

**Algae Task Force Report to the
Lake Mead Water Quality Forum
November 1, 2001**

In February 2001, a significant algal bloom developed in Lake Mead. The bloom persisted throughout the summer and is still dominating the Lake's clarity. Because Lake Mead is an important recreation area and is the primary drinking water source for the Las Vegas Valley, the Lake Mead Water Quality Forum initiated an Algae Task Force (Task Force) to evaluate the problem. The Task Force, which includes staff from numerous agencies and the public, conducted six meetings over a four-month period. During this time, members adopted a mission statement, conducted a literature review, reviewed existing data, collected samples, drafted a public notice and developed a list of potential contributing factors to this year's bloom. The following is a summary of the findings and recommendations.

The predominant species of algae found in the bloom is the green single-celled *Pyramichlamys dissecta*. Although *Pyramichlamys* is non-toxic and is not considered a human health risk, the bloom is a deterrent to recreational uses in Lake Mead, may contribute to low dissolved oxygen concentrations detrimental to fish, and is considered to be a transition species to toxic forms of algae. Unfortunately, specific scientific information on this nuisance species is limited.

Chlorophyll *a*, a measure of algae biomass, was 20 to 30 times greater in Lake Mead during the bloom than in normal years. Agencies in neighboring states were contacted to determine if the Lake Mead algae bloom was localized or if similar events of such magnitude were occurring in their other regions. Utah, Arizona and Idaho reported no unusual outbreaks in any lakes or reservoirs. Additionally, no significant algal blooms were reported in other reservoirs along the Colorado River system. However, field investigators with the Metropolitan Water District of Southern California reported unusual blooms of this same species in their reservoirs along the California Aqueduct.

Recent studies conducted by the University of Nevada Las Vegas indicate that Lake Mead is still phosphorus limited. Although the review of the existing data and other information did not point to a direct cause, it can be assumed there was an adequate supply of nutrients, including soluble forms of phosphorus, available to prompt this year's bloom. Therefore the Task Force developed potential contributing factors and a set of recommendations based on professional judgment.

Potential Contributing Factors

Rapid development in the Las Vegas Valley over the past 15 years has dramatically increased the surface area occupied by lawns and other forms of landscaping. Fertilizer is typically applied during January, February and March. In January and February 2001, the Las Vegas Valley experienced above average precipitation. Excess nutrients from lawns, golf courses, etc., could have been transported into Lake Mead during these rain events.

Historically, the Las Vegas Wash (Wash) has entered the Las Vegas Bay (Bay) as a negatively buoyant plume, submerging to the bottom. However, over the last few years, Lake Mead water levels have dropped, causing the formation of a delta at the confluence of the Wash and Bay. The shallow, braided channels in the delta could have allowed water temperatures to increase and portions of the Wash flow to enter the Bay as a buoyant plume. Nutrient-rich waters near the surface and sunlight exposure could have promoted algal growth.

Analysis of samples collected have shown delta sediments in the Bay are fine grained and contain levels of phosphorus, ranging from 100 to 200 parts per million, as compared to 5 to 10 parts per million measured in other areas of the lake. Under certain conditions, phosphorus can be transferred from sediment to the water column and become available for algal uptake. It is unlikely the chemical environment necessary for this transformation existed, however, other constituents within the Bay sediments may have contributed to this year's bloom. Further research is needed.

The Las Vegas Valley wastewater treatment plants are regulated under the National Pollutant Discharge Elimination System (NPDES) permit program. These treatment plants, operated by the City of Las Vegas, City of Henderson and Clark County, must meet Total Maximum Daily Load (TMDL) discharge limits for phosphorus from March through October. The TMDL limits do not apply from November through February and phosphorus removal down to these levels is not required during this period. As previously discussed, a buoyant plume would have allowed these additional nutrients to remain at or near the surface and be available for algal growth.

Recommendations

After considerable discussions, the Task Force developed four short-term and three long-term recommendations. Short-term tasks are those that can be completed within 18 months. Long-term recommendations may take up to five years to complete.

The short-term recommendations are as follows:

- S1. Through the Lake Mead Water Quality Forum, request federal assistance to study the algae bloom.
- S2. Assess nonpoint source nutrient loadings entering the system. Additional dry and wet weather sampling may be required with flow data to determine actual nutrient loadings.
- S3. Evaluate and use, if appropriate, the Las Vegas Bay model being developed under the Alternative Discharge Study to determine assimilative capacity for the lake and bay.
- S4. Begin voluntary year-round phosphorus removal at wastewater discharge plants.

The long-term recommendations are as follows:

- L1. Conduct federally assisted study to determine the exact cause of the 2001 algal bloom and methods for preventing future outbreaks of potentially toxic algae species.
- L2. Establish a management workgroup to ensure nutrient loadings are reduced by targeting high source areas identified in the nonpoint source assessment.
- L3. Proceed with the Alternative Discharge Study in an expeditious manner. The potential physical and chemical changes to the Las Vegas Wash and Lake Mead must be carefully evaluated and the alternative discharge site selected must have sufficient assimilative capacity.

Algae Task Force Members

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