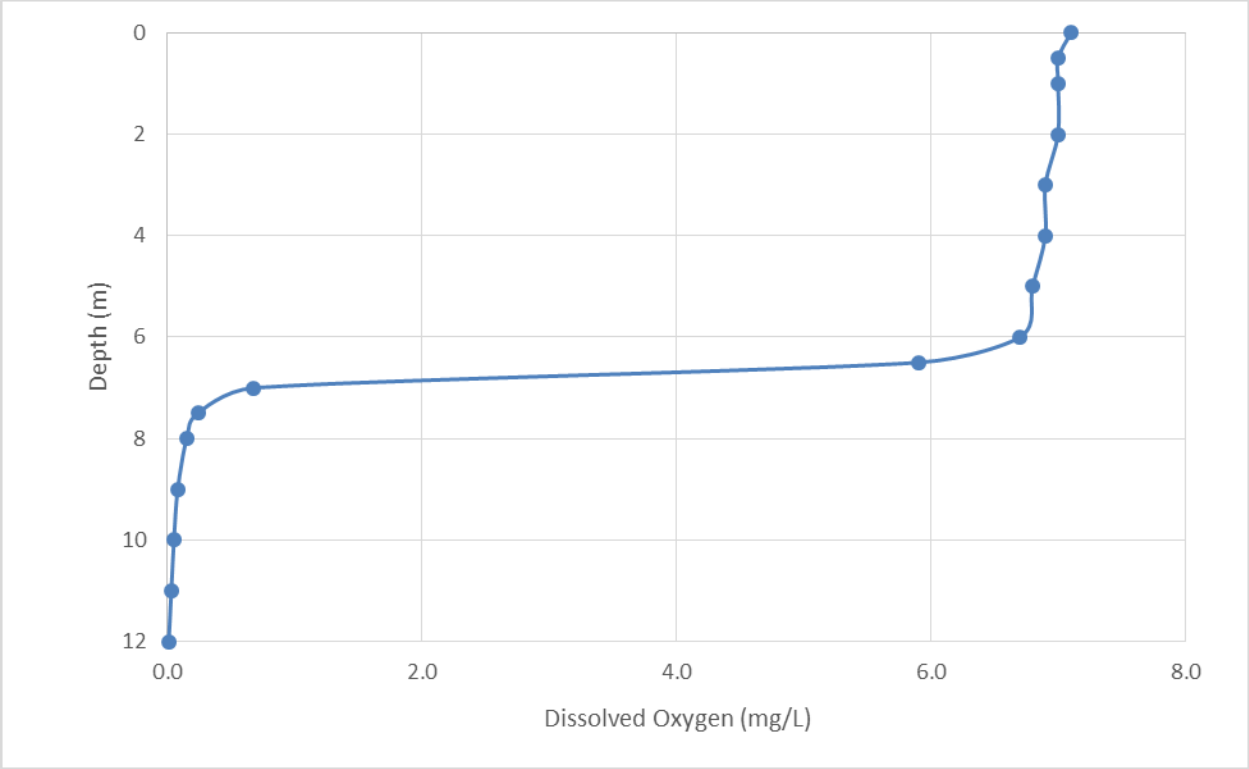


Figure 64. Dissolved oxygen (mg/L) and temperature (°C) measured at approximately 0.5 m depth intervals in the north cell of Ada Hayden Lake on September 12, 2018.



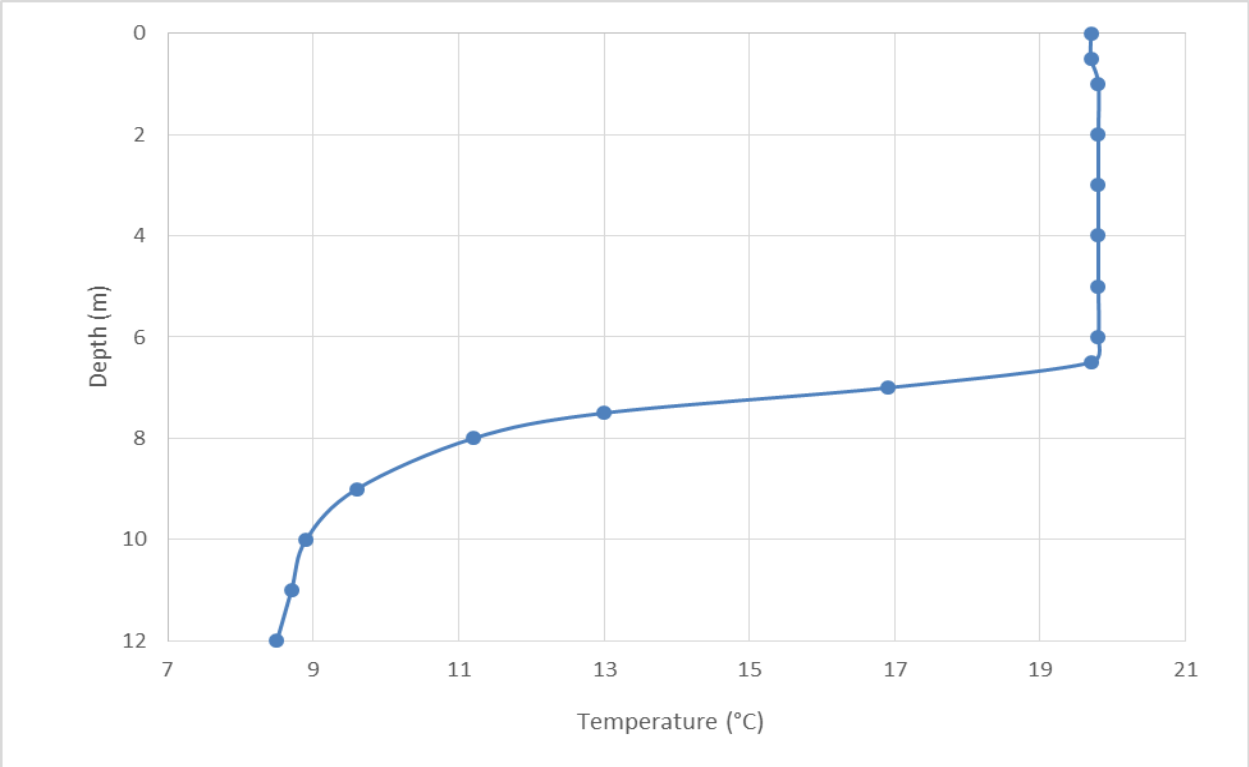


Figure 65. Dissolved oxygen (mg/L) and temperature (°C) measured at approximately 0.5 m depth intervals in the north cell of Ada Hayden Lake on September 27, 2018.