GOLDEN ALGA INFORMATION

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What is golden alga, and how does it kill fish?

The golden alga, *Prymnesium parvum*, is a tiny, one-celled aquatic organism about the size of a human blood cell. A single drop of lake water may contain more than 2,000 cells of golden alga. Biologists suspect that golden alga is relatively new to Arizona and they consider it a nuisance invasive species.

Golden alga releases unique toxins that affect gill-breathing aquatic organisms (mainly fish and clams). The alga is a rapid growing and resilient algae species, out-competing other algae for nutrients and thriving in a wide variety of environmental conditions. In a bloom situation (a bloom is an explosive increase in the population of one or several species of algae), enough toxins are released into the water to kill fish and other gill breathers that come in contact. The toxins cause fish gills to bleed internally, and lose their ability to exchange water and absorb oxygen. Fish then die of a lack of oxygen.

Algae blooms may last for days or weeks. Blooms may occur a couple times a year, or not at all in some years. The environmental conditions that support golden alga are broad, and little is known about the specific and complex conditions that allow it to gain a competitive edge over other species, or about what causes a “bloom” that results in fish kills.

According to reports from other states and recent trends in Arizona, the majority of golden alga fish kills occur during the winter and spring months when water temperatures range from 55-80 degrees Fahrenheit. Winter conditions are not favorable for other, common kinds of beneficial algae normally found in our inland waters, which likely gives the golden alga a competitive edge.

Generally speaking, golden alga also prefers more saline waters, which may also help a bloom get started. Although factors such as water temperature and salinity are somewhat helpful in predicting lake conditions suitable for golden alga, there are also many documented exceptions in Arizona and other states.

Is it harmful to humans, pets and other animals?

Golden alga blooms are not a public health threat. Golden alga toxins have no apparent lethal or harmful effects on animals that do not breathe through gills. The impacts to fish populations vary and are most often temporary. The algal toxins are only harmful to gill-breathing organisms such as fish and clams.

Arizona Department of Health Service officials have stated that human health is not affected by exposure to golden alga or their toxins. Studies indicate the toxins are not passed through the food chain or absorbed into the flesh of fish. Consequently, healthy fish caught from infested waters are safe to eat. Still, people should exercise common sense: do not pick up or eat dead or dying fish.

Cattle and other animals have been observed drinking from rivers during ongoing golden alga fish kills in Texas with no apparent adverse effects. The bottom line: golden alga blooms are harmful to animals (fish and clams) with gills, but the alga and their toxins don't harm animals or people.

Where does it occur?

Golden alga was first identified in Arizona in April 2005. To date, golden alga has been confirmed in various public and private waters in the greater Phoenix area and in three reservoirs on the Tonto National Forest.

Four Urban Fishing Program waters have been infested: Water Ranch Lake (Gilbert), and Alvord Lake at Cesar Chavez Park, Cortez Lake and Desert West Lake in Phoenix. It has been found in Saguaro Lake, Canyon Lake and Apache Lake.

Golden alga was first discovered in the United States in Texas in 1985. Since then, it has caused fish kills in five major river systems and over 25 lakes or reservoirs in Texas. Texas officials have estimated the direct economic loss of over 18 million fish due to golden alga as $7 million. This toxin producing algae has now been documented from 12 states ranging from North Carolina to Georgia to Wyoming to Arizona.

How can it spread?

Nobody knows with certainty how golden alga is spread from one body of water to another or how it was spread into Arizona.

What are the signs of a golden alga bloom?

Water Appearance: When golden alga becomes more abundant during a bloom cycle in a lake, the water begins to turn yellowish, yellowish-copper or a brownish, tea color. Another sign is foaming at the surface of the water in areas where there is a lot of wave action or water is agitated or stirred up. However, these conditions can also come from other sources, and do not always indicate a golden alga bloom.

Dying or affected fish?

Fish exposed to golden alga toxins may swim slowly or erratically just below the surface, lie listlessly along the bottom in shallow areas, or show no normal avoidance to human disturbance or presence.

If clean water flows into a lake, fish will often concentrate in these areas.

Can fish escape a golden alga bloom?

Yes, they can escape a localized bloom in a lake if there is a nearby toxin-free area. Early effects of the toxin are reversible if the fish can swim to a toxin-free area or an area of low toxicity.

In a small pond or lagoon, many or all of the fish present may be killed if a bloom is not promptly treated and is allowed to spread across the entire water body.

What are the ecological and economic impacts?

