



WATER RESOURCES RESEARCH GRANT PROPOSAL

Project ID: 2003TX112G

Title: Bridging the Gap Between Plankton Dynamics and Spatial Variability in Water Quality in the Guadalupe Estuary (Texas): The Importance of Freshwater Pulses

Project Type: Research

Focus Categories: Ecology, Water Quality, Water Quantity

Keywords: estuary, freshwater inflows, pulsed events, salinity, nutrients, phytoplankton

Start Date: 09/01/2003

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Federal Funds: \$233953.00

Matching Funds: \$234718.00

Congressional District: 8

Principal Investigators: Davis, Stephen Edward (Texas A&M University); Roelke, Daniel L.

Abstract: The Lower Guadalupe Water Supply Project (LGWSP) seeks to divert approximately 100,000 acre-ft yr⁻¹ from just below the confluence of the Guadalupe and San Antonio Rivers (near the head of the Guadalupe Estuary) to meet projected needs in the greater San Antonio (TX) area. Reduced freshwater inflow effects on the bay will include reduced loading of new nutrients and sediment to the estuary, increased areal extent of high salinity zones, reduced magnitude of pulsed inflows, and increased period between pulses to the estuary. Ongoing studies supported by agencies involved with the LGWSP are investigating the effects of the proposed diversion on marsh ecosystems and commercially important species in the estuary. Here we propose a 3-year study that will complement these studies. Our proposed research focuses on the effects of temporal variability in inflows, and corresponding spatial variability in the physicochemical environment, on phytoplankton dynamics and water column production in the open water bays of the Guadalupe Estuary. Continuous sampling of water quality and hydrology at the mouth of the river in addition to USGS flow data will be used to understand inflows and loading of materials into the estuary. We will quantify and map the effects of these inflows on estuary-wide water quality with Dataflow, a flow-through measurement apparatus for mapping physicochemical parameters and chlorophyll a concentrations in shallow aquatic systems such as the Guadalupe Estuary. Estuarine

plankton response to a range of inflow events characterized will be analyzed from discrete field samples. We will also conduct laboratory experiments using natural plankton assemblages that are designed to elucidate changes in secondary productivity, and phytoplankton biomass and diversity, in response to varying hydraulic conditions in the estuary. The synthesis of information collected from this study and the mentioned ongoing studies supported by the LGWSP will help provide a better understanding of the relationships between the nature (i.e. frequency, magnitude, and mode) of pulsed inflow events and estuarine ecosystem health, thus allowing water managers to optimize their diversion of freshwater while minimizing impact to estuarine integrity.

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