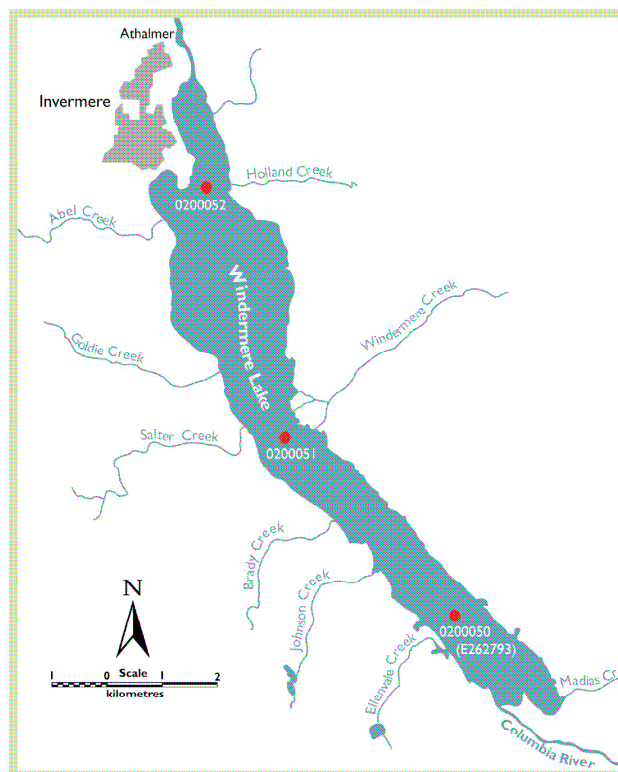




Lake Windermere 2012 Water Quality Monitoring Results

Locations of Water Quality Samples

In 2012 Lake Windermere Ambassadors' volunteers and staff sampled lake water at three locations established by the Ministry of Environment and sampled over 5 years by the Lake Windermere Project. The sites cover the north and south end and center of the lake.



