STUDIES IN MATLACHA ISLES AND OTHER AREAS OF SOUTHWESTERN FLORIDA: FACILITATING ADULT SURVIVAL ESTIMATIONS IN SOUTHWESTERN FLORIDA AND DOCUMENTING MANATEE HABITAT USE PATTERNS

FLORIDA FISH AND WILDLIFE CONSERVATION COMMISSION CONTRACT FINAL REPORT

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30 May 2003

Executive Summary: Studies in Matlacha Isles and Other Areas of Southwestern Florida: Facilitating Adult Survival Estimations in Southwestern Florida, and Documenting Manatee Habitat Use Patterns

Principal Investigators: John E. Reynolds, III, Ph. D., Sheri L. Barton, Teresa J. Kessenich, and Rachel Nostrom

The long-term maintenance and expansion of statewide photo-identification efforts of Florida manatees is of considerable importance for estimating population trends. Collaborative efforts of USGS Sirenia Project, FWC Florida Marine Research Institute, Mote Marine Laboratory Manatee Research Program staff, and others have contributed to the recent adult survival estimates for Florida manatees. Continued efforts are crucial in order to annually update these estimates and other population trends.

During the 2002/2003 contract period, photo-identification efforts were continued in southwestern Florida locations, including Matlacha Isles (the secondary winter refuge in southern Charlotte Harbor), 10-mile canal (Estero Bay), and Burnt Store Marina (Charlotte Harbor). Funding from this project also supplemented photo-identification studies elsewhere in southwestern Florida, including locations at and near the FPL Ft. Myers power plant and Sarasota Bay. We completed 122 surveys from October 2002 to May 2003. Although photographic slide analyses are still in progress, 111 previously known manatees have been identified to date.

Eight aerial surveys of the Caloosahatchee River and nearby warm-water refugia or foraging areas were conducted between December and March. The maximum count of 365 manatees occurred during January, a month of record-breaking cold. Despite the severity and duration of cold weather in winter, 2002-2003, counts in the area were not as high as in some previous years. During coldest weather, manatees aggregated at the Ft. Myers power plant, and
during less cold times, they were found in greater numbers at Matlacha isles (a secondary warm-water refuge) and in foraging areas such as San Carlos Bay. Very poor visibility limited sightings in the Caloosahatchee River itself.

Sightings were communicated within hours to law enforcement personnel in Lee and Charlotte Counties and to other state officials. Such near-real-time reports may prove helpful in focusing enforcement efforts, which could reduce watercraft collisions with manatees at a time when the animals are aggregated.
Title of Project: Studies in Matlacha Isles and other areas of southwestern Florida: Facilitating adult survival estimations in southwestern Florida and documenting manatee habitat use patterns

Principal Investigators: John E. Reynolds, III, Ph. D., Sheri L. Barton, Rachel V. Nostrom, and Teresa J. Kessenich

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Goals of the Project:

The goals of this project included the following: a) to continue the photo-identification efforts in southwestern Florida, particularly in Matlacha Isles; b) to supplement efforts by State personnel to conduct the photo-identification efforts at and near the FPL Ft. Myers power plant during the winter months; c) to augment photo-identification efforts in Sarasota Bay during non-winter months; and d) to conduct aerial surveys of the Matlacha Isles and Caloosahatchee River areas in winter.

Part I: Photo-Identification Studies

Introduction:

Manatee photo-identification (photo-ID) studies have provided information on population structure, life history and reproductive traits, site fidelity, behavior, movement and travel patterns, habitat selection, and estimates of survival rates (Reid et al. 1991; Beck and Reid 1995; O'Shea and Ackerman, 1995; Langtimm et al., 1998; Koelsch 2001). Knowledge of calving intervals/reproductive rates, age at sexual maturity, and estimates of annual adult survival, determined from resightings of individuals, form the basis of the demographic recovery as stated in the most recent Florida Manatee Recovery Plan (U.S. Fish and Wildlife Service 2001). In
fact, according to an expert panel at the Manatee Population Ecology Workshop (Gainesville, FL; April 2003) the adult survival estimates emanating from rigorous photo-identification, followed by mark-recapture analyses represent the strongest available approach for estimating manatee population trends. Sighting histories of identifiable manatees later recovered as carcasses also provide useful information; previous sightings may indicate behavior and movements prior to animals' deaths and provide insight into mortality factors. Thus, an emphasis has been placed on maintaining and expanding photo-identification efforts statewide, particularly in southwestern Florida.

