



# BLOOMING IN FRESHWATER

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A strange phenomenon is occurring in the freshwater lakes and rivers across west and central Texas. Since about the turn of the century a golden yellow alga has repeatedly shrouded the favored fishing scenes killing masses of fish and other aquatic organisms. Dr. Reynaldo Patino, professor of Fisheries and Biological Sciences, is working to establish the cause of these fatal algal blooms and the effects on aquatic life.

The first documented case in Texas of *Prymnesium parvum* blooms occurred in 1985 along the Pecos River in the Rio Grande River Basin. Since, there have been reported blooms in five Texas river basins including the Rio Grande, Colorado, Brazos, Red, and Canadian River Basins. Golden Alga, a microalga species thought to have originated from coastal or estuarine environments, triggers toxic blooms occurring in the sub-tropical and temperate regions. "Toxins produced by Golden Alga impact gill epithelia leading to respiratory and osmoregulatory dysfunction," Dr. Patino explains. Blooms in inland waters typically transpire during the winter months allowing Golden Alga the opportunity to grow without competition from other phytoplankton species.

All of the reported inland blooms have occurred in fresh water bodies with moderate levels of salinity. Dr. Patino points out, "recent observations suggest that Golden Alga is absent in places or times when salinity is relatively high, and follow up experimental research with a Texas strain of Golden Alga shows that optimal salinity for growth of



*Reynaldo Patino is part of the Texas Cooperative Fish and Wildlife Research Unit at Texas Tech University. His research consists of reproductive and developmental biology, impacts of environmental stressors on health and reproductive fitness, and the relationships between water quality and aquatic habitat.*

this species is about 15 parts per thousand.” This may provide light as to why there are currently no reported blooms of Golden Alga along the coast and creating a growth-limiting effect. Though salinity does not appear to have an effect on the potency of toxin, the hardness of the water may. Dr. Patino explains that “the presence of hardness cations such as calcium or magnesium is necessary for the expression of toxin activity.”

Multifarious species of fish and aquatic animals dwell in these noxious waters. Dr. Patino enlists the assistance of fathead minnow larva to monitor the influence of environmental variables on Golden Alga growth and toxin production. Understanding what controls toxin production and its potency may assist in efforts to manage and mitigate Golden Alga in affected areas. “Fish larvae are more sensitive to environmental stressors than adults,” emphasizes Dr. Patino. This sensitivity allows for researchers to establish toxicity levels in waters known to have reoccurring blooms.

Currently, there is no established method to control for Golden Alga in large water reservoirs, however, nutrient availability may serve to provide indications for potential blooms. “Knowledge of salinity and nutrient ‘cutoff’ values for algal blooms can guide the development of specific water quality criteria,” Dr. Patino explains. Insight into the nutrient requirements for Golden Alga is key to remediation efforts and the stability of the ecological systems that may be impacted due to Golden Alga blooms.

Conditions that support or influence blooms vary from water temperature, salinity, turbidity, available nutrients, other microalgae, and zooplankton grazers. Large blooms over the last 10+ years have killed millions of fish in Texas inland waters, causing ecological and economical damage across the state. Dr. Patino’s research may provide useful information for authorities to control Golden Alga. In time, authorities may be able to monitor Golden Alga indicators relatively effortlessly and develop management strategies to diminish the frequency of the blooms and limit their geographic spread.