

2010 Range Ponds Water Quality Report

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The Range Ponds Environmental Association continued to monitor the health of Upper, Middle and Lower Range Ponds in 2010. Water quality monitoring was a combined effort of certified volunteer lake monitors and LWRMA biologists. Monitoring and sampling of the lakes took place from early May through September, during the time of year when lakes and ponds are the most biologically productive, water quality problems are most evident, and “worst case scenario” conditions may exist.

The weather that occurs during and preceding lake monitoring can have a strong influence on indicators of lake water quality, and is likely responsible for some of the variability that is measured within individual seasons and from one year to the next. The weather during the late winter, early spring and summer of 2010 will long be remembered, beginning with lighter than average snowfall during the winter, which resulted in lower than average spring runoff. Many lakes throughout Maine experienced record early “ice out” conditions during the month of March as a result of unusually warm weather during the late winter and spring. In contrast to 2009, which recorded the wettest summer period on record for southern Maine, 2010 was relatively dry, and temperatures were above average. Given these unusual weather circumstances, there was much speculation about how Maine’s lakes and ponds would be affected. A summary of the water clarity of nearly 500 Maine lakes in 2010 is attached to this report.

The following is a summary of findings for the three Range Ponds in 2010. Water clarity data are based on readings taken in August, 2010, as well as any water clarity data provided by certified volunteers on the Range Ponds. All other summary data were obtained by LWRMA staff in August, at a time consistent with the historical gathering of “baseline” data for the Range Ponds.

Upper Range Pond:

2010 was an above average year for Upper Range Pond. Although the clarity of the water was the same as the historical average, both phosphorus and chlorophyll (algae) levels measured

in August were lower (better) than the historical average for these critical indicators of water quality.

Water clarity averaged 6.4 meters (21 feet) for the summer monitoring season, compared to 6.4 meters in 2009, 7.1 meters (23 feet) in 2008, 6.5 meters in 2007, 5.7 meters in 2006, 5.7 meters also in 2005, and 6.7 meters in 2004. The historical average for the lake is also 6.4 meters (21 feet).

The concentration of phosphorus (the nutrient that is responsible for the growth of algae in lakes) measured 4 parts per billion (ppb) in the single sample taken in August, 2010, compared to the dramatically high 16 ppb sample in 2009, 5 ppb in 2008, 6 ppb average in 2007, 9 ppb in 2006, 8 ppb in 2005, and the historical average of 8 ppb. The single 2010 sample was lower than both the 2009 sample, and the historical average for the lake. Total phosphorus concentrations in Upper Range Pond have ranged from 5-16 ppb since 1979, when phosphorus sampling began on this body of water.

Chlorophyll-a (CHL) is a pigment that is measured to determine the concentration of algae in lake water. The August 2010 sample measured 2.6 ppb, compared to the very high 2009 sample, taken in June of that year, when the phosphorus level in the lake was high, measuring 5.8 ppb, compared to the 2008 average concentration of 2.7 ppb, 2.9 ppb in 2007, 4.0 ppb in 2006, 3.5 ppb in 2005, and the historical average of 4.3 ppb. *The 2010 sample was one of the lowest (best) readings on record for Upper Range, whereas the 2009 average was one of the highest on record. It is important to note that both the 2010 and 2009 CHL results were based on a single reading taken in June, whereas many of the annual averages in past years have been based on two samples, collected in early and late summer.*

A temperature and dissolved oxygen profile taken in August indicated that Upper Range was strongly stratified, with water temperatures ranging from 26.0 C at the surface to 10.3 C at 10 meters depth, one meter from the bottom of the sample station at the deepest point in the lake. Dissolved oxygen levels ranged from 8.1 ppm at the surface to a low level of 1.3 ppm at 10 meters depth. Late summer dissolved oxygen loss in Upper Range Pond is minimal.

Middle Range Pond:

Middle Range Pond experienced a substantially above average year in 2010, in that the lake was clearer than average, there was less algae in the water, and phosphorus levels were lower than the historical average for the lake. The average water clarity in 2010 (based on five months of volunteer data, in addition to the reading that we took in late June) was 7.0 meters (23+ feet), compared to the 2009 average of 7.1 meters, 2008 average of 6.7 meters (22 feet), 7.1 meters in 2007, 6.3 meters in 2006, 6.7 meters in 2005, and the historical average of 6.1 meters. Water clarity in Middle Range has improved to the point where the long-term historical average for the lake has improved slightly during the past three years. There appears to be a positive trend in improving water clarity in this lake.