Sampling Sites = Red Dots

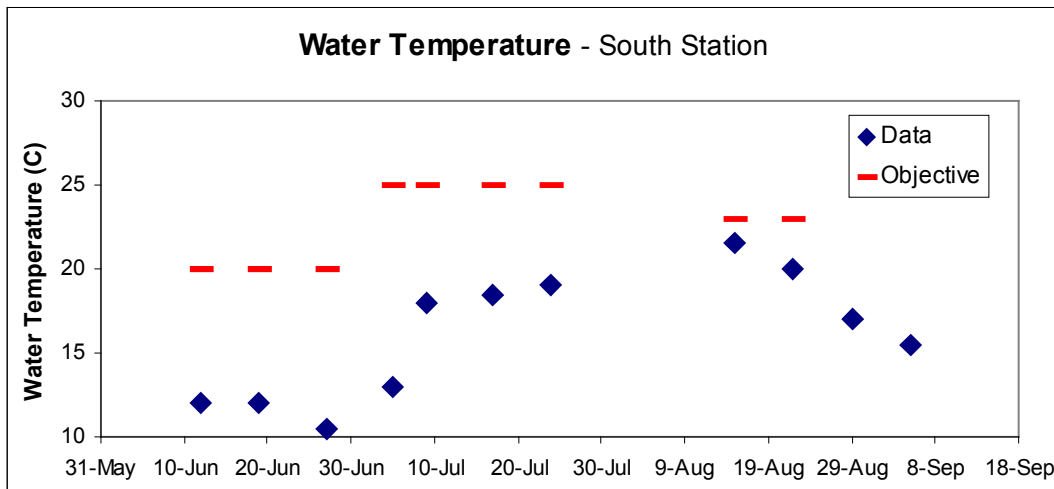
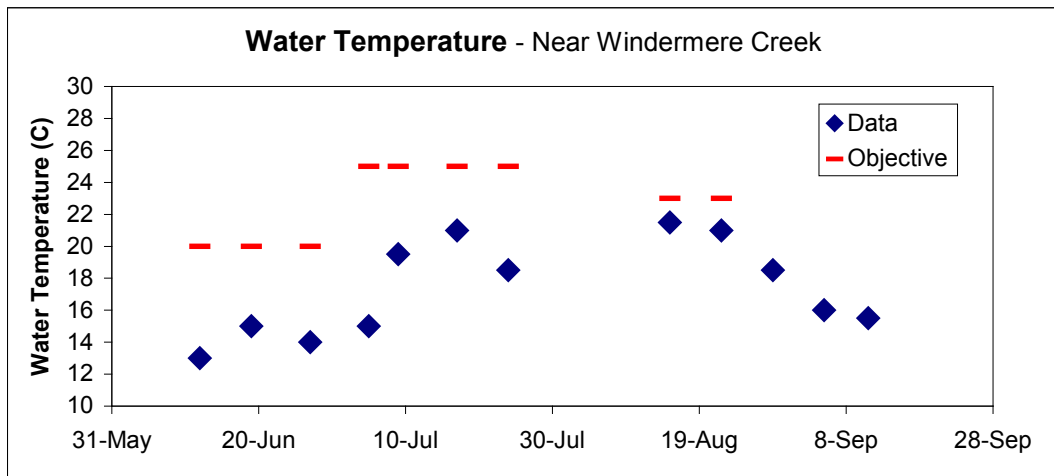
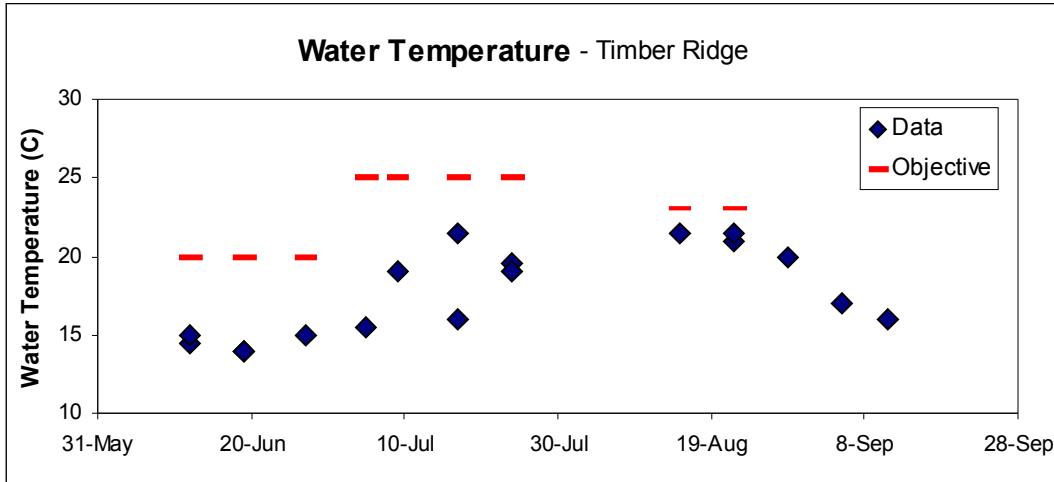
Temperature

Overview

Water temperature is important to the quality of drinking water, and is of critical importance to aquatic life. Lower temperatures are generally more desirable for both uses. The Ministry of Environment determined how warm the lake can get during the summer before problems start to occur – those temperatures are the water quality *objectives* for temperature.

Results

The lake was relatively cool in the summer of 2012. Temperature at all three water monitoring stations was below the maximum recommended temperature, and therefore the lake met water quality objectives for temperature.



Dissolved Oxygen



Overview

Dissolved oxygen is a measure of the amount of oxygen dissolved in water. Fish and other aquatic life need oxygen. The Ministry of Environment determined levels of oxygen necessary to protect aquatic life in Lake Windermere (water quality objectives).

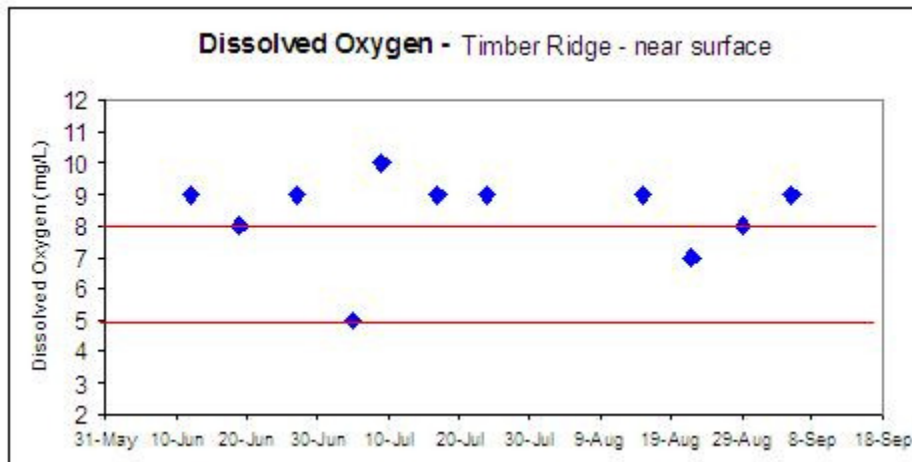
How much oxygen is enough? The Ministry of Environment determined that oxygen should never drop to or below 5 milligrams per liter (instantaneous minimum), and the average of five samples taken over 30 days should be at or above 8 milligrams per liter (mg/L).

