

MANATEE PHOTO-IDENTIFICATION PROJECT

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28INTRODUCTION

Photo-identification (photo-ID) studies of Florida manatees (*Trichechus manatus latirostris*) 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; Langtimm et al. 2004). 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 2002) 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, where concerns are especially strong about the status of the resident subpopulation (U.S. Fish and Wildlife Service 2001; Langtimm et al. 2004).

Prior to 1996, the scar catalog for southwestern Florida (south of Sarasota Bay) was both incomplete and considered outdated. Fifty-seven manatees observed in the Ft. Myers area were incorporated into the statewide computerized scar catalog, the Manatee Individual Photo-Identification System (MIPS), during the 1980s (Beck and Reid 1995), but regular surveys had not been conducted for the several years following. During the summer of 1993, Mote Marine Laboratory (MML) began regular photo-identification surveys of the manatees in and near Sarasota Bay. Additionally, during the winter of 1996-1997, MML began regular photo-identification surveys south of the Sarasota Bay area to update and expand the scar catalog in the southwestern region of Florida. Staff at the Florida Fish and Wildlife Conservation Commission's Fish and Wildlife Research Institute (FWRI) also increased its 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 such analyses had not been done (Langtimm et al. 1998). Although data collected through winter 2001-2002 were recently used by Langtimm et al. (2004) to calculate the first adult survival estimates for the sSouthwest subpopulation, it is important to continue photo-identification studies in order to update the annual survival estimates and monitor trends (U.S. Fish and Wildlife Service 2001).

Manatee photo-identification surveys were conducted in Charlotte, Lee, and Sarasota counties 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. Additionally, data collected at the primary are being used as part of another collaborative study with U.S. Geological Survey Sirenia Project and FWRI to develop models to predict when and how manatees use winter refugia.

Funding from the National Fish and Wildlife Foundation (NFWF) was sought to expand MML photo-identification efforts of key areas of southwestern Florida; without such funding, survey efforts and analyses would have been incomplete, which would have reduced confidence in assessments of adult survival rates and status determinations. During the contract period (fall 2004 through summer 2005), NFWF provided funds that allowed photo-identification efforts (field work; photo-analysis in the laboratory; and contributions of images to the statewide MIPS database) to be expanded by approximately 32% over normal, thereby providing much greater effort and more complete results.

METHODS

Photographic identification surveys of manatees were conducted from fall 2004 to summer 2005 in three areas of southwestern Florida: 1) Charlotte County (Figure 1), 2) Lee County (Figure 1), and 3) Sarasota County (Figure 2). Survey teams worked from either 6-7 meter outboard motorboats with observation towers and propeller guards, shorelines, bridges, or docks. Electric trolling motors were used on all boats to minimize disturbance to the manatees. The primary observer operated a Canon EOS 10D or EOS 20D digital camera with 6.3 and 8.20 megapixel resolution and fitted with a 75-300 mm zoom lens with a polarizing filter. All images were taken in raw format with embedded jpegs. 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 km² 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 (USGS) and FWRI. We noted the gender of individuals when either the ventrum or a nursing calf was observed. We also recorded environmental data, such as weather, water and air temperatures, salinity, wind direction and speed, and photo conditions.

Additional bottom water temperatures were collected at specific sites in Charlotte and Lee counties from fall 2004 to spring 2005 at one-hour intervals using Optic StowAway Temp data

loggers (Onset Computer Corporation). Water temperature loggers were attached to the ends of residential docks or to channel markers. The water temperature loggers were housed in casings made of PVC with multiple holes and covered with antifouling paint. The design of the casings allowed ample water flow to reach the loggers, while protecting them from biofouling. Each logger and casing was cleaned and data from each logger were downloaded approximately once per month. Daily average temperatures were calculated and graphed for each site.

Sighting data and images are processed and analyzed using methods established by MIPS partners (USGS, FWRI, and MML) and similar photo-identification research projects (Beck and Reid 1995; Koelsch 1997; Koelsch and Barton 1999). The collaborative switch to digital photography during this contract period provided the opportunity for MIPS partners to establish standardized protocols and methodology. All photographic images were taken in raw format (for archiving) with embedded jpegs (for data processing and analyses). Images are downloaded from the cameras onto the computer with Downloader Pro software and embedded jpegs are extracted via BreezeBrowser Pro software. Each photographic image has a raw, jpeg, and thumbnail image that is subsequently burned onto DVDs for archival purposes. IMatch software is being used for labeling, sorting, and matching images to known and unknown individuals within and between seasons.

Distinctive individuals that were photographically documented all have sketches drawn of their scars, mutilations, and/or other features to facilitate making matches between days and with previously known individuals. All distinctive manatees are compared to cataloged individuals in MIPS, as well as to distinctive but unknown individuals observed previously in southwestern Florida and elsewhere around the state. Images are also being exchanged with MIPS partners to

further search for matches with individuals that they may have documented. Individual manatees not recognized as being previously identified are 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 the animals which are either not photographed in their entirety or photographs are 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.

Upon completion of slide analyses, all sighting data are ultimately combined with data from FWRI and Sirenia Project in MIPS, as well as entered into MML-specific databases compatible with MIPS.

RESULTS

We completed 353 surveys of over 40 specific sites during 85 field days from 6 October 2004 to 31 July 2005 (Table 1); recall that approximately 1/3 of all effort was supported by NFWF through grant 1999-0273-001. The Florida Fish and Wildlife Conservation Commission, Florida Power & Light Company, and Sarasota County also provided partial funding in order to provide adequate survey effort. In total, over 12,000 digital photographic images were taken of distinctive manatees during the contract period. Each of the images taken through April 2005 has had all of its initial metadata (data specific to each image, which include date, location of sighting, photographer, sighting time, animal's field ID, size class, and reproductive status) entered into the IMatch properties field. Slide analyses are underway, but due to the extremely time consuming processes of entering image metadata, analyzing the images, and searching for matches, slide analyses are still incomplete at this time.

