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| PROJECT NAME: 2016/2017 Alpine Lakes Drinking Water Quality Monitoring | SAMPLING DATE: 5/4/2017 |
| MICHAEL BAKER FIELD PERSONNEL: S. Eklund, H. Runa | SUBMITTED BY: S. Eklund |
| LCMF FIELD PERSONNEL: C. Wells | PROJECT CODE: 156671 |
| SAMPLE LOCATIONS: Lake L9312 and Lake L9313 | WEATHER: 20°F, wind 5-10 mph, overcast/flurries |

1. MONITORING EVENT DETAILS

The Alpine Lakes Drinking Water Quality Monitoring was coordinated to coincide with the 2017 Colville River Delta Spring Breakup field program. At 6:00 AM on Thursday, May 4, Ms. Eklund and Ms. Runa attended UMIAQ's daily health and safety meeting. UMIAQ and Michael Baker personnel traveled to Lake L9312 via Hägglund and began surveying the water surface elevation (WSE) at 12:35 PM and began taking water quality measurements at 1:40 PM. Following sampling at Lake L9312, UMIAQ and Michael Baker personnel traveled to Lake L9313 via Hägglund and began surveying the WSE at 3:20 PM and began taking water quality measurements at 4:35 PM.

Ice thickness, snow depth, total water depth, freeboard, temperature, salinity, conductivity, dissolved oxygen (DO) in milligrams per liter (mg/L), pH, and turbidity measurements were collected at the deepest location in each lake, identified from previous monitoring events. Specific conductance (SC) was calculated using water temperature and conductivity. DO in percent (%) saturation was calculated based on salinity and temperature. All measurements were made from below the ice surface to the lake bottom at a maximum of two-foot intervals. Water surface elevations at each sampling location were surveyed using local control established by UMIAQ.

In-situ water quality parameters were recorded using an EXO1 sonde meter. The water quality meter was calibrated by TTT Environmental in Anchorage. Conductivity, pH, and DO parameters were checked for accuracy on site prior to sampling. Water quality parameters at Lake L9312 and Lake L9313 are summarized below in Table 1.

2. LAKE L9312 RESULTS

At Lake L9312, SC ranged from a minimum of 351 microsiemens per centimeter ($\mu\text{S}/\text{cm}$) at a depth of 11 feet to a maximum of 362 $\mu\text{S}/\text{cm}$ at a depth of 6 feet. Salinity was constant throughout the water column at 0.2 parts per thousand (ppt). DO ranged from 23.5% at a depth of 13 feet to 74.2% at a depth of 6 feet; average DO was 58.2%. The pH ranged from a minimum of 5.6 at a depth of 13 feet to a maximum of 5.9 at depths of 6 and 7 feet; average pH was 5.8. Turbidity values ranged from 1.5 Nephelometric Turbidity Units (NTU) at a depth of 9 feet to 13.1 NTU at a depth of 13 feet.

3. LAKE L9313 RESULTS

At Lake L9313, SC ranged from a minimum of 807 $\mu\text{S}/\text{cm}$ at a depth of 9 feet to a maximum of 812 $\mu\text{S}/\text{cm}$ at a depth of 7 feet; average SC was 809 $\mu\text{S}/\text{cm}$. Salinity was constant throughout the water column at 0.4 ppt. DO ranged from 11.5% at a depth of 9 feet to 14.8% at a depth of 11 feet; average DO was 13.2%. The pH ranged from a minimum of 6.6 at a depth of 7 feet to a maximum of 6.9 at a depth of 11 feet; average pH was 6.7. Turbidity values ranged from 0.0 NTU at a depth of 7 feet to 11.2 NTU at a depth of 9 feet.

This concludes sampling for the 2016/2017 Alpine Lakes Drinking Water Quality program.

