Invasive Species Emerging Issues
Toxic Golden Algae
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In the southwest, the term “invasive species” usually refers to salt cedar (*Tamrix ramosissima*) or Russian olive (*Elaeagnus angustifolia*), two riparian species receiving much attention. Little known are the invasive aquatic species such as “parrot feather” (*Myriophyllum aquaticum*), a species found in abundance in diversion canals along the Middle Rio Grande or an even lesser-known invasive aquatic species “golden algae” (*Prymnesium parvum*). *Prymnesium parvum* is a naturally occurring microscopic flagellated algae that typically occur in brackish waters. Under certain environmental stresses, this alga can produce toxins, which can cause massive fish and bivalve (i.e. clams and mussels) kills. Fortunately there is no evidence these toxins harm other wildlife, livestock or humans.

Fish kills caused by *Prymnesium parvum* have been documented in inland waters of Texas since 1985. While originally noted in the Pecos River in the Rio Grande Basin, the alga has also caused fish kills in several other river basins in Texas. This algal species is found worldwide in estuarine waters and in some freshwater bodies that have relatively high salt content. Texas Parks Wildlife Department (TPWD) biologists were the first to note the occurrence of this alga in freshwater bodies in the Western Hemisphere. Subsequently, other states have reported its occurrence or possible occurrence. Fish kills caused by the alga can be significant, resulting in both ecological and economic harm to the affected water bodies.

Algae are primitive plants that are usually aquatic and lack true stems, roots, and leaves. The golden alga is a microscopic, flagellated organism that normally is suspended in the water column. TPWD do not know if this alga is native or if it is an invasive species accidentally introduced to North America. Little is known about the environmental requirements of the alga or what allows it to gain a competitive edge over other species, cause a "bloom" which results in fish kills. This alga releases several toxins that affect gill-breathing organisms (mainly clams and fish). Cattle and other animals have been observed drinking from rivers during ongoing golden alga fish kills with no apparent effects. Texas Department of Health officials have stated that the golden alga is not known to be a human health problem, but people should not pick up dead, or dying, fish for consumption.

The majority of golden alga fish kills occur during the winter months. This is the time of year not favorable for the normal green algae and likely gives the golden alga a competitive edge. Golden algae prefer more saline waters than normal freshwater conditions and may contribute to bloom initiation. In New Mexico, salinity in the Rio Grande increases with distance downstream. The total dissolved solids content (TDS) increases from less than 50 mg/L in headwaters of Colorado to over 2000 mg/L south of El Paso, Texas. These salinity increases have previously been attributed to evapotranspirative concentration and to flushing by irrigation water of salts accumulated by pre-irrigation evapotranspiration. This brackish water in southern New Mexico may provide a suitable habitat for *P. parvum* in the near future.

In Texas, the golden alga has caused fish kills in five major river systems including the Canadian River Basin, the Red River Basin, Brazos River Basin, Colorado River Basin, the Rio

Grande Basin, and the Pecos River. In addition, golden alga has been identified in other lakes and rivers in Texas but without associated fish kills. Other states have also been impacted by this alga. States that have reported golden alga include: Alabama, Arizona, Arkansas, Colorado, Florida, Georgia, Maine, Nebraska, New Mexico, North Carolina, Oklahoma, South Carolina, Texas, and Wyoming.

Between 2001 and 2002 several major fish kills have occurred in the Brazos and Colorado River systems because of golden alga. Approximately 7.0 million fish were killed on the Brazos River system and approximately 2.3 million fish were killed on the Colorado River system. As a result recreational fishing was severely impacted throughout these systems and particularly so in popular fishing destinations like Possum Kingdom reservoir. Additionally, significant impacts occurred at the Dundee State Fish Hatchery. Over 5 million fish were killed (valued at about $430,000) in hatchery ponds before it was realized that the golden alga was present. An entire year's production of striped bass was lost. The striped bass fishery in Texas generates approximately $150 million in angler expenditures annually.

There is limited knowledge of basic biological and distributional information on golden alga in rivers, lakes, bays, and estuaries in Texas. Texas Parks and Wildlife Department has been instrumental in providing information on this problem to other agencies and universities. The interagency Toxic Substances Coordinating Committee chaired by the Texas Department of State Health Services has formed a workgroup (Texas Harmful Algal Bloom Work Group) to address issues relating to toxic algal blooms. In January 2002, this committee prepared a report entitled Toxic Golden Algae in Texas that outlined specific research needs and projects that could be accomplished by universities and possibly other research entities to better understand and possibly manage golden alga. Projects are currently underway; the solutions to the problems of toxic golden alga (like other harmful algae species) will not be solved easily or quickly, although progress and successes will occur.

As recently as 31 January 2006, TexHab Golden Algae update reported that in the Rio Grande Basin TPWD Kills and Spills biologist Stephen Twidwell has initiated golden alga monitoring on the Pecos River. No golden alga was found, however, New Mexico's Brantley Reservoir, which is on the Pecos River, has a golden alga bloom and fish kill in progress. New Mexico biologists will be monitoring the Pecos River in that vicinity for any additional evidence of *P. parvum* activity.

Prymnesium parvum seems to be moving northward. While the alga is flagellated I doubt that it is able to swim upstream. Therefore the vector must be identified in order to stop its spread. Research on this toxic alga now may prevent future outbreaks in New Mexico reservoirs further north. These northern reservoirs could potentially provide a more suitable environment. Better to be on the cutting edge than to try and play catch-up.