NATANYA HAYDEN

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THESIS RESEARCH:

Harmful algal blooms (HAB) have become increasingly detrimental to inland lakes in Texas. *Prymnesium parvum* (Golden Algae) has been particularly costly to fish populations and local economies throughout 5 major watersheds (Brazos, Canadian, Colorado, Red, and the Rio Grande rivers) during the last decade (Southard *et al*., 2010). This mixotrophic organism produces allelopathic toxins that result in the suppression of competing phytoplankton, mortality of grazers (i.e., zooplankton), and has produced massive fish kills as a side effect (Graneli *et al*., 2008; Henrikson *et al*., 2010). The ultimate goal of my research is to test and develop an ecologically benign and sustainable management plan to control or circumvent these deadly blooms.

The first large-scale freshwater bloom observed in Texas occurred in 2001 in the Brazos River watershed, producing an economic loss of 2.8 million dollars (TPWD 2005). Another bloom in 2003 resulted in 1,475,212 fish killed and a 1.1 million dollar deficit in revenue lost from recreational fishing and tourism (TPWD 2005). Texas has experienced an estimated statewide loss of 34 million fish and 13 million dollars, due to ichthyotoxins produced by this invasive species and it is continuing to spread to new freshwater systems (Southard *et al.*, 2010).

Many factors contribute to favorable conditions for HAB proliferation. Including increased salinity and unbalanced inorganic nutrients (Graneli and Salomon, 2010), which can result from anthropogenic effects and increased urban development. In addition, natural inflow events have been positively correlated with removing 89 percent of *P. parvum* cells though flushing, as well as alleviating further production of allelopathic chemicals (Roelke *et al.*, 2010). Consequently, eliminating the mortality of fish and resulting in the termination of a *P. parvum* bloom in 2007 (Roelke *et al.*, 2010). In fact, the timing of bloom termination in multiple lake systems in Texas closely follows inflows (Roelke *et al.*, in press). However, relying on natural inflow events may be complicated by projected urban demands on water and climate change concerns. A study by Muttiah and Wurbs (2002) has projected the largest affect of climate change on hydrology to be caused by altered precipitation patterns and elevated levels of evaporation, ultimately leading to uncertainty for local watersheds. The implications of HAB damage and reduced magnitude of freshwater inflows are enormous in Texas water systems. Therefore, conducting research on these effects are paramount to sustain complex aquatic food webs, as well as preserve the integrity of Texas inland lakes.

The thesis research that I am pursuing is testing how varying freshwater inflow magnitudes affect *P. parvum* density and toxicity. A large-scale inlake experiment was conducted in spring 2010 in Lake Granbury, during the time of year when blooms develop. Twelve mesocosms were used throughout the experiment and 3 different magnitudes of flushing were simulated and then sampled. The water source that I used for flushing was pumped from 20 meters lake depth and added to each mesocosm. This technique contained all of the natural components that an inflow event would provide and only requires the amount of water already present in a given lake. Natural phytoplankton and zooplankton assemblage were introduced from a different area of the lake, diversity of nutrients were provided, and HAB cells were flushed from an initiating bloom.

Water samples were collected to analyze *P. parvum* cell density, toxicity, and zooplankton population density. In addition, abiotic factors were also tested: pH, salinity, temperature, chlorophyll *a*, pigment, and inorganic nutrients (phosphorus and nitrogen). Comparing these measurements against a controlled environment will make it possible to isolate the effect of pulsed inflow magnitude on primary productivity and conditions leading to HABs. After samples have been examined and statistically analyzed the results from this experiment will outline the potential relationship that inflow has on water chemistry and favorable conditions for *P. parvum* blooms.

ACADEMIC QUALIFICATIONS:

I am currently a graduate student in the Wildlife and Fisheries Science Department at Texas A&M. Within my first year I have had the opportunity to continue developing my knowledge and passion for environmental issues through challenging coursework and working in an aquatic ecology laboratory. Graduate courses include: Ecology of Lakes and Rivers, Dynamics of Populations, Environmental Conflict Management, Ecology of Coastal Zone, and Statistics for Research.

I attained a Bachelor of Science *magna cum laude* from Lake Erie College majoring in Chemistry, where I received the Mastin Science Scholarship for academic excellence three consecutive years. Additionally, I graduated from Northwestern Michigan College with an Associate of Science *high honor*. Undergraduate courses include: Biology, Organic Chemistry, Calculus, Quantitative Analysis, Biochemistry, Environmental Science, Genetics, Anatomy & Physiology, and Physics.

GPA: Cumulative undergraduate: GRE:
Graduate:

USE OF FUNDS:

The funds from this scholarship would help to offset the cost of tuition, books, and course expenses. In addition, this scholarship would assist with laboratory expenses and purchasing equipment necessary for data analysis, statistical analysis, and ultimately the publication of research results.

FUTURE CAREER GOALS:

Through my work at Texas A&M, I have become increasingly interested in studying aquatic ecology and conservation. I believe that it is essential to understand conditions leading to harmful algal blooms to effectively manage and conserve wildlife populations, as well as protect humans from detrimental health risks.

I have a great drive to continue my education and professional development through research. After I finish my master's it is my goal to pursue my Ph.D. My ultimate goal is to bring knowledge and new ideas to this field of study, as well as be a driving force in aquatic ecology and conservation through research, education, and outreach.