Review

Milton Reservoir: Reservoir Water-Quality Assessment

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The objective of the report on Milton Reservoir is identical to the objective to the report on Barr Lake. The report was done by essentially identical methodology with similar supporting data. The two reservoirs share many characteristics as follows: eutrophic status, high concentrations of phosphorus and nitrogen, low transparency, inflow of water from ditches containing nutrients from wastewater effluent and nonpoint sources, potential for internal loading of phosphorus, short hydraulic residence time (less than one year), a filling and drawdown cycle, high pH, intermittent stratification, intermittent loss of dissolved oxygen in deep water. Because of these shared qualities, most of the conclusions and interpretations in the Milton Reservoir report are the same as those in the Barr Lake report. Rather than repeating the review comments that are given for Barr Lake, this review identifies some respects in which the data interpretation will be different for Milton Reservoir than for Barr Lake.

1. Whereas the data record for Barr Lake contain some older information on water quality, no such information is available for Milton Reservoir. Therefore, interpretations involving long-term changes are not possible for Milton Reservoir.

2. In Milton Reservoir, important water-quality variables show no statistical difference across the three surface water stations where samples were collected. This result is similar to the result for Barr Lake. For hypolimnetic samples, however, there were some significant differences, in contrast to Barr Lake. The differences in the hypolimnetic zone are probably accounted for by the shallower water column of Milton Reservoir, as compared to Barr Lake. For a shallower water column there is more hypolimnetic variability from one location to another because of the greater relative effect of sediment in areas where the hypolimnetic thickness is low.

3. Like Barr Lake, Milton Reservoir shows complete oxygen depletion on an annual basis. Depletion is most likely during summer or fall, but also can occur under winter ice cover.

The episodes of depletion are briefer than for Barr Lake, probably because the differences in mean depth for the two reservoirs.

4. Low phosphorus concentrations during winter in Milton Reservoir make a contrast with Barr Lake. The explanation is not obvious from the data at hand. During the growing season, however, the water column contains sufficiently high concentrations of phosphorus to supersaturate the needs of algae.

5. As in Barr Lake, Milton Reservoir shows complete depletion of inorganic nitrogen during the growing season, suggesting nitrogen limitation of algal growth. At times, however, nitrate is nearly absent while ammonia is present in substantial quantity. This is less true of Barr Lake; it may indicate that denitrification rather than algal uptake is responsible for much of the disappearance of nitrate.

6. The assessment of algal taxa lists *Aphanocapsa* as present along with *Microcystis* and *Aphanizomenon*. This difference from Barr Lake has no great practical significance, as *Aphanocapsa* is present in most Colorado lakes.

7. Milton Reservoir shows exceptionally long intervals of very low chlorophyll. This is probably explained by very low stability of layering in the reservoir, which causes light deprivation for algae. The occasional spikes probably correspond to intervals of maximum stability.

8. Phosphorus concentrations do seem to be increasing (mainly through higher minima), but the explanation is not obvious.

9. Phosphorus loading for Milton Reservoir differs from that of Barr Lake in that the South Platte source (Platte Valley Canal) is supplemented with a substantial contribution from the Beebe Canal. Same is true for nitrogen.

10. Given the nutrient concentrations, the chlorophyll concentrations are remarkably low.

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