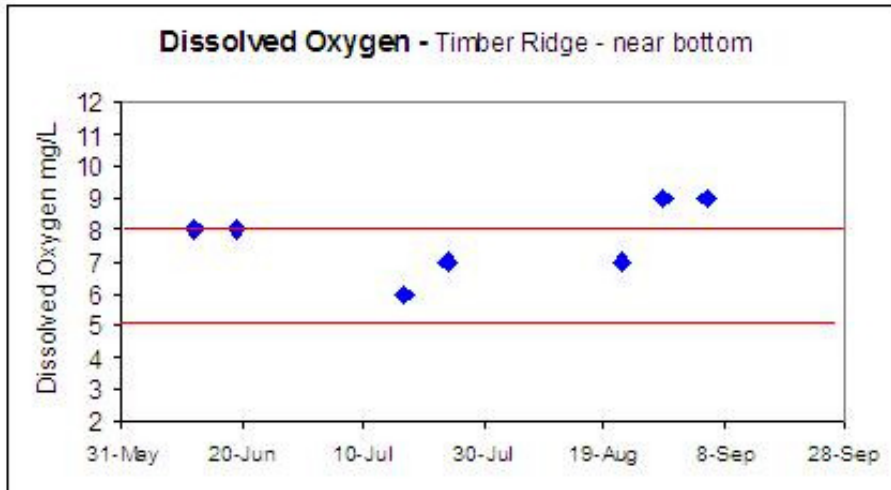
Results

Timber Ridge

At the Timber Ridge station on the north end of the lake, mean oxygen levels at the lake surface were always at or above the objective to protect aquatic life (8 mg/L). The instantaneous minimum oxygen level (5 mg/L) was detected once during the sampling period (July 5th). It is expected that sampler error is responsible for that value.

Our submersible Van Dorn tool broke mid-way through the season, so not enough samples were taken near the bottom of the lake to draw a conclusion about the average results near the bottom of the lake. The instantaneous minimum oxygen level (5 mg/L) was not detected near the lake bottom.





Windermere and South Station

There was plenty of oxygen at both of these sites. Dissolved oxygen levels at the Windermere and South stations were at or above the recommended 8 mg/L objective to protect aquatic life. The instantaneous minimum oxygen level (5 mg/L) was not detected during the sampling period.

Turbidity

Overview

Turbidity is a measure of the light scattered by particles suspended in water, and indicates the cloudiness or clarity of the water. When waters are highly turbid, drinking water quality is impaired, light cannot penetrate to reach aquatic plants- which reduces photosynthesis, and fish become stressed. Since aquatic life in Lake Windermere have adapted to seasonal flushes of sediment into the lake, how much turbidity should be in the water (water quality objective) depends on time of year.