Prior to 1996/97, the scar catalog for southwestern Florida south of Sarasota Bay was outdated. Fifty-seven manatees observed in Ft. Myers were incorporated into MIPS during the 1980s (Beck and Reid 1995), but regular surveys had not been conducted for the several years following. During the winter of 1996/97, Mote Marine Laboratory began regular photo-ID surveys in southwestern Florida (south of Sarasota Bay) to update and expand the scar catalog in this region. Staff at the Florida Marine Research Institute (FMRI) also increased photo-ID efforts in this region to further update the scar catalog and facilitate the calculation of annual adult survival probabilities in southwestern Florida, as this was the only subpopulation for which those analyses had not been done (Langtimm et al., 1998). Although data collected through last winter (2001/2002) were recently used by Langtimm et al. (in review) to calculate the first adult survival estimates for the southwest subpopulation, it is important to continue photo-ID studies in order to annually update the survival estimates (U.S. Fish and Wildlife Service 2001).

Manatee photo-identification surveys were conducted in Matlacha, Sarasota County, and at and near the FPL Ft. Myers power plant to further develop and increase sighting histories of manatees in the Southwest subpopulation. Data collected during these surveys will update,
expand, and improve the collaborative statewide scar catalog (MIPS) by documenting individual manatees at primary and secondary winter refuge sites, as well as non-winter sites, and establish sighting histories for new distinct individuals.

Methods:

Photographic identification surveys were conducted in three areas in southwestern Florida (Matlacha, Sarasota County, and the Florida Power & Light Ft. Myers power plant) from late fall 2002 to spring 2003. During the winter and early spring, photo-ID surveys were conducted regularly at Matlacha Isles and sites at and near the FPL Ft. Myers power plant (FPL discharge canal, Manatee Park, and Orange River; Figure 1). Additional sites, which include Burnt Store Marina, 10-mile canal, and northern Pine Island, as well as sites in Sarasota Bay (Figure 2) were surveyed less frequently and/or opportunistically. As water temperatures continued to warm, we redirected our focus from areas near the power plant to Sarasota Bay sites, which include Pansy Bayou, City Island Grass Flats (CIGF), Buttonwood Harbor, and areas of Longboat Key.

Survey teams worked from either 6-7 meter outboard motorboats with observation towers and propeller guards, a 3-meter modified pontoon boat with observation tower (Orange River), shoreline, bridge, or dock. Electric trolling motors were used on all boats to minimize disturbance to the manatees. The primary observer operated a Canon EOS Elan II or 7E or Nikon F7 35mm SLR camera with a 70-300 mm zoom lens and a polarizing filter, and used 200 ISO Fujichrome slide film to photograph manatees. A field day included one or more sites surveyed on a single day. Whenever possible, multiple sites were surveyed simultaneously by different observers in order to increase effort and efficiency and decrease travel expense. A
sighting was defined as all individuals at a geographically distinct location (i.e., canal, bayou, harbor, boat basin) within an approximately 0.1 - 0.2 km$^2$ area at the same time. For each sighting, we photographed individual manatees and sketched scars and other features on data sheets compatible with those used by the U.S. Geological Survey Sirenia Project and Florida Fish and Wildlife Conservation Commission, FMRI. We noted the gender of individuals when the ventrum or a nursing calf was observed. We also recorded environmental data, such as weather, water and air temperature, salinity, wind direction and speed, and photo conditions. Locations of all sightings will be plotted in ArcView GIS.

Data and slides are being processed and analyzed using methods established by Sirenia Project, Manatee Individual Photo-Identification System (MIPS), and similar photo-identification research projects (Beck and Reid 1995; Koelsch 1997; Koelsch and Barton 1999). To date, over 250 rolls of film and 9200 slides taken of distinctive individuals have been developed and labeled. Distinctive individuals that were photographically documented through 29 December 2002 have had sketches drawn of their scars, mutilations, and/or other features to facilitate making matches between days and with previously known individuals. All distinctive manatees will be compared to cataloged individuals in MIPS, as well as to distinctive but unknown individuals observed previously in southwestern Florida. The slides of all unidentified distinctive manatees will also be temporarily given to photo-ID staff at Florida Marine Research Institute to search for matches with individuals that they may have documented. Individuals not recognized as being previously identified will be grouped into one of three categories:

- Indistinct - Manatees with no readily identifiable scars or natural markings;
- Distinct Unknown (DU) - Manatees with visible scars or natural markings, but which were either not photographed in their entirety or photographs were not of
adequate quality to allow for verifiable resightings. These distinct unknowns may represent incomplete photographs of previously sighted animals, but others may be unique individuals;

- Distinct Known - Manatees with readily recognizable, permanent scars or natural markings. These animals have adequate photographic documentation to be considered for inclusion into the MIPS catalog.

