Lake Restoration
FACT SHEET

OWRB
the water agency

Oklahoma Water Resources Board staff provide information and solutions for repairing Oklahoma lakes facing serious impairments due to "cultural eutrophication."

Through lake and watershed modeling, the source of a lake's problem can be identified. Models provide lake inflow estimates of substances of concerns and generate lake response. Models are then used to predict the effects of water and land use management techniques. Water sampling and analysis facilitate development and document success of feasible mitigation options.

Lake Restoration Activities

OWRB staff carefully evaluate the latest technology for application to Okahoma's eutrophied lakes.

Sometimes restoration is a onetime effort of sediment removal to recover lost volume. Sediment removal has been successful at Carmen City Lake, Ada City (Wintergreen) Lake, and Meadow Lake in Enid. Sediment removal to reduce sediment-borne nutrients has been successful at Northeast (Zoo) Lake in Oklahoma City. However, sediment removal for larger reservoirs is not cost efficient, and alternative means of mitigation are needed.

More innovative methods are also needed to control excessive alga growth. Concurrent with or following the implementation of watershed based measures to control point and non-point source pollution, most in-lake measures to control alga growth involve limiting the availability of key nutrients to the surface algae--chemical nutrients (such as nitrogen and phosphorus) or physical nutrients like sunlight.

OWRB staff have worked with various federal, state, and local partners to introduce and/or facilitate the growth of aquatic plants along the shorelines of many Oklahoma lakes. The process begins by placing potted plants with well established root systems in shallow coves. The plants are then caged to protect them from turtles, carp, and other herbivores. Over time, these plantings (called "founder colonies") will spread by rhizome, fragments and seed to populate the cove sufficiently, overcoming the herbivory pressure and eventually no longer requiring cages or pens to survive and multiply. This process could take several years, but once established, spread of the plants will be exponential. The positive changes to the ecosystem of the shallow shoreline of the lake will be measurable and significant.

Carl Albert Executive Fellow Caitlin Miller documents the progress of soft-stem bulrush at Atoka Lake.

OWRB staff have joined with the Grand River Dam Authority, Oklahoma City, and the Oklahoma Department of Wildlife Conservation to plant at Grand, Wister, Atoka, Ft. Cobb, and Stanley Draper Lakes. Many other sites have been proposed and funding sources are being sought to continue work across the state. Word about successful projects is spreading and lake managers everywhere are seeing the advantages.

What is Cultural Eutrophication?

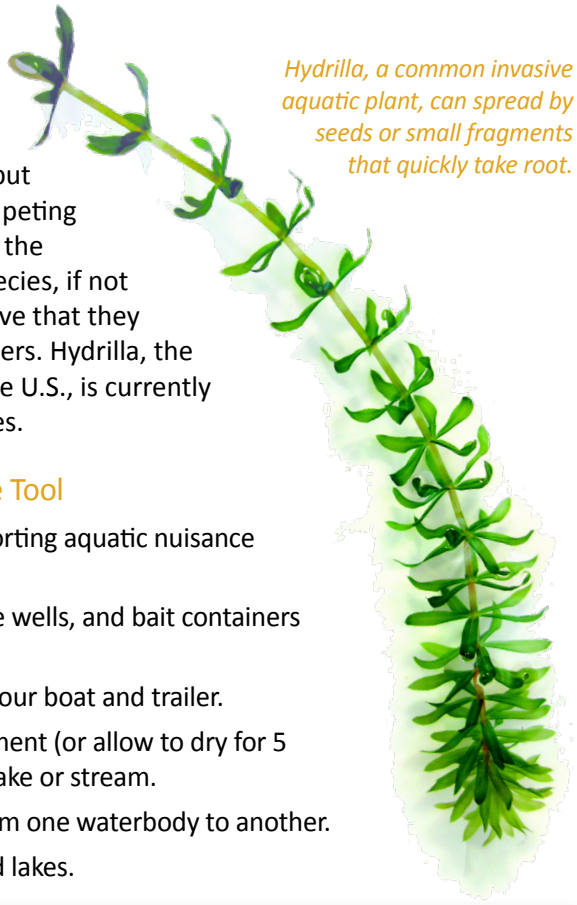
Fertilizer, municipal waste, farm and feeding operation waste, and other human by-products are common pollutants to Oklahoma lakes. The overload of nutrients, primarily nitrogen and phosphorous, can lead to excessive algae growth and depleted oxygen levels, creating a bad environment for wildlife and recreation. Cultural eutrophication directly affects Oklahoma's water supplies through algae-produced taste and odor compounds, increased treatment costs, and reduced supply through accelerated sedimentation.

