

BIOASSAY EXPERIMENTS ON THE PHYTOPLANKTON IN  
WATER OF THE KALAMALKA-WOOD LAKES BASIN

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## Résumé

Bioassay experiments of two kinds were carried out to assist in evaluation of water management alternatives. These two kinds were (1) water mixing experiments, using natural water from three sources (Vernon Creek above the distillery, Wood Lake, and Coldstream Creek near the mouth) in mixtures with natural Kalamalka Lake water, and (2) nutrient enrichment experiments, using various combinations and concentrations of nutrients in natural waters from Ellison, Wood, and Kalamalka Lakes. Responses of the natural algal communities were measured by microscopic counting and by measurement of carbon-14 assimilative capacity. The water mixing experiments were carried out once, in May 1972. The nutrient enrichment bioassays were done in May, July, September and November 1972.

The response of the algae, as measured by cell counting, agreed very well with that measured by carbon-14 activity. Both methods would lead to essentially the same conclusions.

It was found that the natural stimulatory capacity of water from Coldstream Creek and Wood Lake were nearly identical when corrections for the "seed" populations of algae are applied. Both of these water sources gave disproportionate stimulation in the 10-25% source water mixture. There were also indications that 10-25% Kalamalka Lake water gave disproportionate inhibition of algae. This non-linearity in algal response suggests that (1) small amounts of Coldstream Creek or Wood Lake water would elicit a pronounced stimulation of the algae in Kalamalka Lake, and (2) small amounts of Kalamalka Lake water mixed into Wood Lake

would produce a salutary aesthetic effect on Wood Lake.

The effect of mixing waters from various sources into Kalamalka Lake depends not only on the inherent stimulatory capacity of the water, but also on the abundance of algae in the source waters. Consequently, the relative aesthetic desirability of adding Coldstream Creek water and/or Wood Lake water to Kalamalka Lake will depend on the algae populations carried in the two sources.

It was found that the stimulatory effect of Vernon Creek water was much less than that of Coldstream Creek or Wood Lake. It is apparent that the stimulatory attributes of Wood Lake water are not derived from the creek upstream of the distillery. The algal-culturing capabilities of Vernon Creek water and Kalamalka Lake water are very similar, but mixtures of the two seem to be an improved culture medium.

Nutrient enrichment experiments consistently indicated that Kalamalka Lake is more deficient in nitrogen than in phosphorus. The single experiment including trace elements and chelater produced marked stimulation in Kalamalka Lake water. In general, the greatest stimulation in Kalamalka Lake water occurred when nutrients were added in combination.

Nutrient enrichment of Wood Lake water resulted consistently in indications of nitrogen limitation, but variable response to phosphorus enrichment. The response of Wood Lake water to trace elements and chelater was inhibition. As with Kalamalka Lake, the greatest stimulation was obtained with combinations of nutrients.

Nutrient enrichment of Ellison Lake water gave the most variable response of the three lakes. The addition of nitrogen alone produced significant stimulation in September, but only marginal effect at other times. Phosphorus addition was more consistently stimulatory. The single occasion when trace elements and chelater were added resulted in negligible response. The addition of combinations of nutrients gave significant stimulations throughout the period of the experiments.

It was concluded that all the valley-bottom lakes are susceptible to increased algal proliferation in the event of nutrient enrichment, especially when both nitrogen and phosphorus are augmented. The results are not inconsistent with the proposition that phosphorus control would create a condition of phosphorus limitation.

The details of the kinds of algae which would predominate in the lakes under various management alternatives cannot be predicted with confidence. The experimnts do, however, indicate that enrichment would tend to favour the green algae and the diatoms.