

# **WORK PLAN**

## **DEVELOPMENT OF A GEOGRAPHIC INFORMATION SYSTEM AS A MANAGEMENT TOOL TO REDUCE BYCATCH OF SEA TURTLES IN U.S. ATLANTIC OCEAN AND GULF OF MEXICO FISHERIES**

**A Partnership Project Between NOAA's  
National Marine Fisheries Service & National Ocean Service**  
*Office of Protected Resources & National Centers for Coastal Ocean Science*



**Prepared by the  
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National Oceanic & Atmospheric Administration**

*Updated: 1/06*

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## **GOALS**

The National Oceanic and Atmospheric Administration's (NOAA) National Ocean Service's National Centers for Coastal Ocean Science (NCCOS) has partnered with NOAA's National Marine Fisheries Service (NMFS) Office of Protected Resources to develop a dynamic geographic information system (GIS). This GIS will be used by NMFS as a management tool to address sea turtle bycatch in Atlantic and Gulf of Mexico fisheries. The GIS supports the NMFS strategy for sea turtle conservation and recovery in relation to Atlantic Ocean and Gulf of Mexico fisheries (the "Strategy") to fully characterize domestic fisheries, evaluate sea turtle bycatch across gear types, develop and implement measures to reduce bycatch, authorize fishery takes consistent with Endangered Species Act (ESA) mandates, and conserve and recover sea turtles (Figure 1).

## **OBJECTIVES**

- 1.** Development of a comprehensive GIS in cooperation with NMFS that incorporates:
  - a. Sea turtle distribution
  - b. Commercial fishing activity
  - c. Observed sea turtle bycatch
  - d. Federal and state regulations relevant to sea turtles
  - e. Oceanographic conditions relevant to sea turtle distribution
- 2.** Support NMFS with data quality assurance and quality control of sea turtle, fisheries, oceanographic, and regulatory data
- 3.** Support NMFS with processing and development of GIS data layers to be used to create visual products, tools, and analyses needed to implement the Strategy
- 4.** Provide NMFS with consultative support to expand GIS capabilities to meet broader agency needs
- 5.** Train NMFS' Strategy team members to effectively manipulate data layers and mapping capabilities created for the GIS using the graphical user interface and tools in ArcMap

## **PROJECT BACKGROUND**

All species of sea turtles inhabiting the Atlantic Ocean and Gulf of Mexico are listed as either endangered or threatened under the ESA. Five species of sea turtles are commonly found in U.S. Atlantic and Gulf of Mexico waters. None of the species have yet met the recovery goals outlined in their respective recovery plans. Within this region, the leatherback, loggerhead, and Kemp's ridley are the most widely distributed, while the green and hawksbill turtles are found more commonly south of Virginia. Trends in populations are difficult to determine among the five species, however, only the Kemp's ridley has shown a long-term, strongly increasing trend in the number of nesting females (the most common measure of population status). Loggerheads nest predominately from North Carolina through the panhandle of Florida, on beaches that comprise the second largest nesting assemblage in the world. Along the mainland U.S., the leatherback and green turtle nest almost exclusively in Florida. U.S. inshore and offshore waters from Maine through Texas provide critically important habitat for feeding, migration, courtship, and mating. Incidental capture in fisheries is a major limiting factor in the recovery of sea turtles in these areas.

NMFS is responsible for protecting sea turtles in the marine environment and has implemented conservation and monitoring programs, regulations, and other actions under the ESA to recover these species. To further help meet ESA recovery goals for sea turtles, NMFS is implementing the strategy for sea turtle conservation and recovery in relation to Atlantic Ocean and Gulf of Mexico fisheries (Figure 1). The Strategy, finalized in a decision memorandum in June 2001, is a strategic plan to address the incidental capture of sea turtles in federal and state fisheries through a comprehensive, integrated, and consistent gear-based approach. The Strategy is a new approach to reducing incidental capture of sea turtles in U.S. commercial and recreational fisheries that will rely heavily upon involvement of stakeholders (e.g., fishing industry, non-government organizations, and the interested public). This strategy evolved out of the need to address sea turtle bycatch reduction in fisheries of the Atlantic and Gulf of Mexico in a more comprehensive way. A strategic approach evaluating fishery impacts by gear types across state, federal, and regional boundaries will increase management effectiveness. Rather than addressing turtle bycatch issues fishery by fishery, or state by state, the Strategy will focus on fishing gear types known to take sea turtles across their range in the Atlantic and Gulf of Mexico.

