

# State of the Lake 1999

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How does Flathead Lake fare? Answering that question is one of the primary jobs of the Flathead Lake Biological Station.

We have continuously monitored all aspects of water quality in the lake since 1977, and periodic studies date back to 1899 when the Station was founded by The University of Montana. Open-water primary production is our main measure of water quality. This is a very sensitive measure of the ability of the lake to grow algae. Lakes polluted with plant growth nutrients, particularly nitrogen and phosphorus, typically have high rates of primary production, poor water clarity due to blooms of algae, and bad tastes and odors associated with the decomposition of the blooms. Hence, declining water quality is directly associated with increasing primary production.

Over the long term, primary production has steadily increased in Flathead Lake and, therefore, by this criterion water quality has declined. However, the rate of increase slowed substantially in the mid-1990s. We believe this was due primarily to substantial improvements in the Flathead Basin's urban sewage treatment plants during 1989-1993, which reduced human sources of nutrient pollution by about 15%.

Unfortunately, in 1998 the annual rate of primary production at our mid-lake monitoring site was the second highest value ever recorded. That value was a whopping 20% increase over 1997, which was just slightly above the long-term average. Other water quality measures also correlated with this upturn in algal production. For example, for several years we have been very worried about declining oxygen levels in the Ross Deep area of Big Arm Bay associated with increased primary production. Bacteria decomposing the algae use up the oxygen in the water. In late summer 1998, dissolved oxygen values in bottom waters of Big Arm Bay were 30% lower than in 1997 and the lowest yet recorded. We also observed near-shore blooms of the pollution alga, *Anabaena flosaqua*, which is akin to a dead canary in the coal mine. *Anabaena* only blooms in lakes like Flathead when too many nutrients are getting into the water.

What happened? Well, 1997 was a very high runoff year and 1998 also was relatively wet. Inputs of nitrogen and phosphorus, the primary nutrients that stimulate algae growth in the lake, were correspondingly high. So, climate variation clearly was involved. But, we residents of the Basin are not off the hook by a long shot. In 1997 and 1998, nitrogen concentrations in the Stillwater River and the Flathead River were among the highest levels we have ever recorded. Anthropogenic sources of nitrogen and phosphorus include runoff from hard surfaces (parking lots, city streets) and nearshore housing construction, poorly managed farm and timberlands, and groundwater pollution from faulty household drain fields. Moreover, the long-term record shows that as much as 40% of the annual input of phosphorus to Flathead Lake comes from the airshed, contained in particulates from slash and other burning and fugitive dust from

rural roads. This so-called "nonpoint nutrient loading" in the Flathead Basin is a very serious pollution problem that is getting worse and must be aggressively controlled.

I am heartened by responses to our long-term monitoring data. The Flathead Basin Commission has adopted water quality enhancement targets and is implementing a nutrient reduction strategy for nonpoint sources in the Basin to reach those targets. Farmers are working proactively to reduce loss of fertilizers and soil from farmlands by careful fertilizer and irrigation applications, and using native vegetation as filters for runoff headed for streams that drain into Flathead Lake. The Tribes have implemented riparian restoration on Dayton Creek and their shoreline protection and other water quality protection programs are proactive. The timber community is aggressively pursuing better harvest and road management practices through self-audits and training courses sponsored by MSU Extension Forestry and the Montana Logging Association that are taught at the Biological Station. Will county planning boards, governmental officials, home builders and others demonstrate similar resolve by minimizing unplanned urban and semi-urban expansion, conserving open space, enforcing water quality laws and mediating shoreline protection?

For our part, we are collaborating with the Tribes and MFWP to better understand how the lake food web is responding to mysid shrimp dynamics. We know shrimp introduction in the early 1980s vastly increased lake trout and lake whitefish numbers and caused the collapse of the kokanee fishery. The recent, rapid decline of Flathead Lake bull trout likely is related to complex food web interactions caused by the shrimp. But, precisely how? And, how will the lake fare if the managers attempt to reduce the whitefish or lake trout as a restoration strategy for bull trout? Is the long-term decline in water quality at least in part related to the food web changes?

These and other important lake problems will be aggressively investigated by researchers at the Station during the coming year. Thanks to John Mercer, Mike Taylor, Bob Keenan and other local lawmakers, the Montana legislature fully funded the Station's Flathead Lake monitoring program for the next two years. We also will continue to offer courses and forums at the Biological Station to expand awareness and appreciation of natural goods and services provided by the Flathead River-Lake ecosystem. Please periodically check our web site at [www.umt.edu/biology/flbs](http://www.umt.edu/biology/flbs) for Station data and information.

As I have said year after year for over 25 years, Flathead Lake is one of the cleanest lakes in the temperate latitudes of the world. A little pollution does a lot of damage in relatively pristine lakes like Flathead, Swan and Whitefish, and food web changes caused by introduction of nonnative plants and animals are just as bad, if not worse.

Sound scientific information, conveyed in a generally understandable way, is good medicine for ailing lakes. The Flathead Lake Biological Station has been the "Sentinel of the Lake" for a century. I invite everyone to our 100th birthday party and open house on July 11 from 1:00 - 5:00 pm when Friends of the Station will help us rededicate the Station's legacy.

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