

# GOLDEN ALGA

## *Prymnesium parvum*

*Prymnesium parvum*, commonly called golden alga, is a naturally occurring, one-celled, microscopic organism that can produce toxins under certain environmental conditions. These toxins have caused die-offs of gill-breathing organisms such as fish and clams—resulting in ecological and economic harm to the affected water system.

Photo courtesy of Greg Southard,  
Texas Parks and Wildlife Department.



### SPECIES DESCRIPTION

Golden alga is a tiny, single-celled organism which is about the size of a human blood cell. Algae are considered primitive aquatic plants that usually lack true stems, roots, or leaves. Golden alga is very mobile and uses its two “tails” called flagella to move about in the waters of lakes and ponds. A single drop of water may contain over 2,000 cells of golden alga.

### NATIVE AND INTRODUCED RANGES

Golden alga occurs on every continent except for Antarctica. It is found primarily in coastal waters and estuaries where there is mixing between freshwater and seawater; however, it can also occur in freshwater that has a relatively high salt content. Scientists first identified the alga in United States waters in Texas in 1985 and it has since spread to more than 15 states. It is unknown whether the alga is an invasive species to North America, or whether it is actually native, but was not identified before the 1980s. The first known occurrence of golden alga in Pennsylvania was in 2009 in Dunkard Creek, along the Pennsylvania-West Virginia Border.

### BIOLOGY & SPREAD

It is uncertain how golden alga moves from one body of water to another, or how it ended up in Pennsylvania. Intentional spread of golden alga is unlikely; however unintentional spread may occur in many ways. It may naturally disperse by water currents moving downstream or through canal pathways. It could also spread by sticking to the feathers or fur of waterfowl or other animals; hitchhiking in live wells, bait buckets, tackle, and gear of recreational equipment; or sticking to wet clothing of recreational water users. It also may have hitchhiked on equipment used for drilling or transporting water. Golden alga has a resting cyst stage, which allows it to survive in dried lake sediments and potentially be distributed by strong winds.

Photo courtesy of Texas Parks and  
Wildlife Department.

### HABITAT

Golden alga can thrive in a variety of environmental conditions; however, it prefers alkaline waters with high salt and mineral content. The probability for golden alga blooms increases as water temperatures rise above 50°F (10°C), with optimum temperatures between 65°F (18°C) and 85°F (29°C); however, there is a possibility that blooms can occur in cooler water. During a typical bloom cycle, 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.



Fish kill resulting from golden alga bloom.

## IMPACTS

### *Threat to Biodiversity*

Golden alga is fast growing, resilient, and uses nutrients more effectively than other kinds of algae. A harmful algal bloom is an explosion in population of one or more algae species. In a bloom situation, enough toxins are released to kill fish and clams. The toxin causes bleeding internally from the gills; impeding the organism's ability to exchange water and absorb oxygen. Impacts can range from minor reductions in forage fish, to major fish and clam kills. Blooms may also threaten endangered species, or species of concern, which may lack sufficient numbers to recover from kills. Fish kills caused by golden alga blooms may last for days, weeks, or months and can change

locations daily.

### *Human Health*

There is no evidence that the toxins produced by golden alga harm other wildlife, livestock, or humans. Cattle, birds, and other animals have been observed drinking water during a bloom with no apparent effects. One reason for this is that golden alga toxins will break down in acidic conditions such as the stomach. Also, terrestrial animals have skin layers which protect them from the toxins.

### *Economic Impact*

Golden alga has the potential to have devastating economic impacts on local businesses and communities that rely on the affected water source. Repeated fish kills in many western states' reservoirs have decimated their recreational fisheries. Fish kills can also reduce local revenues, as tourists are less likely to fish and boat in an area with a fish kill. The cost of winter fish kills in Texas in 2001 was estimated to exceed 18 million dollars lost to the local economy. Projected management, control, and monitoring costs in Texas are another estimated 7.9 million dollars per year.



Foam can sometimes be a sign of a golden alga bloom.



Top photo courtesy of Greg Southard, Texas Parks and Wildlife Department.

Both foam photos courtesy of Texas Parks and Wildlife Department.



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## PREVENTION & CONTROL

There are many algal control treatments available but not all may be successful at controlling golden alga. Copper sulfate, which is a widespread algacide, is able to kill golden alga cells; however, it will not reduce toxicity and may harm other non-target plant species. Non-chemical treatments may include rakes and filters, pH treatments (reducing pH to between 6.0 and 6.5 may reduce toxicity and the number of viable alga cells), or reducing the salinity in the affected waterway. More research is needed to explore potential control or management actions for golden alga in large reservoirs and rivers.

To help prevent the spread of golden alga in Pennsylvania's waterways:

1. **check** for and remove plants, mud, and aquatic life before transporting;
2. **drain** water from boat, live well, bilge, and bait bucket before transporting;
3. **clean** boat and gear with hot water, OR
4. **dry** everything for at least five days.

### *References:*

Arizona Game and Fish Department. Golden Alga typically asked questions.  
<[http://www.azgfd.gov/temp/golden\\_alga\\_faqs.shtml#4](http://www.azgfd.gov/temp/golden_alga_faqs.shtml#4)>

Sager, D., Fries, L., Singhurst, L., and Southard, G. 2007. Guidelines for Golden Alga *Prymnesium parvum* Management Options for Ponds and Small Reservoirs (Public Waters) in Texas. Texas Parks and Wildlife. Report #: PWD RP T3200-1404.

Texas Parks and Wildlife. Harmful Algal Blooms Index: Golden Alga.  
<<http://www.tpwd.state.tx.us/landwater/water/enviroconcerns/hab/ga/>>

Wisconsin Department of Natural Resources. Golden alga Factsheet.  
<[http://dnr.wi.gov/invasives/classification/pdfs/LR\\_Prymnesium\\_parvum.pdf](http://dnr.wi.gov/invasives/classification/pdfs/LR_Prymnesium_parvum.pdf)>

