# I. REPORT TITLE:

## Refinement Of An Electronic Logbook To Support Fishing Operations By Spatially Predicting Shrimp Abundance In Relation To Environmental Conditions Off The West Coast Of Florida

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## II. ABSTRACT

An Electronic Logbook (ELB) System was refined and used to gather catch effort, and associated environmental data on three shrimp vessels fishing for pink shrimp (Farfantepenaeus duorarum) on the West Florida Shelf from July 2004 to June 2005. Oceanographic modeling was conducted by University of South Florida, College of Marine Science to predict bottom conditions from March 2004 to June 2005. The Florida Fish & Wildlife Conservation Commission, Fish & Wildlife Research Institute (FWC-FWRI) also contracted the University of Colorado at Boulder, Institute of Arctic and Alpine Research. Habitat mapping using geographic information systems (GIS) was conducted by FWC-FWRI with the data obtained. Suitability functions were created to elucidate the relationships of shrimp catch rates (CPUEs) across environmental gradients. Habitat suitability modeling (HSM) was successful in predicting the spatial distributions and relative abundances of pink shrimp on the West Florida Shelf.

## III. EXECUTIVE SUMMARY

An electronic logbook (ELB) was developed by the Florida Fish and Wildlife Conservation Commission (FWC), Fish and Wildlife Research Institute (FWRI) in cooperation with Versaggi Shrimp Corp. and Sasco Inc. The ELB was used by the captains to record catch, effort, and environmental data onto computers situated in the wheel house of three shrimp fishing vessels. A data logger (CTD) associated with the boat's trynet recorded vertical and horizontal profiles. The CTD data were transferred wirelessly to the computer each time the trynet was retrieved. Counts of shrimp numbers from the trynet and weights of size grades of shrimp species obtained from the main trawls were recorded using the ELB system. Positions (latitude and longitude) automatically recorded by the boat's GPS receiver allowed determination of fishing effort (hours fished). Environmental data collected by the CTD were displayed on-screen to depict changes in temperature or salinity over the path taken by the trynet. The ELB system maintains a database of use to the captain and provides data to support Habitat Suitability Modeling (HSM) and mapping using geographic information systems (GIS).

The FWC-FWRI subcontracted the College of Marine Science at the University of South Florida (USF) and the Institute of Arctic and Alpine Research (INSTAAR) at the University of Colorado at Boulder. USF modeled and mapped circulation patterns on the West Florida Shelf (WFS) from March 2004 to June 2005 as part of the Coastal Ocean Monitoring Prediction System (COMPS) to produce predicted monthly maps of bottom temperature, bottom salinity, and bottom current (speed and direction) patterns. INSTAAR aggregated available grab sampling data from the U.S. Geological Survey (USGS) and other sources and produced bottom type maps for the WFS. Staff at FWRI interpolated the data using GIS to produce habitat maps and grids needed to support HSM analyses for pink shrimp (Farfantepenaeus duorarum) on the WFS.

The GIS modeling and mapping conducted by the Center for Spatial Analysis at FWRI have been used to relate pink shrimp abundance to environmental conditions on the WFS. Shrimp catch rates (CPUEs standardized in pounds per hour) were analyzed across environmental gradients to produce suitability functions for depth, temperature, current speed, current direction, aspect, vessel monitoring zones, and sediment type.

Analyses were conducted to predict Low to Optimum HSM zones on the WFS monthly for 16 months. The analyses demonstrate that shrimp were significantly more abundant on the WFS associated with onshore currents during 2004, than during 2005 when offshore currents prevailed. This can also account for increasing CPUEs associated with higher current speeds, and higher CPUEs found associated with currents coming from the Northwest during 2004. Nutrient upwelling associated with the onshore current patterns appears to have created more productive benthic food conditions (algae and benthic invertebrates) that supported higher shrimp densities during 2004. This cooperative research sponsored by the Gulf and South Atlantic Fisheries Foundation Inc. (GSAFFI) supports sustainable fisheries, better fisheries management, and the delineation and management of Essential Fish Habitat (EFH).