It is too early to tell at this time what the impacts may be in Arizona. Potentially, the negative impacts may be significant at a particular water, especially in larger lakes and reservoirs. While golden alga toxins can affect all species and sizes of fish, most of the fish killed at Saguaro, Canyon and Apache lakes have been a 2-6 inch forage fish, threadfin shad. These fish grow quickly and lay many eggs for rapid reproduction. Because of this, a reservoir can recover, even from a massive fish kill, if the waterbody has ample time between fish kills. However, forage fish do form the basis of the food chain and on-going fish kills may harm larger game fish in two ways, directly by toxicity and indirectly by reduced food supply. Most fish kills, however, do not continually affect the entire lake and different parts of the lake may continue to support excellent fishing.

Where else can I read about golden alga?

The Texas Parks and Wildlife Department provides information on this problem to other agencies, universities and the public. Their website offers helpful information on golden alga and other harmful algal blooms.

Does golden alga occur throughout the water column?

Golden alga can occur throughout the water column, depending on the water's depth. The cells need only moderate light for photosynthesis, so they may be limited by how deep the sunlight reaches. Generally, few golden alga are found more than 20 feet below the lake surface. However, some parts of the golden alga life cycle can occur in the dark.

Will warm water cause a golden alga bloom to decrease?

Warmer waters may allow the algal community to change, which can decrease a golden alga bloom. However, if golden alga becomes numerous in the phytoplankton (algal) community, it can last all year despite rising

temperatures. Fish kills due to golden alga have occurred in some Texas lakes and rivers throughout the summer months. Worldwide scientific literature states that golden alga is not toxic at 86 degrees Fahrenheit or above. Texas hatcheries have seen decreases in golden alga numbers and impacts during the heat of the Texas summer.

Most of the documented golden alga blooms and associated fish kills occur during seasons when water temperatures are between 55-80 degrees Fahrenheit.

What is AZGFD doing about the golden alga?

The Arizona Game and Fish Department is working diligently to learn more about this recently discovered alga in Arizona, to inform the public, to monitor affected lakes, to investigate all fish kills, and to work collaboratively with other affected stakeholders. There is simply no “silver bullet” to eliminating golden alga.

The Arizona Game and Fish Department has implemented cooperative efforts that give Arizona the best chance to mitigate the impacts of these events and address the potential for future outbreaks. The department is coordinating efforts to monitor fish kills and also to manage the recreational fisheries in these waters with the lake authorities and managers, state agencies, and other stakeholders. These monitoring, management and research efforts are significant and important.

The four lakes in the Salt River system (Saguaro, Canyon, Apache, and Roosevelt) are being monitored regularly for algal blooms and fish kills. The department has set up a contact number (623-236-7257) for the public to report any observations of golden alga blooms or fish kills. Fish kill and other lake observation information suspected to be connected with golden alga blooms may also be emailed to the department at goldenalgae@azgfd.gov. The department is also working with city officials to monitor, test and control the golden alga at Urban Fishing Program lakes. The city park departments have been responsive in treating their affected lakes with algaecides. After each treatment is completed, the department tests the lake waters to determine if the treatment was successful in killing off the algae. When lake water quality is satisfactory, fish stockings then resume. When necessary, the lake will be restocked with sunfish, bass and catfish. Public notices are posted around the Community Fishing Program lakes to advise park users of current management and fish stocking activities.

*Note: Although ponds and lakes smaller than a few hundred surface acres can be treated successfully, these treatments may not be economical or feasible in the larger and more complex reservoirs and riv*ers.

How can I help?

If you see dead or dying fish or large numbers of fish behaving strangely, take note of the species and sizes of fish affected, approximate numbers of fish observed, and the location(s) where fish were observed. Report your observations as soon as possible to the Arizona Game and Fish Department at goldenalgae@azgfd.gov or call (623) 236-7257. Common sense should be exercised by not picking up dead or dying fish for consumption.

To prevent transporting the alga to other waters:

Drain all lake water from watercraft, live wells and equipment before leaving the lake.

Rinse out watercraft, live wells and fishing equipment at home and allow it to dry before using it at another lake or river.

Do not move water, aquatic wildlife or plants (fish, frogs, tadpoles, clams, crayfish, aquatic weeds, etc.) offsite.

Alga or Algae?

The term “alga” is used when only one species is being referenced, such as Prymnesium parvum, the golden alga. If the discussion is about several species (or a group of species), then the term algae is used.