Ultimately, this approach should be both effective and inclusive for the challenge of recovering threatened and endangered sea turtles in the Atlantic and Gulf with U.S. fishery constituents. The major priorities of the Strategy include: a) continue and improve stock assessments for each stock/species of sea turtle found within the U.S. Exclusive Economic Zone (EEZ), b) improve and refine estimation techniques for the takes of sea turtles to ensure that the criteria for recovery are being met are consistent with ESA mandates, c) continue and improve the estimation or categorization of sea turtle bycatch by gear type and fishery, d) evaluate the significance of bycatch by gear type, e) convene specialist groups to prepare plans for reduction of takes for gear types with significant levels of sea turtles take, and f) promulgate ESA and Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) regulations implementing plans developed for sea turtle take reduction by gear type. Sea turtle conservation measures will be developed using all elements of the Strategy - information gathering, research and analysis, and stakeholder involvement.

The professional development of a dynamic GIS for sea turtles to facilitate the implementation of the Strategy is a key baseline need. The development of such a GIS would also assist NMFS in meeting other ESA and legislative responsibilities that require everything from simple maps to in-depth geographic/oceanographic analyses. While there are several efforts that have been undertaken to compile sea turtle datasets into a GIS environment, there has been no comprehensive NMFS sea turtle program-wide approach. The development of a fully integrated GIS for turtles would be cross-regional and would serve the national program. NCCOS' Biogeography Team has been identified as the most appropriate group within NOAA to develop these capacities for NMFS. The Biogeography Team has extensive GIS and database experience to ensure that the products developed will meet the needs of the Strategy and NMFS. Partnering with NCCOS' Biogeography Team will facilitate working with both regions and centers as well as coordinating with NMFS' Office of Protected Resources-based team leader for the Strategy.

## **PROJECT OVERVIEW**

NCCOS' Biogeography Team, in consultation with the NMFS' Strategy team, will develop a GIS that characterizes sea turtle interactions with commercial fisheries in the U.S. Atlantic and Gulf of Mexico waters, including inshore waters, state regulated waters, and federally regulated

waters (out to the EEZ; Figure 1). NCCOS' Biogeography Team will examine the relationship between sea turtles and commercial fisheries by incorporating existing data on oceanographic conditions, sea turtle distribution, commercial fishing activity, known interactions between sea turtles such as observed commercial fisheries sea turtle bycatch, and marine managed areas within a comprehensive GIS. Requested GIS data products, tools, analyses, input, and guidance for the Strategy will be provided to expand GIS capabilities to meet broader agency goals. In addition, NCCOS' Biogeography Team will provide training sessions on the sea turtle GIS. NMFS Strategy team members will be able to effectively manipulate data layers and utilize mapping capabilities and analyses tools created specifically for the GIS to conserve and recover sea turtles.

This work will complement the NMFS' Strategy that involves the characterization of Atlantic and Gulf of Mexico state waters, estimation of bycatch, gear research, compilation of ESA, MSFCMA, Marine Mammal Protection Act (MMPA) regulations, and National Environmental Policy Act (NEPA) scoping.

## **PROJECT TASKS**

The major tasks of the NCCOS' Biogeography Team are outlined below. The principal task (Task 1) involves compiling data to create GIS layers that are relevant to the conservation and recovery of sea turtles with the graphical user interface. Supporting tasks (Tasks 2-5) will be ongoing throughout the course of the project and will be completed after the GIS has been fully developed.