Results:

We completed 122 surveys of 15 sites during 61 field days from 17 October 2002 to 9 May 2003 (Table 1). To date, we have identified 111 previously known individuals (94 cataloged and 17 DUs), which were documented 346 times (Table 2). Seventy-seven of the known manatees were observed on multiple occasions (range: 1-11 observations/individual). Twenty-one of the known individuals were documented at both Matlacha and at or near the FPL Ft. Myers power plant this winter. Two cataloged manatees were documented during the winter and then later in Sarasota Bay during the non-winter. All 111 of the known individuals had been previously identified in southwestern Florida or elsewhere along Florida’s west coast prior to this year. Sighting histories of these previously documented manatees date back 1-20 years.

Total counts of manatees were highest following cold fronts, with the highest estimated counts being at Manatee Park during these periods (maximum count: 140 on 20 January 2003; Table 1). Lengthy periods of cold during January caused water temperatures outside winter refugia to remain below 18°C for most of the month, with averages in the upper Caloosahatchee River and Matlacha Pass of 16.5°C and 15.9°C, respectively. Water temperatures within Matlacha Isles also decreased by the end of January, causing most of the manatees to leave this
site (Table 1). As water temperatures increased in February, counts in Manatee Park and Orange River decreased, while those in Matlacha Isles increased. The high count in Matlacha Isles was 70-80 in site 1 on 14 February 2003.

Discussion:

Photo-identification surveys of manatees in southwestern Florida documented many previously recognized as well as several new, formerly unidentified individuals during the 2002-2003 contract period. We documented distinct manatees in all major areas surveyed. Although slide analyses have not been completed yet, we have made considerable progress and have identified at least 111 previously known individuals to date. Also, by covering multiple sites, we have documented movement between sites during the winter and non-winter.

Acknowledgements:

We would like to thank the numerous Mote Marine Laboratory (MML) college student interns for providing instrumental assistance with fieldwork and data collection. M. and P. Gaidient, Manatee World, and Burnt Store Marina provided boat slips and ramp access, respectively.

Literature Cited:


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Table 2. Known individuals documented during photographic identification surveys in southwestern Florida, 17 October 2002–9 May 2003.

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Figure 2. Locations of photographic identification surveys in Sarasota Bay, 31 January–9 May 2003.
Table 1. Summary of photographic identification surveys conducted in southwestern Florida, 17 October 2002 - 9 May 2003.

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Figure 2. Locations of photographic identification surveys in Sarasota Bay, 31 January 2003–9 May 2003.
Part II: Aerial Surveys

Introduction:

Aerial surveys have been used by scientists and managers involved in manatee research and conservation in a number of ways. Repeated aerial surveys that are conducted consistently over long periods of time can provide data that permit trends in numbers of manatees to be assessed (e.g., Garrott et al., 1994, 1995; Craig et al., 1997; Craig and Reynolds 2002). More commonly, aerial surveys provide a means by which to assess habitat use patterns of manatees (e.g., Wright et al., 2002). The surveys described here were conducted for three primary reasons: a) to provide better insights into high use habitats for manatees in parts of the Caloosahatchee River and Charlotte Harbor in winter; b) to provide enhanced documentation of the numbers of manatees that are present at various locations in southwestern Florida in winter; and c) to provide better real-time information on manatee numbers and distribution to law enforcement officers in southwestern Florida. The information was provided, not simply as a courtesy to keep people informed, but also particularly so that law enforcement personnel would be aware of locations and times when manatees were aggregated and perhaps especially vulnerable to collisions with watercraft.

Methods:

Aerial surveys were conducted using the intensive search method (Packard et al., 1989; Reynolds and Wilcox 1994) from a high-winged Cessna 172 aircraft. Altitude and air speed were approximately 152 meters (500 feet) and 167 kilometers/hour (90 knots), respectively. Prior to surveys being conducted, the following entities were notified by telephone of the date
and approximate time of the survey and the call sign of the aircraft: Florida Power & light Company security staff; Lee County Sheriff’s Office; and the air traffic control personnel at Southwest Regional Airport and Page Field.

During especially cold weather, Reynolds flew surveys of the Ft. Myers power plant and Matlacha Isles, the two primary locations where manatees aggregate when temperatures are low. The area that was surveyed around the plant included the Caloosahatchee River between Franklin Locks and the Rt. 41 bridge. Three other surveys of the entire Caloosahatchee River (west of Franklin Locks) and southeastern Charlotte Harbor were flown during less cold times. Four planned surveys were cancelled due to windy conditions. Survey dates appear in Table 1.

We intended to conduct approximately 10 surveys. Because of the extremely cold winter temperatures, five surveys were conducted under the auspices of a grant from Florida Power & light Company. As noted, three additional surveys were done and several others cancelled due to weather. Thus, eight surveys were conducted of the area of concern, even though state funds were used for only three. This allowed more funding to be focused on the intensive photo-identification efforts described earlier in this report.

