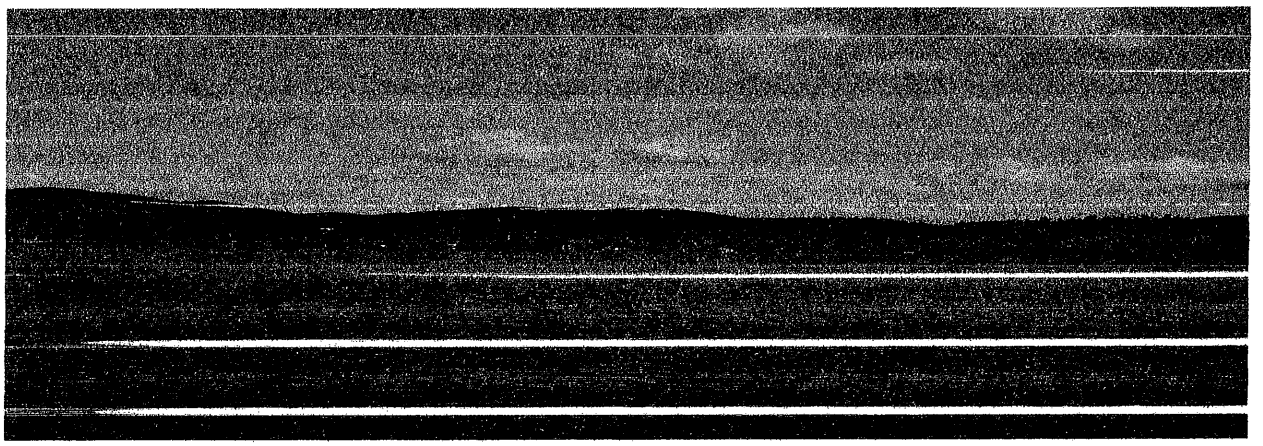

2006 Range Ponds Water Quality Report

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The The Range Ponds Environmental Association continued to monitor the health of Upper, Middle and Lower Range Ponds in 2006. Water quality monitoring was a combined effort of certified volunteer lake monitors and lake professionals. 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, and water quality problems are most likely to occur.

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 2006 monitoring season was characterized by frequent, and often heavy, rain events, following an unusually dry spring, in which there was relatively little runoff from snowmelt.

The following is a summary of findings for the three lakes.

Upper Range Pond:

2006 was a mixed year for Upper Range Pond, in that indicators of water quality varied somewhat. For instance, water clarity averaged 5.7 meters for the summer, compared to 5.7 meters also in 2005, and 6.7 meters in 2004. However, the historical average for the lake is 6.4 meters, so the lake was overall substantially less clear in both 2005 and 2006. This may have been the result of an extremely wet early summer, during which time very heavy periods of stormwater runoff occurred in the area. Stormwater runoff from developed watersheds is the vehicle through which phosphorus, sediment and other pollutants are carried to the lake.

The concentration of phosphorus (the nutrient that is responsible for the growth of algae in lakes) averaged 9 parts per billion (ppb) in 2006, compared to 8 ppb in 2005, and the historical average

of 8 ppb. Total phosphorus concentrations in Upper Range Pond have ranged from 5-11 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 2006 average concentration measured 4.0 ppb, which was slightly *lower* than the 4.5 ppb historical average for the lake, but higher than the 2005 average of 3.5 ppb. It is interesting that both water clarity and phosphorus levels were below average in 2006, while the concentration of algae remained slightly lower than historical levels. This may have been the result of the timing of samples, since phosphorus and chlorophyll concentrations in lake water may be out of phase with each other, due to algal growth response time.

Late summer dissolved oxygen levels were very low in the deepest region of the lake, as has been the case for a number of years. 2006 oxygen levels were lower than in 2005, but were similar to 2004 levels. Low concentrations of late summer dissolved oxygen serve as a warning that the lake is sensitive and vulnerable to a decline in water quality. It is for this reason that Upper Range Pond is considered at moderate risk for experiencing a nuisance algal bloom.

Natural water color levels were slightly higher than average in 2006, most probably due to excess precipitation. pH and total alkalinity were within the historical range of values for the lake.

Middle Range Pond:

Middle Range Pond was clearer than average in 2006, averaging 6.3 meters (~ 20 feet), compared to the historical average of 5.9 meters, 6.7 meters in 2005, and 6.9 meters in 2004. However, even though the lake was clearer than the historical average in 2006, it was less clear than it has been for the past five years, most probably the result of heavy rainfall during the 2006 summer period.