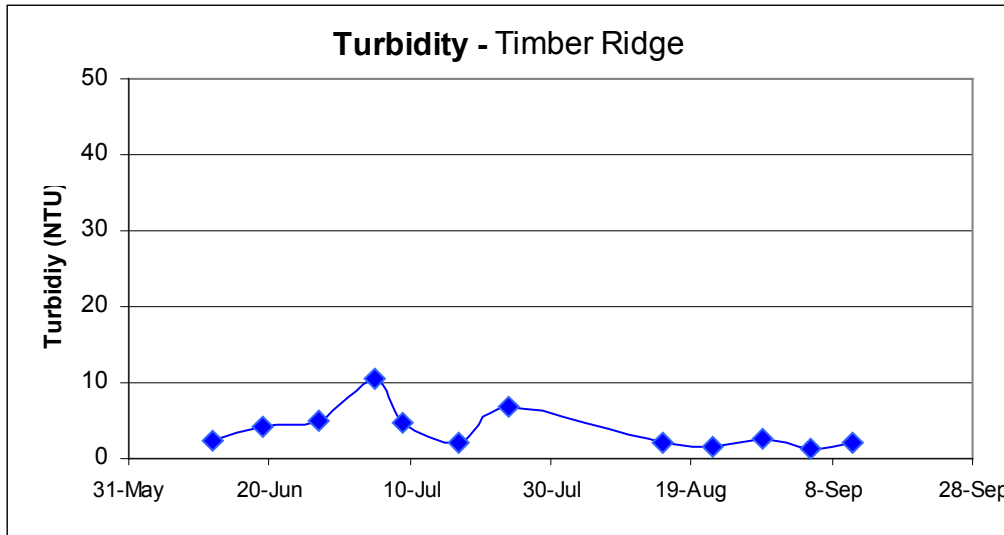


During spring runoff (May 1 – August 15), in what is known as “turbid flow”, the 95th percentile of turbidity measurements taken in five days over a 30-day period should not exceed 5 NTU (turbidity units). During “clear flow” (August 16 – April 30), the maximum turbidity at any time should be less than or equal to 5 NTU. Additionally, the objectives for “clear flow” state that the average of 5 samples over 30 days should not exceed 1 NTU.

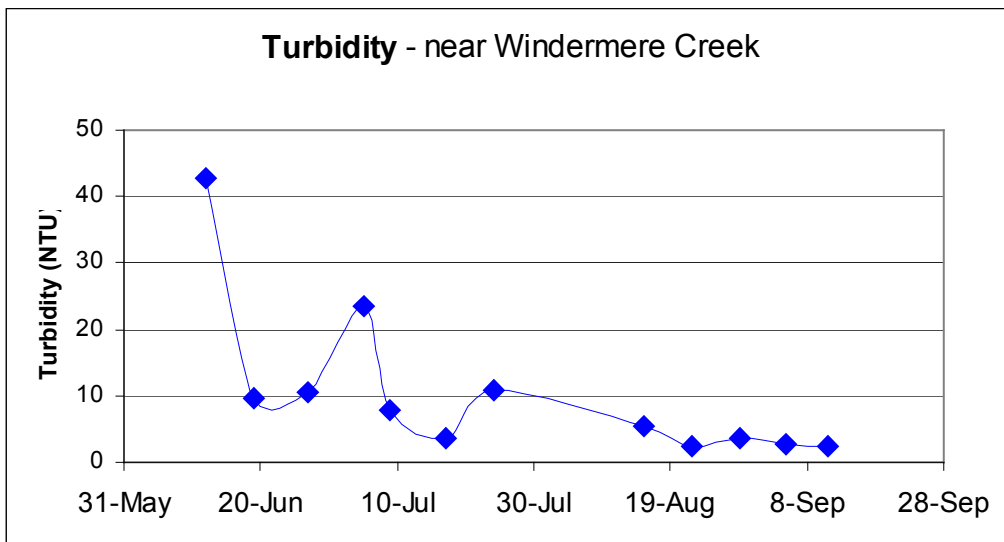
Results

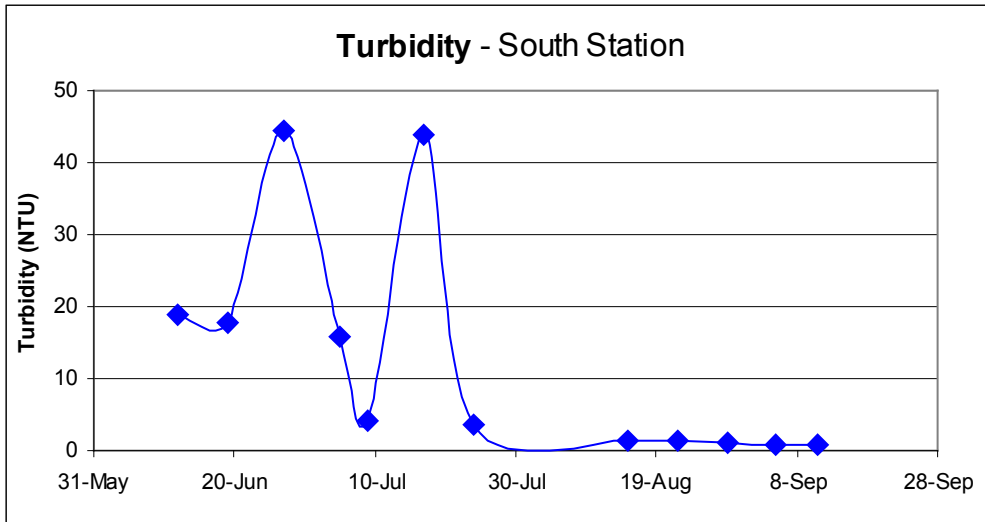
June was a very rainy month, bringing lots of sediment into the lake. A landslide in Fairmont Hot Springs in July also brought lots of sediment into the lake. The turbidity levels were much higher than the objective during the “turbid flow” period at all three monitoring stations. The graphs below show exceptionally high turbidity in June and July in the Windermere and South station. The relatively lower turbidity at the Timber Ridge site suggests that the source of that turbidity was inflow from Windermere Creek and the Columbia River.