### **Task 1. Development of a comprehensive GIS for the Strategy**

(Estimated Completion Date of Final Project: 12/06)

NCCOS' Biogeography Team will compile oceanographic data relevant to sea turtle distribution (i.e., sea surface temperature, bathymetry, and chlorophyll concentration) and all data transferred from NMFS (i.e., sea turtle distribution, commercial fishing activity, observed sea turtle bycatch, and state and federal regulations relevant to sea turtles) into a comprehensive GIS. The task of developing a comprehensive GIS to support conservation and recovery of sea turtles has been divided into the following areas:

**A. Compile oceanographic layers relevant to sea turtle distribution**

(Completed: 10/04)

NCCOS' Biogeography Team will compile layers characterizing oceanographic conditions relevant to sea turtle distribution (i.e., sea surface temperature, bathymetry, and chlorophyll concentration).

**B. Develop layers of marine managed areas**

(Estimated Completion Date: 2/06)

NMFS and the Biogeography Team will compile regulations that operate under the ESA, MMPA, and MSFCMA mandates relevant to sea turtles and NCCOS' Biogeography Team will use these regulations to develop layers that show the extent of the marine managed areas in the U.S. Atlantic and Gulf of Mexico. These will be reviewed by NMFS staff and edited by the Strategy team and the Biogeography Team.

**C. Develop layers showing sea turtle distribution**

(Estimated Completion Date: 4/06)

NMFS will supply data on sea turtle distribution and occurrence from existing surveys and NCCOS' Biogeography Team will compile data that will display sea turtle distribution and survey effort appropriate for the Strategy's needs.

**D. Develop layers showing commercial fishing activity**

(Estimated Completion Date: 6/06)

NCCOS' Biogeography Team will compile data to develop appropriate layers showing commercial fishing activity and effort relevant to the conservation and recovery of sea turtles, as data is supplied by NMFS.

**E. Develop layers showing observed sea turtle bycatch**

(Estimated Completion Date: 8/06)

NMFS will supply data on fisheries' observer data and NCCOS' Biogeography Team will compile data to develop appropriate layers that will display observed sea turtle bycatch and observation efforts.

**F. Development of a graphical user interface within ArcGIS for the Strategy**

(Estimated Completion Date: 12/06)

NCCOS' Biogeography Team will design and develop a graphical user interface for the query, analysis, and manipulation of the data to generate maps, summaries, and other

analytical products. The design of the interface will be based on NMFS Strategy Team user needs and input.

**Task 2. Support NMFS with data quality assurance and quality control**

(Estimated Completion Date: 12/06)

All data received and compiled will be reviewed for quality assurance and quality control before incorporation. In addition, appropriate metadata for each data set will be created and provided.

**Task 3. Create visual products, tools, and analyses needed to implement the Strategy**

(Estimated Completion Date: 12/06)

NCCOS' Biogeography Team will support NMFS with processing and development of GIS data layers to create visual products as requested to guide the Strategy to meet broader agency needs. Examples of support include development of a website as tool to communicate ideas, promote dialogue, and measure progress.

**Task 4. Provide NMFS with consultative support for implementation of Strategy**

(Estimated Completion Date: 12/06)

NCCOS' Biogeography Team will provide input and guidance to the Strategy to expand GIS capabilities to meet broader agency needs. Examples of support include GIS analyses of sea turtle, fisheries, regulatory, and oceanographic data and guidance for maintaining a dynamic GIS such that continuous change, activity, or progress of sea turtle conservation and recovery would be characterized within the GIS.

**Task 5. Train NMFS' Strategy team members on the dynamic GIS**

(Estimated Completion Date: 12/06)

NCCOS' Biogeography Team will train NMFS' Strategy team members to effectively manipulate data layers and utilize mapping capabilities and analyses tools specifically created in the GIS to support conservation and recovery of turtles.

**PROJECT PERIOD:** September 2003 – December 2006

**NCCOS PROJECT DELIVERABLES:** Final Project Report and completed GIS: 12/31/06

**NCCOS PROJECT MANAGER:** Connie Moy, Marine Biologist/GIS Specialist

### **STRATEGY TEAM MEMBERS AND PARTNERS**

NMFS' Office of Protected Resources is leading the collaborative sea turtle strategy effort while NCCOS' Biogeography Team is leading the GIS effort. Other project partners include staff from the NCCOS' Biogeography Team, NOAA Office of Protected Resources, Northeast Fisheries Science Center, Northeast Regional Office, Southeast Fisheries Science Center, and Southeast Regional Office.