Phosphorus levels were approximately average for 2006, averaging 8 ppb, compared to the historical average of 8 ppb also, and 9 ppb in 2005. However, in 2004 the average was 6 ppb. Historical phosphorus levels in Middle Range Pond have varied from 5-12 ppb since samples have been collected starting in 1985.

Phosphorus samples taken near the bottom of the lake in August showed an elevated level, compared to surface concentrations. However, the increase was not great enough to suggest that any substantial level of internal phosphorus recycling is taking place in the pond.

The concentration of chlorophyll-a (algal concentration in the pond) was somewhat higher than the historical average for the pond in 2006, measuring 5.2 ppb, compared to the historical average of 4.4 ppb, the considerably lower 2005 average of 3.6 ppb, and 3.1 ppb in 2004. This suggests that overall biological productivity and algal growth increased somewhat in 2006, compared to recent years. The increase was most likely driven (in part) by the unusual summer weather.

Late summer oxygen levels near the bottom of the lake were low, but not depleted, as has been the case in some previous years. Oxygen loss during the critical summer months can precipitate the release of phosphorus from bottom sediments, and under certain conditions, can cause relatively rapid negative changes in water quality. Efforts to protect the lake from phosphorus pollution and excess algal growth can help to minimize this risk.

Other water quality indicators that are measured to help support the primary data (color, pH, and total alkalinity) were within the normal range of readings for Middle Range in 2006.

Lower Range Pond:

Lower Range Pond was clearer than average in 2006, averaging 7.1 meters for the monitoring season, compared to 6.9 meters in 2005, 7.8 meters in 2004 and the historical average of 6.8 meters. Lower Range was the clearest of the Range Ponds in 2006 by a substantial margin.

The average total phosphorus concentration in Lower Range Pond last summer was 8 ppb, compared to 9 ppb in 2005, 6 ppb in 2004, and the historical average of 8 ppb. A phosphorus sample taken near the bottom of the lake in August (due to very low oxygen levels at that time) measured 14 ppb, possibly suggesting that phosphorus was being released from the sediments at that time. The low oxygen loss, combined with present phosphorus levels in the lake put Lower Range Pond at moderate risk to experience a nuisance algal bloom. Every effort should be taken to reduce phosphorus export to the lake from developed areas of the watershed.

Chlorophyll-a averaged 4.3 ppb in 2006, compared to 4.4 ppb in 2005 and the historical average of 3.7 ppb. Although this direct measure of algal growth in the pond was higher than average in 2006, the difference was relatively small.

However, late summer dissolved oxygen levels were critically low in the deep areas of the lake. By late August, there was virtually no oxygen in the water below 7.0 meters depth (~24 feet). The maximum depth of Lower Range Pond is approximately 12 meters. Consistently depleted levels of dissolved oxygen in the deepest area of Lower Range Pond in late summer is a significant warning of the vulnerability of this body of water to experience a negative change in water quality – even though conditions at the surface currently look very good.

All additional support indicators of water quality were within normal limits for the 2006 season.

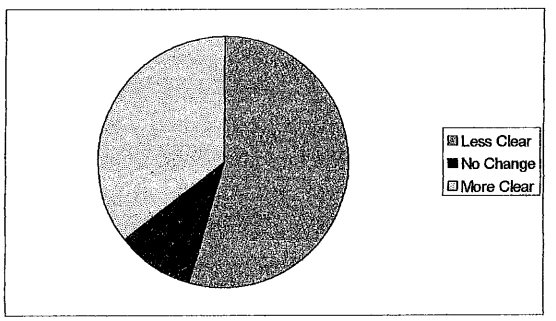
Summary:

2006 was a mixed year for the Range Ponds. Lower and Middle Range Ponds were clearer than their individual historical averages, while Upper Range was not. Lake water clarity is highly valued by the public, often ranking first in terms of desirable attributes in user-perception surveys.

It is likely that the unusually wet summer weather had a strong bearing on the quality of the Range Ponds last summer, but the extent to which that may be the case is difficult to judge. Stormwater runoff from watershed precipitation is the means by which phosphorus, sediment and other pollutants travel downstream to lakes. However, at some point it is possible that the benefits of flushing fresh rainwater through the system outweighs the negative effects of pollutants that are washed into the lakes. To make matters even more confusing, the extreme lack of flushing that occurs during periods of drought may also cause lakes and ponds to experience at least temporary improvements in water quality.

Each lake and pond responds in a unique way to the influences of weather, changes in land use in the watershed, and other forces upon the ecosystem. This is because of the wide range of physical, chemical and biological characteristics of each lake basin and its watershed.