During “clear flow” after August 15th, the maximum turbidity value was only exceeded once at the Windermere site. The average of 1 NTU was exceeded during the entire “clear flow” period at the Timber Ridge and Windermere site. The south end of the lake was clean and clear during that period, suggesting that the high turbidity at the more “downstream” sites came from sources other than the Columbia River.



Note: Lines added to ease interpretation only – no continuous data were taken.





Note peak in turbidity July 17th. The landslide in Fairmont occurred July 15th.

Phosphorus

Overview

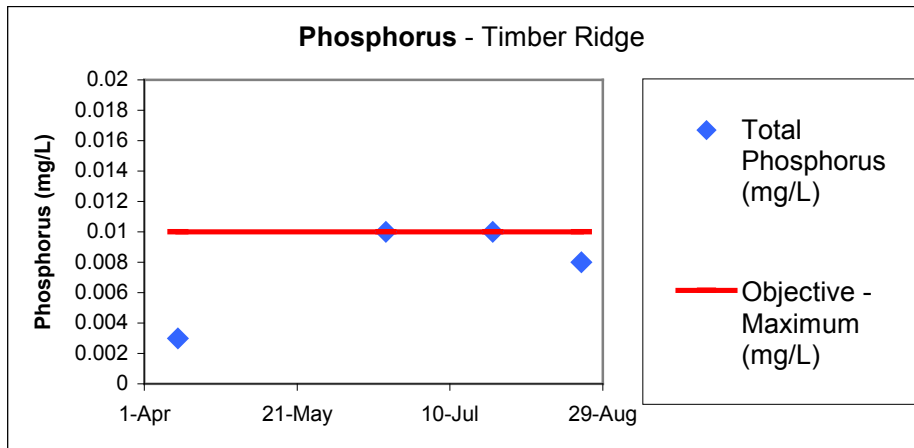
Phosphorus is a nutrient that is usually found in limited quantities in natural lakes. In high quantities it leads to algal blooms. Unnatural inputs of phosphorus into lakes are one of the main contributors to algal blooms. Past results from sampling for phosphorus indicate that Lake Windermere is “oligotrophic.” This means that low nutrient levels and clear waters are to be expected in this lake.

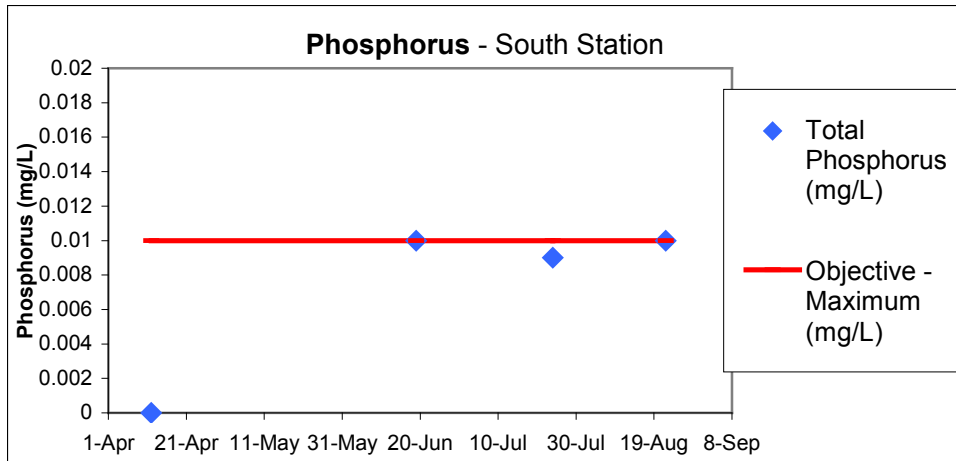


The Ministry of Environment determined that the most total phosphorus that should be present in Lake Windermere (objective) is a concentration of 0.01 milligrams per liter.

