To: Tarryall Fishing Club

From: Chris Holdren, Ph.D., Consulting Limnologist

RE: Evaluation of Lost Park Ranch Lake at Stagestop

Date: February 1, 2010

Field Observations

Lost Park Ranch Lake at Stagestop was evaluated on September 5, 2009, at the request of the Tarryall Fishing Club. Both rooted aquatic plants and algae were present at levels that could cause some difficulties for lake users, but neither plants nor algae appeared to in need of immediate control.

The rooted plants included water milfoil (*Myriophyllum* sp.) elodea (*Elodea canadensis*), pondweed (*Potamogeton* sp.), and possibly a fourth species which could not be retrieved for positive identification. These species are all capable of reaching nuisance populations under certain conditions, but the mixture of plants present and the many patches of open water indicated none were out of control in this lake.

The algal species present was *Aphanizomenon flos-aquae*. Aphanizomenon is one of three common, nuisance species of blue-green algae, which are more correctly referred to as cyanobacteria. Although some species of blue-green algae can produce toxins, this has not been reported as a problem with Aphanizomenon in Colorado. This species is easily identified because it looks like fine, short grass clipping while alive.

Blue-green algae have specialized cells called gas vacuoles that give them a competitive advantage over other algae. The gas vacuoles help the blue-greens adjust their position in the water column and also allow them to use atmospheric nitrogen as a nutrient source. Since nitrogen and phosphorus are the nutrients that usually can limit the growth of algae in lakes, the ability to use atmospheric nitrogen allows blue-greens to grown under conditions where other algae cannot.

When the blue-green algae die, they clump together to form floating scums that have the blue-green color that give these species their common name. The scums are problematic because they are unsightly and also produce odors. Several patches of dead algae were identified during the site visit.

Both algae and rooted aquatic plants produce oxygen during daylight hours through photosynthesis. Very productive lakes can experience low oxygen conditions at night when photosynthesis does not occur and bacterial decomposition of dead algal cells and other organic matter removes oxygen from the water column. No water quality measurements were made during the site visit, but fishing club members indicated that dissolved oxygen measurements did not indicate problem conditions. Those

measurements have typically been taken at mid-day. Taking measurements early in the morning (near sunrise) would provide a better indication of potential problem conditions. Profiles (measurements at different depths in the water column) for temperature, dissolved oxygen, and conductivity (which provides an indication of the amount of dissolved salts) would provide valuable information on lake mixing and general water quality. Club members indicated this would be easy to do with available resources and it is highly recommended. Late August to early September is the time when most Colorado lakes experience the highest number of problems. At a minimum, profiles should be collected at that time.

In general, both algae and rooted aquatic plants start to die off in mid-September as water temperatures cool and the days become shorter. Any water treatment measures that are undertaken can generally be stopped, or at least reduced, at that time.

Current Management Practices

Nuisance algal blooms in the lake are currently being treated only by adding more water. A pump was being used to circulate water in the pond at the time of the site visit. This is a very effective and relatively low-cost treatment method that has several benefits to the lake. These include:

1) Water circulation increases oxygen levels in the lake. This increases dissolved oxygen levels and helps limit oxygen sags during periods of high productivity and also accelerates decomposition processes to reduce odors and prevent a buildup of organic matter in the lake.
2) The excess pumped water leaves the lake via overflow. This helps remove the floating algal scums that are the most visible nuisance problem in the lake without having any adverse effects.
3) The moving water helps reduce the competitive advantage that the blue-green algae would otherwise have by being able to control their position in the water column. As a result, pumping not only removes algal scums but may help limit nuisance algal growth.

The main problem with the current pumping operation is the manpower needed to control the pump. A timer could allow unattended operation and may also result in lower operational costs if less expensive electricity is available at night.

Other Potential Control Measures

Both muskrats and the growth of willow trees on the dam present potential stability problems. Any muskrats burrowing into the dam should be trapped and removed to prevent possible water piping and embankment instability. Tree roots can present similar problems and any trees growing on the dam should be cut.

If rooted aquatic plants do become more of a problem, there are several low-tech and low cost control methods available. Several companies sell aquatic weed cutters and rakes

that are thrown from the shoreline. Note that cutting alone may create even more problems because the plant fragments produced can root and resprout, but the rake removes the cut plants to prevent this problem. The pond also has a liner that could be damaged if care is not taken. Aquatic EcoSystems, Apopka, FL, is one source that provides a cutter (http://www.aquaticeco.com/subcategories/2787/Aquatic-Weed-Cutter) and rake (http://www.aquaticeco.com/subcategories/3034/Aquatic-Weed-Rake-Ultralite). An internet search would provide additional options.

Some suggestions have been made that the algae be treated with copper sulfate. While this method provides effective algae control on a short-term basis, it can lead to unanticipated, long-term problems. These include:

1) Copper is toxic not only to algae, but to other aquatic organisms as well. Copper can have an even greater toxicity for zooplankton, snail, and other aquatic invertebrates than it does for algae. These higher organisms are an important food source for both game and forage fish.
2) Following repeated treatments, blue-green algae may have a greater tolerance to copper than more desirable species of algae. This may actually lead to more frequent and severe blue-green blooms if copper sulfate is used over extended time periods.

Several club members were interested in using grass carp (*Ctenopharnygodon idella*) to control aquatic plants. Although grass carp are widely used as a biological control for aquatic plant growth, they are not recommended in this case for a variety of reasons.

1) First and foremost, while the Colorado Division of Wildlife does allow the stocking of triploid grass carp, which are sterile and cannot reproduce, they do not recommend stocking grass carp at elevations above 9,000 ft. They have found that grass carp do not feed well at higher elevations and therefore have limited effectiveness.
2) Grass carp do not feed upon planktonic (free floating) algae like the blue-green algae that are the main problem in Lost Park Ranch Lake at Stagestop. They are only used to control the growth of rooted aquatic plants.
3) Grass carp have well-defined feeding preferences, but will feed on less desirable species after they completely deplete their preferred food plants. *Elodea* is usually regarded as a preferred species, but milfoil is not. Over time, grass carp can change the plant community to less desirable conditions.
4) Plant cover is necessary for a healthy lake fishery and it is extremely difficult to stock grass carp at a rate that controls only nuisance plant growth. If too many fish are added to a lake, they may destroy the entire plant community and stir the lake bottom, causing sediment re-suspension and increasing lake turbidity. On the other hand, if too few fish are added, there may be little or no effect on the plant community.