From late fall to early spring (November through April), survey efforts focused on sites near two winter refugia in Lee County (Figure 1). The primary winter refuge in Lee County is at and near the Florida Power & Light Company's Ft. Myers power plant, and includes the plant's discharge canal, Manatee Park, and the Orange River. A secondary refuge in southwestern Florida is at the Matlacha Isles canal system. Total counts of manatees were highest following cold fronts, with the highest estimated counts being at Manatee Park during these periods (maximum count: 113 on 27 December 2005; Table 1). Cold fronts during mid- to late December caused water temperatures outside the Orange River to remain below 18⁰C for most of this period, whereas

temperatures within the Orange River averaged above 21⁰C (Figure 3). Daily average water temperatures were lowest on 16 and 28 December 2004, with each having daily averages of 13.9⁰C in Matlacha Pass. Additional cold fronts in late January also caused water temperatures outside of the Orange River to drop below 18⁰C again for several days in a row. Not surprisingly, most of the manatees sighted during these colder periods were at Manatee Park/Orange River (Table 1), whose waters are heated by the effluent of the FPL Ft. Myers power plant and average >4⁰C higher than those of other sites (Table 2).

During the periods between cold fronts, counts in Manatee Park/Orange River decreased (Table 1), indicating that many of those manatees may have dispersed. Total counts of manatees in survey sites outside Manatee Park/Orange River increased during these times. The highest total count during photo-identification surveys in Matlacha Isles was 67-76 on 22 February 2005. As water temperatures continued to increase in the spring, manatees relied less on the refugia and became more dispersed throughout the region.

During the warmer months, survey effort was focused on the estuarine and coastal waters of Sarasota County (Figure 2), particularly those within close proximity of Mote Marine Laboratory (i.e., Pansy Bayou and City Island Grassflats). Due to the dispersion of manatees in warmer months, photo-identification sites are more numerous and manatee counts are typically on the order of a few to no more than 10 animals. The average maximum number of manatees observed per sighting from April to July 2005 was 5.6. Groups with maximum counts greater than 10 animals were observed in Roberts Bay, Pansy Bayou, and marinas along the bayside of

Longboat Key (maximum count: 18 manatees on 21 October 2004 in Pansy Bayou; Table 1). At least 2 of these sightings were of mating herds.

In Sarasota County, manatees frequently use protected areas such as Pansy Bayou, CIGF, Buttonwood Harbor, Hudson Bayou, and northern Roberts Bay during the summer months. The spring and summer of 2005 were an exception due to prolonged and re-occurring red tide events. Red tide blooms were more severe in the northern portions of Sarasota County (northern Sarasota Bay to Siesta Key), with the greatest intensity occurring mid-summer (Florida Fish and Wildlife Conservation Commission 2005). Manatees were documented during the spring in all of the locations regularly surveyed. Sightings in June and July, however, were lower than usual for this time of year at sites such as Pansy Bayou, CIGF, and Buttonwood Harbor. Aerial survey data (supported by grants from the Fish and Wildlife Conservation Commission and Sarasota County) indicate a possible shift of manatees to the southern portions of Sarasota County during these months (MML unpublished data). A re-distribution of manatees away from these northerly locations hampered our photo-identification efforts, resulting in fewer sightings than occurs in most years.

In 2005, Mote Marine Laboratory staff began a focused effort to provide all images and accompanying metadata to MIPS partners to facilitate creation of a central photo catalog (plus attendant data) of all recognizable manatees. As a result, approximately 39,000 of MML's slides have been scanned and saved as high-resolution digital images, which have been provided to MIPS partners, along with the metadata for each image.

DISCUSSION

Photo-identification surveys of manatees in the southwestern region of Florida documented distinctive manatees at all but three survey sites. Sighting data collected during this study are incorporated with those from Sirenia Project and FWRI, to update, expand, and improve the collaborative statewide scar catalog (MIPS), establish sighting histories for new distinct individuals, calculate annual adult manatee survival estimates, and develop models to predict when and how manatees use winter refugia.

Analyses of photographic images documenting distinct individuals are under way; however, the process is time consuming, and thus analyses are incomplete. At this time, sightings of individual manatees recorded during the contract period and their movement patterns cannot be discussed due to the incompleteness of photo analyses. The MIPS partners previously agreed to transfer all existing photographic slides to digital format, in order to keep up with technology and ease data exchange. Non-fieldwork activities have focused extensively in 2005 on preparing MML's original slides for scanning (which entails thoroughly checking each slide and corresponding datasheet for accuracy, and at a minimum that each have the roll identifier and exposure number, date, location, and photographer), which has slowed progress in processing new images. As a result, though, the partners now have 39,000 digital images (plus associated metadata) of manatees from MML's catalog. Once all of the MIPS partners have completed this process for all of their images, each of the partners will be better able to search the entire state for matches, and thus greatly improve the utility of the MIPS database to assess manatee movements, survival, reproduction rates, population trends and other critical aspects of manatee biology.

Conservation benefits:

The long-term maintenance and expansion of statewide photo-identification efforts of Florida manatees is of considerable importance for estimating population trends. The National Fish and Wildlife Foundation and other organizations and agencies have funded collaborative efforts of USGS Sirenia Project, FWC Fish and Wildlife Research Institute, Mote Marine Laboratory Manatee Research Program staff, and others. These efforts have contributed to development of adult survival estimates for Florida manatees, as well as to providing insights on critical aspects of manatee life history attributes and movement patterns. Continued efforts are crucial in order to annually update these estimates and other population trends.

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