

## Sirenia Project: Manatee Ecology and Population Biology

The USGS Florida Caribbean Science Center's Sirenia Project conducts long-term, detailed studies on the life history, population dynamics, and ecological requirements of the West Indian manatee (*Trichechus manatus*). Sirenia Project biologists work cooperatively with federal and state researchers and managers on research identified as essential for the recovery of the species.



The endangered manatee is one of the most unique and popular aquatic resources. Sirenia Project personnel have pioneered several important tools for manatee research, most notably: development of a computerized photo-identification catalog; survival estimation methods; integration of life history data and population modeling; radio-tag assemblies for tracking manatees in fresh or salt water; food habits and age determination techniques; development of molecular genetic analyses techniques; and, habitat characterization and assessment of manatee grazing impacts on seagrasses.

Project personnel have also been involved in developing and testing salvage protocols and aerial survey techniques for manatees, and integrating GPS technology to monitor manatee movements. Expertise and assistance in project design and implementation of studies on sirenians has been shared with colleagues in foreign countries.

The Florida Manatee Recovery Plan, prepared by an interagency team under the direction of the U.S. Fish and Wildlife Service, guides manatee research and management activities with the primary objective of protecting and recovering the species. Sirenia Project personnel serve as representatives on the Manatee Recovery Team, and are active members in several working groups established to coordinate research and management priorities for assessment of manatee population

status, development of GIS applications, and evaluation of captive manatee releases.

### Current Research and Collaborations

#### *Reproduction Traits and Population Dynamics of Florida Manatees Based on Photo-identification Techniques*

Long-lived manatees are identifiable by unique and permanent body features, which are primarily scars from collisions with boats. The manatee photo-identification study focuses on the identification of individual manatees based on photographic records of these features. Federal and state managers responsible for protecting and recovering the manatee use life history information obtained from



the photo-identification sightings database. Collaborators include Mr. Ron Osborn at the Mid-continent Ecological Science Center, who assists in development of database management and applications software; Dr. Catherine Langtimm, Restoration Ecology Branch of the FCSC, collaborates in survival, reproduction, and rate of scar acquisition estimates using image and resighting histories derived from the database; and Drs. Jim Nichols, Mike Runge and Bill Kendall of the Patuxent Wildlife Research Center, who are modeling manatee population trends, based on estimates of manatee life history parameters.

#### *Genetic Population Structure of the Florida Manatee for Management and Conservation Applications*

Aspects of manatee ecology, ethology, and population dynamics can be enhanced with research on manatee genetics. Recent advances will assist in defining relationships between kinship groups, behavior, reproductive strategies and success, and population structure. Mitochondrial DNA sequences and a manatee genomic library for identifying microsatellite loci have been completed and hold great potential for evaluating current and future management and research approaches. Collaborators include Dr. Tim King of the Leetown Science Center, and Drs. Brian Bowen and Peter McGuire of the University of Florida.



***Seagrass Ecology and Manatee Diet in Selected High Use Habitats***

Manatees utilize freshwater, brackish, and marine habitats. The survival of manatees will depend on maintaining the integrity of ecosystems and habitat sufficient to support a sustainable population. Habitat research will help biologists assess impacts of manatee grazing in high use areas such as the northern Banana River on Florida's Atlantic coast and eastern Puerto Rico, and elucidate their role in maintaining species diversity. Diet determination will help to identify areas and species requiring protection, and the relative importance and extent to which manatees utilize available resources. Collaborators include biologists with Dynamac Corp., Kennedy Space Center and Dr. Jud Kenworthy with the NMFS/NOS Beaufort Lab.

***Predicting and Assessing the Effects of Hydrologic Restoration on the West Indian Manatee in South Florida***

This five-year study was initiated in FY2000, as part of an integrated FCSC project (Impacts of hydrological restoration on three estuarine communities of the Southwest Florida coast and on associated fauna). Given the manatee's reliance on freshwater and aquatic vegetation, we hypothesize that altered water management regimes will affect manatee distribution, relative abundance, habitat use, and movement patterns. Demographic data are lacking for manatees in southwest Florida, thus this study will fill a major gap in our understanding of manatee population biology. Collaborators include Drs. Carole McIvor, Don DeAngelis, and Tom Smith, Restoration Ecology Branch of the FCSC, and biologists at the Ten Thousand Islands National Wildlife Refuge and Everglades National Park.



***Determination of Manatee Use Patterns and Characterization of Seagrass Areas Important to Manatees in Puerto Rico***

Rapid development and increasing human activity threaten the long-term existence of manatees inhabiting Puerto Rican waters. Federal and Commonwealth managers have specified the need for data on manatee habitat and habitat utilization. Sirenia Project studies on radio-tagged manatees have revealed movements and habitat use patterns in eastern Puerto Rico, elucidating areas essential for feeding, resting, and obtaining fresh water. Additional radio-tracking studies in western Puerto Rico are ongoing. Detailed habitat mapping and characterization of seagrass beds near Roosevelt Roads and Vieques Island is underway to establish a baseline to assess the long-term status of seagrass resources and the animal communities that depend upon them. Collaborators include the



**Figure 1: Satellite telemetry locations of manatees (red) overlying a map of seagrass coverage (green) in the northern Banana River, FL. Telemetry data collected from 1987 through 1998 revealed a consistent pattern of manatee use of this region during the warm season (March-September).**

USFWS Caribbean Field Office, Puerto Rico Department of Natural Resources, NMFS/NOS Beaufort Lab, the University of Puerto Rico, and the U.S. Navy.

***Cooperative International Manatee and Dugong Research and Information/Technology Transfer***

The Sirenia Project is actively involved in international research on sirenians and has been responsible for standardizing aspects of data collection and conveying this technology and expertise to biologists working in other countries. Collaborative efforts have helped to launch studies on manatees in the Bahamas, Belize, Brazil, Colombia, Costa Rica, Cuba, the Dominican Republic, Ecuador, Guatemala, Haiti, Jamaica, Mexico, Panama, Nicaragua, Venezuela, and several countries in West Africa, and on dugongs in Australia, Japan, Malaysia, New Guinea, Palau, and Saudi Arabia. Cooperative studies have been carried out on genetics, radio tracking, anatomy, parasites, feeding ecology, diet determination, and conservation.

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