Counts and locations of sightings were communicated after each survey to a variety of individuals, including officers from the FWC, Division of Law Enforcement who are responsible for waterways in Lee and Charlotte Counties, managers with the FWC Bureau of Protected Species Management, personnel in the Environmental Services Department of Florida Power & Light Company, and scientists at the Florida Marine Research Institute.
Results:

Aerial survey results from the Caloosahatchee River are biased by the very poor water clarity there. On most surveys and in most locations, manatees are extremely difficult to detect if they are more than a few centimeters below the surface. Visibility generally improves in the waters of Matlacha Pass and San Carlos Bay, but some other locations where manatee aggregate (e.g., Matlacha Isles and Burnt Store Marina) have turbid water that reduces visibility considerably.

Counts obtained during the surveys appear in Table 1. On the coldest dates, manatees were aggregated in large numbers at the Ft. Myers power plant. As weather moderated, manatees were less abundant near the plant and more abundant elsewhere. The aggregate sighting data for all surveys are represented in Figure 1.

Discussion:

January, 2003, was one of the coldest January’s on record in Florida. Such weather induces manatees to aggregate at warm-water refugia and induces high counts of manatees at such locations (see Reynolds and Wilcox 1994; Reynolds 2003). The counts at the power plant were predictably high (with the highest count of 343 occurring on 21 January), but fell considerably short of the highest counts of over 430 manatees at that plant in a couple previous winters (Reynolds 2003). Even though numbers of manatees using the plant discharge were not as high as in several previous winters, a high percentage of the manatees at the plant were calves, perpetuating a trend for this plant to provide important shelter from cold for females and calves (e.g., see Reynolds and Wilcox 1994).
The reasons for the less-than-record counts at the plant are not known, but may reflect the following (or other) possibilities: a) the likely decline in the numbers of manatees present in southwestern Florida (Langtimm et al., 2002); or b) that many manatees simply sought refuge from cold in other locations in winter, 2002-2003. Given the difficulties in obtaining an accurate count of manatees at the plant, to better document manatee numbers and trends we hope to start intensive “calibration surveys” similar in purpose to those done at the Tampa Electric Company’s Apollo Beach plant (see Edwards et al., 2002).

The general trend we observed is for most manatees to be found at the power plant on the coldest days, and for locations other than the plant to be occupied by more manatees on less cold days. Even on the coldest days of a very cold winter, Matlacha Isles was used by at least a few manatees. Through past contracts with the State, Mote Marine Laboratory scientists have demonstrated the importance of Matlacha Isles as a secondary warm-water refuge for manatees.

Other locations in the area may be less important as warm-water refugia, but they clearly serve as important locations for manatees to use between cold periods and during the rest of the year. Given the relative lack of vegetation in the area of the power plant and in much of the Caloosahatchee River, San Carlos Bay seems to be an especially important location as a place for manatees that have fasted during cold periods to forage.

The Caloosahatchee River itself is extremely difficult to survey for manatees. The fact that we observe few animals there is primarily an artifact of poor visibility, we believe, rather than lack of manatees. The river is an important travel corridor for manatees that use the power plant discharge as a source of warm water in winter, but use other locations to forage or for other activities. In addition, manatees are present (albeit in reduced, but undetermined numbers relative to winter) in the river year-round.
Feedback we received from Captain Denis Grealish of the FWC Division of Law Enforcement indicates that our efforts to provide close to real-time feedback on manatee locations and numbers was greatly appreciated by the enforcement officers who strive to protect manatees in the Caloosahatchee River area. Since Lee County continues to be an area where watercraft-related mortality of manatees is high (Ackerman et al., 1995; Florida Marine Research Institute, unpublished), the officers are anxious to acquire any help they can to focus their protection efforts. In that regard, aerial surveys can provide some useful information, but other census or detection methods may ultimately prove much better. Interestingly, watercraft-related mortality of manatees in Lee County was lower in 2002 than in recent years.

Literature Cited:


List of Tables:

Table 1. Dates and results of surveys during winter, 2002-2003. The numbers represent the total count for a particular location, with the number of calves in parentheses. Where no count is reported, the area was not surveyed on a particular date. The survey dates marked with an asterisk were done on especially cold days and were supported by Florida Power & Light Company. In addition to the surveys flown, four others were cancelled in February and March due to windy conditions. Note that the counts indicated for “Power Plant” below include manatees observed in the Caloosahatchee River near the plant (see details in Reynolds 2003).

List of Figures:

Figure 1. Map showing aggregate counts for all surveys. Within the survey area, the primary locations used by manatees are Matlacha Isles and the Ft. Myers power plant.
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Figure 1. Map showing aggregate counts for all surveys. Within the survey area, the primary locations used by manatees are Matlacha Isles and the Ft. Myers power plant.