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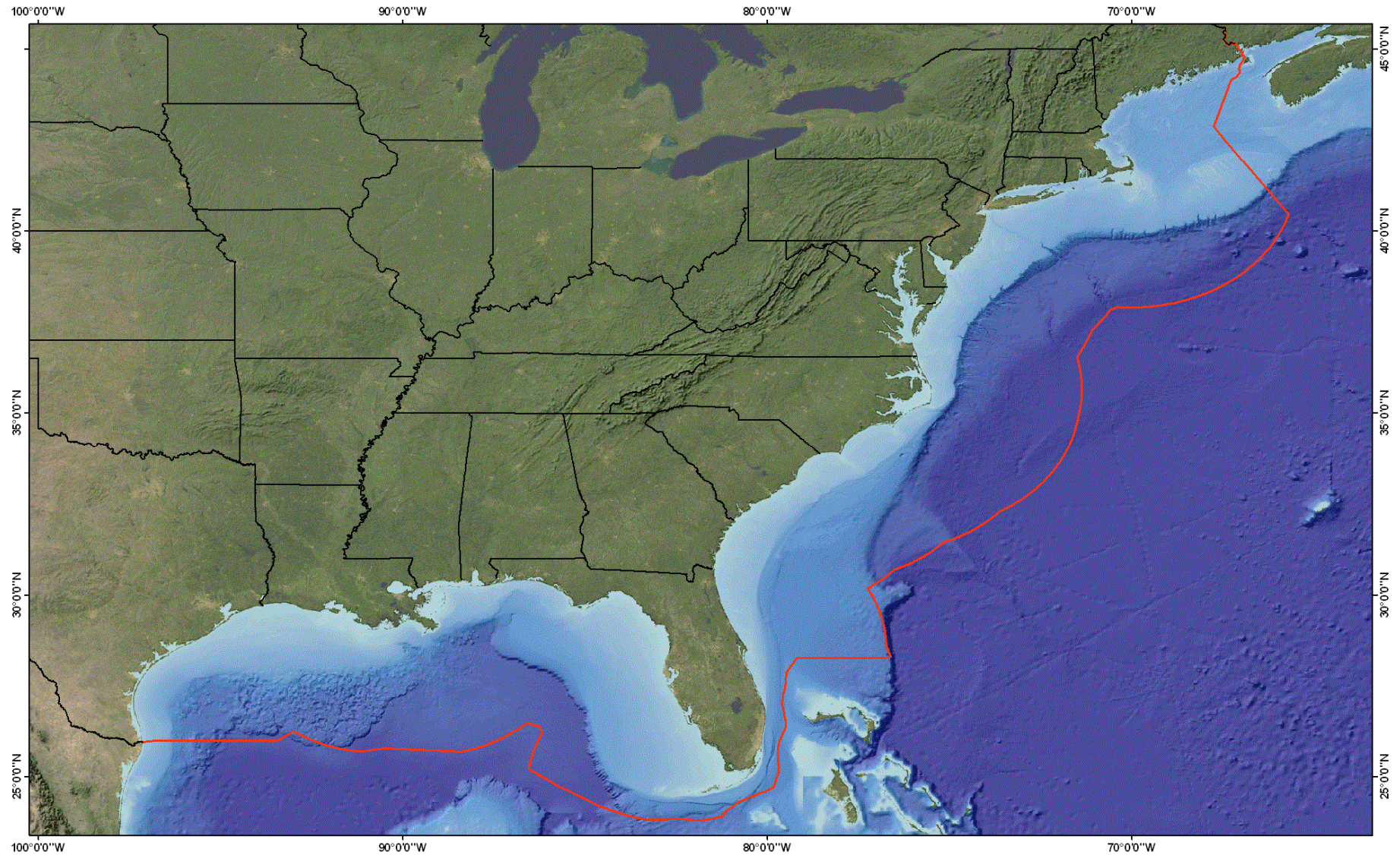
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# Sea Turtle Strategy to Reduce Commercial Fisheries Bycatch

A Partnership Project Between NOAA's National Marine Fisheries Service and National Ocean Service



— NMFS/NOS Sea Turtle Strategy Extent



Figure 1.