Aquatic Mammals 2010, *36*(2), 148-153, DOI 10.1578/AM.36.2.2010.148

First Report of a Florida Manatee (*Trichechus manatus latirostris*) in Cuba

Anmari Alvarez-Alemán,[1] Cathy A. Beck,[2] and James A. Powell[3]

[1]*Centro de Investigaciones Marinas, Universidad de La Habana, Calle 16 #114 e/1ra y 3ra, Playa, Ciudad de La Habana, Cuba*
[2]*U.S. Geological Survey, Southeast Ecological Science Center, Sirenia Project, 2201 NW 40th Terrace, Gainesville, FL 32605-3574, USA; E-mail: cbeck@usgs.gov*
[3]*Sea to Shore Alliance, 4411 Bee Ridge Road #490, Sarasota, FL 34233-2514, USA*

Abstract

Manatees (*Trichechus manatus latirostris*) in Florida utilize intake and effluent canals of power plants as resting and thermoregulatory habitat. We report the use of a power plant canal in Cuba by a known Florida manatee, the first documented case of movement by a manatee between Florida and Cuba. In January, February, and April 2007, two manatees (mother and calf) were reported entering a power plant canal in north Havana, Cuba. The larger manatee had several distinctive scars which were photographed. Digital images were matched to a previously known Florida manatee (CR131) with a sighting history dating from December 1979 to July 2006. Exchanges of individuals between Florida and Cuba may have important genetic implications, particularly since there appears to be little genetic exchange between the Florida manatee subspecies with populations of the Antillean manatee subspecies (*T. m. manatus*) in Puerto Rico and the Dominican Republic.

Key Words: Florida manatee, *Trichechus manatus*, migration, photo-identification, power plant, Cuba

Introduction

Two subspecies of the West Indian manatee, the Antillean manatee (*Trichechus manatus manatus*) and the Florida manatee (*T. m. latirostris*), are distinguishable with a high degree of genetic reliability (Kellogg et al., 2008) and by quantitative cranial morphologic characters (Domning & Hayek, 1986). The subspecific distinction between these two populations may lie in restricted gene flow due to the strong currents and deep channel of the Straits of Florida, which may keep Florida manatees geographically and, therefore, reproductively isolated from those in the remainder of the species range.

The Antillean manatee ranges along the coasts of Mexico, Central America, and South America and may reach as far south as Recife, Brazil; this subspecies is also found in the Greater Antilles, including Cuba, Jamaica, Hispaniola, and Puerto Rico (Lefebvre et al., 2001; Powell, 2002). The Florida manatee is found primarily in Florida, but it occasionally ventures as far north as Virginia (Reid et al., 1991; Deutsch et al., 2003), and, rarely, further north to Massachusetts (U.S. Geological Survey [USGS], 2010). Along the Gulf of Mexico, Florida manatees may be found as far west as Texas (Fertl et al., 2005). Waifs are also known to reach the Bahamas (Lefebvre et al., 2001), and Reynolds & Ferguson (1984) reported a sighting of two manatees of unknown origin 61 km northeast of the Dry Tortugas in the Gulf of Mexico.

A difference commonly reported between the subspecies is the larger size of Florida manatees compared to Antillean manatees (Rommel & Caplan, 2003). Smaller manatees have a less favorable surface area-to-volume ratio and are apparently incapable of elevating resting metabolic rate in cold waters (O'Shea & Reep, 1990; Worthy et al., 2000). Due to cooler water temperatures during winter, Florida manatees frequent the warmer-than-ambient waters of springs and industrial effluents, with a large percentage of the population reliant on warm water emanating from power plants (Laist & Reynolds, 2005). These artificial sources of warm water can harbor more than 300 manatees during extremely cold weather (Reynolds & Wilcox, 1994; Powell, 2002; Laist & Reynolds, 2005). In Cuba, cooler weather is short in duration and not extreme. For this reason, the cold-related energetic demands on manatees are minimal, and manatees may not be so dependent on warm water refugia for survival in Cuba or elsewhere in the Caribbean. This is the first report of manatee use of a power plant canal in Cuba and the first documented case of movement by manatees from Florida to Cuba.

Materials and Methods

The Center for Marine Research (CMR), University of Havana, has ongoing research activities focused on manatees in Cuba. As part of those research activities, the CMR collects data on manatee sightings along the Cuban coast. In Florida, the USGS Southeast Ecological Science Center's Sirenia Project has maintained a long-term research program on manatees and shares responsibility with state and private partners for maintaining a computer database on individually identifiable Florida manatees—the Manatee Individual Photo-identification System (MIPS). The MIPS uses photo-identification of scars, mutilations, or other marks to identify individual manatees (Beck & Reid, 1995). Submitted photographs of manatees are scrutinized by multiple evaluators using strict criteria to make positive matches of individual manatees. Currently, there are over 2,200 distinct individual manatees from the southeastern United States in the MIPS database.