Results

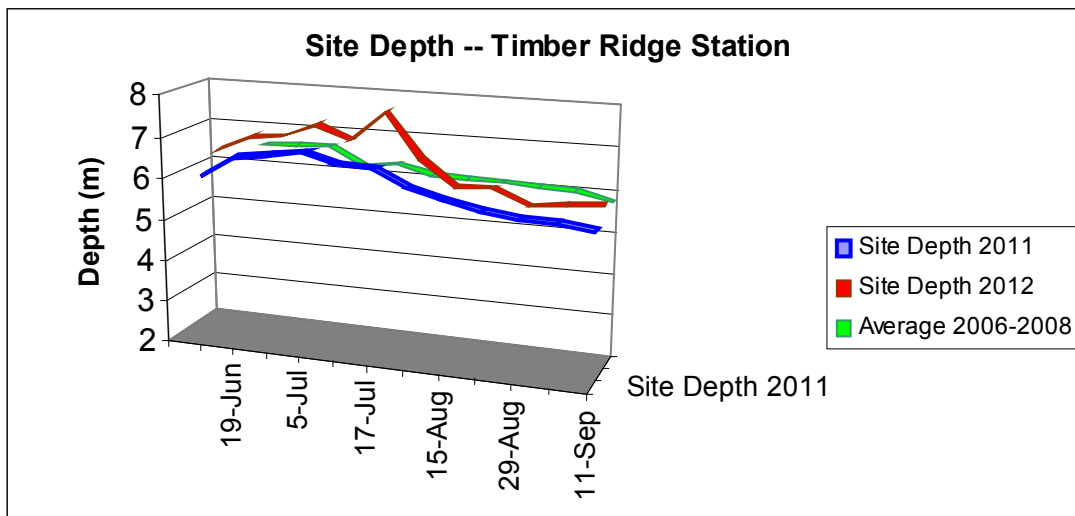
The measured phosphorus concentration at all three sites was found to be at or lower than the recommended level during all three sampling events. Higher concentrations were found in 2011, so these results are encouraging.



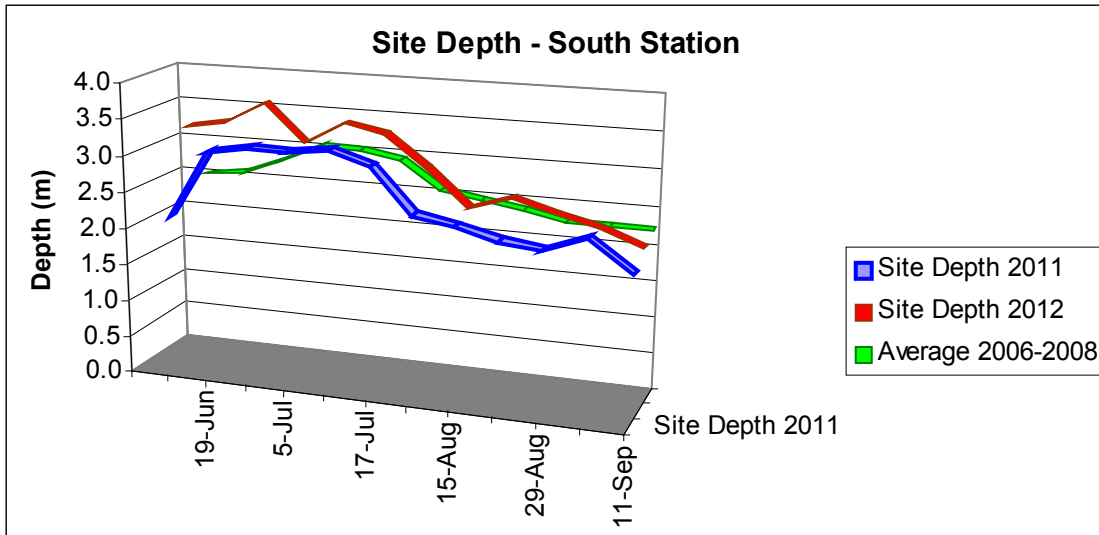


Depth

Local residents noted lake levels in 2012 to be higher than they'd been in the previous 20 years. Below are graphs showing lake depth in 2012 compared to 2011. On average across all sites on all sampling days, the lake was 0.28 meters deeper in 2012 than 2011.



*Note – data not collected on all sampling days – some data points added to smooth the line



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Erin Hillary and Fiona Devlin testing the water – June 2011

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Questions about this report?

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