The phosphorus level measured in August measured 5 parts per billion (ppb), compared to the historical average for the lake of 8 ppb. Historical phosphorus levels in Middle Range Pond have varied from 5-12 ppb since samples have been collected starting in 1985.

The concentration of chlorophyll-a (algal concentration in the pond) was lower (better) than the historical average for the lake, measuring 2.7 ppb in August, compared to the historical average of 4.1 ppb. CHL was considerably lower than many of the previous years, resulting in a lowering (improvement) of the historical average for the lake. This suggests that overall biological productivity and algal growth has decreased somewhat in recent years, most probably due to the weather influences mentioned above and below. *However, weather influences aside, the overall clarity of Middle Range Pond has improved measurably in the past decade.*

A temperature and dissolved oxygen profile taken in August indicated that Upper Range was strongly stratified, with water temperatures ranging from 26.4 C at the surface to 6.0 C at 20 meters depth, near the bottom of the sample station at the deepest point in the lake. Dissolved oxygen levels ranged from 8.2 ppm at the surface to a low level of 3.2 ppm at 20 meters depth. Late summer oxygen levels in Middle Range are low, but not critically so. Efforts to protect the water quality of Middle Range will prevent DO levels from declining further in the future.

Other water quality indicators that are measured to help support the primary data were within the normal range of historical values for Middle Range in 2010

Lower Range Pond:

Overall, Lower Range Pond experienced an above average year in 2010, in that the lake was significantly clearer than its historical average, and phosphorus and chlorophyll (algae) levels were lower than their historical averages.. The lake was clearer than average in 2010, averaging 7.3 meters (24 feet), based on a full summer of readings taken by volunteer lake monitors, and our reading in August. In 2009, the average was also 7.3 meters; 2008 was 7.2 meters (23.5 feet), and the historical average of Lower Range is 6.9 meters, which has recently increased slightly as a result of several very clear years for the lake. Once again, Lower Range was the clearest of the Range Ponds in 2010.

The total phosphorus concentration in Lower Range Pond last summer, based on the single August sample, was 6 ppb, compared to 6 ppb in 2009, 7 ppb in 2008 and 2007, and the historical average of 8 ppb.

Chlorophyll-a (measuring algal growth in the water) measured 3.3 ppb in August, compared to 3.5 ppb in 2009, the 2008 average of 3.0 ppb, 3.6 ppb in 2007, and the historical average of 3.5 ppb.

A temperature and dissolved oxygen profile taken in August indicated that Lower Range was strongly stratified, with water temperatures ranging from 26.7 C at the surface to 10.3 C at 12 meters depth, near the bottom of the sample station at the deepest point in the lake. Dissolved

oxygen levels ranged from 8.3 ppm at the surface to a low level of 0.1 ppm at 12 meters depth. Late summer dissolved oxygen levels in Lower Range have been consistently depleted in the deepest area of the lake. This phenomenon has the potential to negatively impact the overall health of the lake. Measures to protect water quality through watershed management may help to improve late summer DO levels in Upper Range.

Additional supporting indicators of water quality were within the normal range of the historical data for Lower Range Pond in 2010.

It is important to note that our baseline sampling of the lake in 2010 was limited to the month of August, whereas much of the historical data for the three Range Ponds is based on both mid and late summer sampling. This change in the sampling schedule may have influenced the 2010 readings for some of the indicators that were monitored, relative to historical levels for some indicators. However, volunteer lake monitors on the three lakes provided additional water clarity (Secchi transparency) readings for the full summer monitoring season. It is important to keep this change in the sampling schedule in mind when considering the 2010 monitoring results.

Summary:

Overall, 2010 was a good year for the Range Ponds, in that all three of the ponds were as clear as, or significantly clearer than they have been historically. A relatively high percentage of Maine lakes that were monitored in 2010 were clearer than their historical averages. Concentrations of total phosphorus and algae in the three ponds were also generally average, or better, during the summer. Lake water clarity is highly valued by the public, often ranking first in terms of desirable attributes in user-perception surveys.

Special thanks are due to several volunteer lake monitors who collected water clarity data for the three Range Ponds in 2010. Their efforts added substantially to the value of the data used to create this report!

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