On 18 January 2007, a call was received by CMR reporting two manatees in the intake canal at the Camilo Cienfuegos Power Plant located in Santa Cruz del Norte village (23° 09' 28.44" N; 81° 55' 41.52" W), 60 km east of Havana City, Cuba (Figure 1). The power plant has two canals: an intake canal where ocean water enters to cool the turbines and another shorter discharge canal where warm water from plant operations flows back into the sea. Manatees are prevented from entering the discharge canal at this power plant by a spillover dam. The intake canal is 30 m wide and almost one km long. Where the intake enters the plant, fresh water sometimes flows into the canal from a 30-cm diameter pipe when the plant equipment is being cleaned. At the time of the sighting, water temperature at the inland portion of the intake was 29.4° C, and salinity was 28 ppt, which is lower and warmer than the ocean water (36 ppt, 27° C) at the mouth of the canal. The depth of the intake varies between 1 and 10 m; the benthos is comprised of sand and rocks, and lacks seagrasses, although the shore is lined with sparse vegetation. The coastal habitat near the mouth of the canal is rocky with seagrass beds dominated by *Thalassia testudinum* mixed with *Syringodium filiforme*.

When CMR staff arrived on-site, two manatees were sighted at the end of the intake canal, within 2 m of shore. Employees of the plant reported that the manatees were first observed in the canal the previous night and speculated that they had entered the canal seeking refuge from exceptionally rough seas. After 2 h of observation, CMR staff left the site; plant personnel reported that these two manatees did not leave the canal until midday on 19 February. The larger manatee had several scars which appeared to be caused by

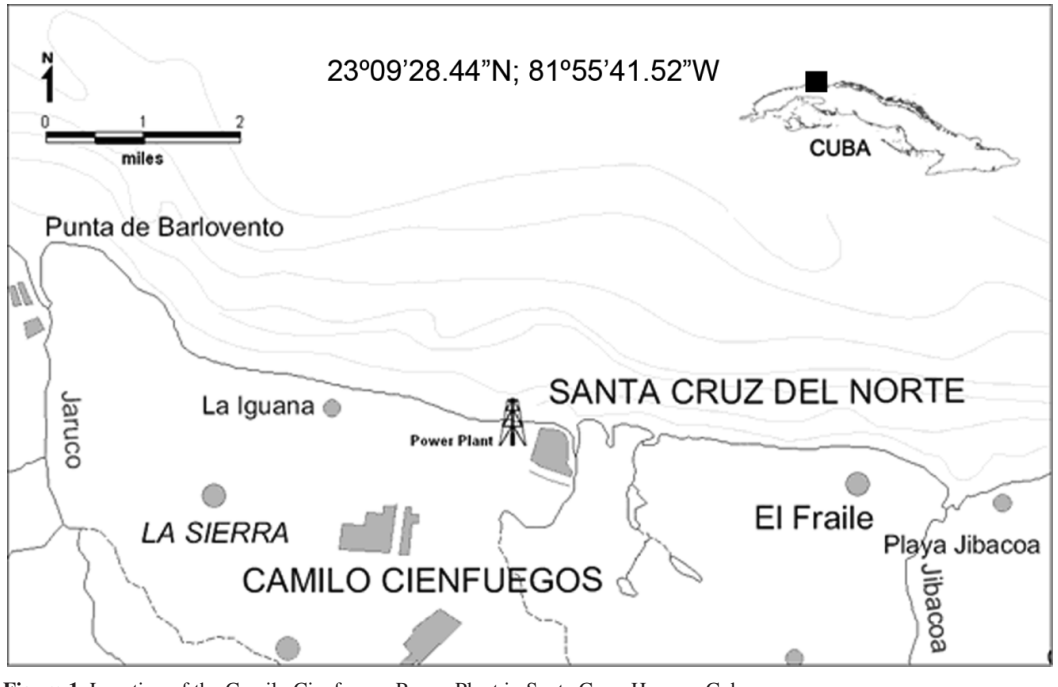

Figure 1. Location of the Camilo Cienfuegos Power Plant in Santa Cruz, Havana, Cuba

multiple collisions with boat propellers. One set of scars could be seen on the left side of the body and another set could be seen on the tail (Figure 2). The smaller animal had no apparent scars or mutilations. Both individuals appeared to be in good health.