Table 1: Water Quality Parameters at Lake L9312 and Lake L9313

| Location & Time | Water Surface Elevation (ft BPMSL) | Water Depth (ft) | Ice Thickness (ft) | Snow Depth (ft) | Freeboard (ft) | Sample Depth (ft) | Temp (°C) | Conductivity (µS/cm) | Specific Conductance (µS/cm) | DO (mg/L) | DO (% Saturation) | Salinity (ppt) | pH (SU) | Turbidity (NTU) | |
|---|------------------------------------|------------------|--------------------|-----------------|----------------|-------------------|-----------|----------------------|------------------------------|-----------|-------------------|----------------|---------|-----------------|---|
| Lake L9312 N70°19'52.2" W150°56'59.9" 1:40 PM | 7.2 | 13.9 | 5.3 | 0.6 | 0.4 | 1 | - | - | - | - | - | - | - | - | |
| | | | | | | 2 | - | - | - | - | - | - | - | - | - |
| | | | | | | 3 | - | - | - | - | - | - | - | - | - |
| | | | | | | 4 | - | - | - | - | - | - | - | - | - |
| | | | | | | 5 | - | - | - | - | - | - | - | - | - |
| | | | | | | 6 | 0.2 | 186 | 362 | 10.78 | 74.2 | 0.2 | 5.9 | 5.9 | |
| | | | | | | 7 | 0.2 | 186 | 361 | 10.60 | 73.1 | 0.2 | 5.9 | 2.5 | |
| | | | | | | 8 | - | - | - | - | - | - | - | - | |
| | | | | | | 9 | 1.1 | 189 | 355 | 9.29 | 65.7 | 0.2 | 5.8 | 1.5 | |
| | | | | | | 10 | - | - | - | - | - | - | - | - | |
| | | | | | | 11 | 1.8 | 192 | 351 | 7.55 | 54.4 | 0.2 | 5.8 | 6.0 | |
| | | | | | | 12 | - | - | - | - | - | - | - | - | |
| | | | | | | 13 | 2.1 | 198 | 359 | 3.24 | 23.5 | 0.2 | 5.6 | 13.1 | |
| | | | | | | 14 | - | - | - | - | - | - | - | - | |
| Lake L9313 N70°20'28.1" W150°56'31.5" 4:45 PM | 6.0 | 12.0 | 5.5 | 0.1 | 0.4 | 1 | - | - | - | - | - | - | - | - | |
| | | | | | | 2 | - | - | - | - | - | - | - | - | |
| | | | | | | 3 | - | - | - | - | - | - | - | - | |
| | | | | | | 4 | - | - | - | - | - | - | - | - | |
| | | | | | | 5 | - | - | - | - | - | - | - | - | |
| | | | | | | 6 | - | - | - | - | - | - | - | - | |
| | | | | | | 7 | 0.9 | 428 | 812 | 1.90 | 13.4 | 0.4 | 6.6 | 0.0 | |
| | | | | | | 8 | - | - | - | - | - | - | - | - | |
| | | | | | | 9 | 1.1 | 429 | 807 | 1.63 | 11.5 | 0.4 | 6.7 | 11.2 | |
| | | | | | | 10 | - | - | - | - | - | - | - | - | |
| | | | | | | 11 | 1.1 | 430 | 809 | 2.09 | 14.8 | 0.4 | 6.9 | 8.1 | |
| | | | | | | 12 | - | - | - | - | - | - | - | - | |

Notes:

- (1) All sample location coordinates referenced to NAD83 datum.
- (2) Time shown indicates the start of the measurement.
- (3) Elevation of water surface in sample hole correlates to British Petroleum Mean Sea Level (BPMSL).
- (4) Water depth is the distance from the water surface in the sample hole to the bottom of the lake.
- (5) Freeboard is the distance from the top of ice to the water surface, negative indicates a water level above ice.
- (6) Sample depth is measured from the water surface.
- (7) Specific conductance (referenced to 25°C) was obtained using a conversion coefficient of 0.0196 based on empirical data.
- (8) Temperature measurements have an accuracy of +/- 0.2°C.
- (9) Negative turbidity is possible if the sampled water is less turbid than the calibration standard. These values can be interpreted as 0 NTU.
- (10) Turbidity values measured in the field were adjusted by +18 NTUs to account for a calibration offset as post-field verified by TTT Environmental (meter owner).