To put all of this in perspective, consider the fact that in 2006, out of 429 Maine lakes that were monitored through the Maine Volunteer Lake Monitoring Program and the Maine Department of Environmental Protection, 152 lakes (35.4%) were clearer than their historical average, 233 lakes (54.3%) were less clear, and 44 (10.2%) were the same as their historical average. For two years, the number of Maine lakes that were clearer than their historical average has declined to less than 50%.



Number of Maine lakes that were clearer, less clear, or the same as their historical water clarity average in 2006
Source: Maine Volunteer Lake Monitoring Program

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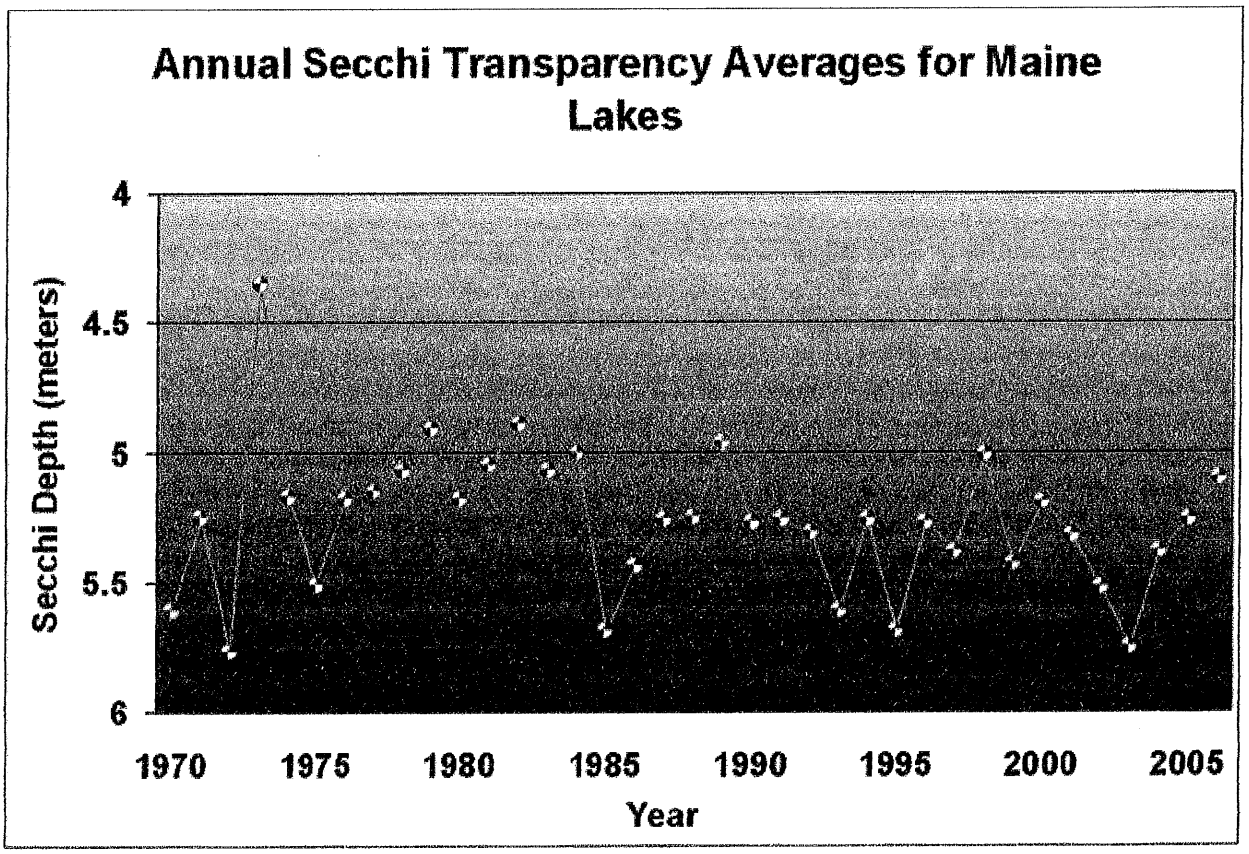
In 2006, Maine lakes overall were less clear than they have been during the past few years, as illustrated in the graphic below.



Source: Maine Volunteer Lake Monitoring Program

Special thanks are due to certified volunteer lake monitors on the three Range Ponds who collected additional Secchi disk transparency (water clarity) data in 2006. Their efforts substantially improve our confidence in the monitoring results on the lakes last summer.