Due to cultural eutrophication, many Oklahoma lakes are now impaired for fish and wildlife propagation. Drinking water costs are increasing due to the need for additional treatment. Intensive and sometimes invasive action may be necessary to restore these impaired systems to their previous state or function.

Another technique used by OWRB staff to restore Oklahoma lakes is oxygenation. Many Oklahoma lakes are oxygen deficient due to the rapid accumulation of organic matter on the lake bottom. Oxygen deficient sediment acts as a large compost pile, releasing excess nutrients back into the water column as oxygen is consumed. This dual threat limits oxygen to organisms like fish and furnishes nutrients, further stimulating algae growth. Pumping super-oxygenated water into the lake allows the "mulch pile" to decompose completely while mitigating the negative effects of low dissolved oxygen and nutrient release.

Other types of restoration can be accomplished through shoreline erosion control projects, such as the current projects at Stanley Draper, Ft. Cobb, and Thunderbird Lakes, or floating wetlands, such as those at Lake Eucha.

OWRB project coordinator Paul Koenig installs aquatic plants on floating wetlands at Lake Eucha.



Hydrilla, a common invasive aquatic plant, can spread by seeds or small fragments that quickly take root.

Control of invasive aquatic nuisance species is an important lake restoration activity as well. Invasive aquatic nuisance species put littoral wetlands at risk by out-competing native species. This leaves holes in the natural ecosystem. Often these species, if not controlled, can become so expansive that they affect lake recreation and water users. Hydrilla, the most damaging aquatic weed in the U.S., is currently found in Arbuckle and Murray Lakes.

Prevention is the Most Effective Tool

Follow these tips to prevent transporting aquatic nuisance species between water bodies.

- Drain water from your boat, live wells, and bait containers before leaving the boat ramp.
- Remove plants and mud from your boat and trailer.
- Spray or rinse boats and equipment (or allow to dry for 5 days) before entering another lake or stream.
- Never transfer plants or fish from one waterbody to another.
- Don't harvest bait from infested lakes.

STOP AQUATIC HITCHHIKERS!

Prevent the transport of nuisance species
Clean all recreational equipment
www.ProtectYourWaters.net

Benefits of Aquatic Plants

Many Oklahoma reservoirs are missing crucial aquatic vegetation on their shorelines. Aquatic plants, which work as a natural buffer to the shoreline, offer many benefits, such as:

- Root systems of aquatic plants protect the shallow sediment from resuspension by waves. The above ground plants dissipate the wave energy that would otherwise erode the bank.
- Aquatic plants take up nutrients out of the water column and reduce algal biomass, add dissolved oxygen, and increase water clarity.
- Some plants take up and bind contaminants, such as heavy metals, that are present in the water column.
- Aquatic plants act as wetland habitat for many species of wildlife, creating a well oxygenated zone of thick cover, often densely populated with macroinvertebrates (bugs) that are a food source for young fish.
- Aquatic plants add to the aesthetics of Oklahoma's shorelines.
- Aquatic plants can protect shorelines from infestations of other unwanted nuisance or exotic plant species that inevitably find their way to an open niche.

www.owrb.ok.gov/lakestudies