On 3 February 2007, an employee from the plant called CMR again to report that the manatee pair had returned to the intake canal. Photographs and video taken at the plant on 3 February allowed CMR staff to confirm that the two were the same pair seen on 18 January. On 5 April 2007, the pair was again reported in the canal and photo-documented before they moved from the mouth of the canal to the west. Digital images of the pair were shared with U.S. colleagues (JP and CB) for comparison with the MIPS database.

Results

Based on close association between the two manatees, observed nursing behavior, and relative sizes, the pair was classified as a cow-calf pair. Using MIPS matching and validation criteria (Beck & Reid, 1995), a positive identification of the larger manatee was made to a previously known female Florida manatee (CR131) (Figure 2). CR131 was first photographed in Crystal River on the northwest coast of Florida by one of the authors (JP) in December 1979. The last documented Florida sightings of this female were in Crystal River on 22 January 2005, then in the Wakulla River, further to the north, on 4 July 2006, with a small calf. Based on the photographic documentation from January 2005 and July 2006, the overall body condition of CR131 appeared to be good. When seen in Cuba, the calf was estimated to be about 1.5 to 2 m long or between 6 to 9 mo old, based on size-age ratios of Florida manatee neonates (Marmontel et al., 1996). Judging by the relative size differences of the calf between the July 2006 and January 2007 sightings, it was assumed that these sightings were of the same calf that CR131 traveled with from Florida to Cuba.

Discussion

When first sighted in 1979, CR131 was considered an adult, making her current age more than 30 y. During the span from 1979 to 2005, CR131 had a consistent winter sighting record in northwestern Florida, including the spring-fed warm waters of the Crystal and Homosassa rivers. During the summers of 2001 and 2003, she was documented in the Wakulla River in Florida's panhandle region in the northeastern Gulf of Mexico. Her last known sighting in Florida was on 4 July 2006 when she was photographed again in the Wakulla River.

Figure 2. Propeller scar patterns visible on the upper left flank and tail of manatee CR131 photographed at the Camilo Cienfuegos Power Plant, Cuba, January 2007 (A) (O. González, CMR); and at Crystal River, Florida, December 1997 (B) and December 1992 (C) (R. K. Bonde, USGS, Sirenia Project)

It is uncertain whether CR131 swam to Cuba deliberately, a distance of approximately 700 km from her known winter habitat; was accidentally displaced; or moved with the currents from the Gulf of Mexico, fortuitously reaching

Cuba. In the United States, selection pressure on a manatee's ability to find and move to warm waters during winter cold periods is strong (Reynolds & Wilcox, 1994). Seasonal migratory patterns in the Florida subspecies are well-recognized, with manatees generally moving south for the winter and returning north for the non-winter months or moving into natural or artificial sources of warm water during cooler periods and away during warmer months (Powell & Rathbun, 1984; Deutsch et al., 2003). Resightings of distinctively scarred manatees through the use of photo-identification techniques confirm that some individuals make long-distance migratory journeys along the Atlantic coast (Langtimm et al., 2004). Deutsch et al. (2003) ascertained that 12% of the tagged manatees made seasonal migrations of over 400 km along the Atlantic coast, but movements across the Florida Straits to Cuba until now were unknown. The distance between Florida and Cuba is short enough to make the passage plausible; it is only the presence of deep water that reduces the likelihood of such movements becoming commonplace.

Local air temperature at the time of the Cuban sighting on 18 January 2007 was 24.6° C, comparable to a spring temperature in this manatee's known range in northwest Florida. Deutsch et al. (2003) noted that manatees may move to a warm water source in response to a drop in either air or water temperatures. Hartman (1979) ascertained that manatees will seek warm water if water temperatures drop below about 18° C. Manatees in Florida sometimes seek deep canals as passive, warm water sanctuaries created by thermal heating. The intake canal at the Cuban plant where the cow-calf pair was seen, however, has a steady current from the sea created by suction pumps used to circulate water through the machinery, resulting in a mixture of sea water and sporadic amounts of fresh water from runoff and maintenance operations. The current would tend to mix water and reduce warming.

Manatees also seek sources of fresh water, and in Florida are sometimes seen drinking fresh water directly from freshwater hoses and pipes (Reep & Bonde, 2006). The canal where the manatees were seen has a freshwater discharge pipe, which perhaps attracted these individuals. Alternatively, the rough sea conditions on 17 January 2007, as the power plant employee suggests, could have caused the manatees to seek refuge in the protected canal. Manatees in Florida are frequently found in canals associated with power plants. Powell et al. (1981) noted that where manatees primarily frequent the coastal areas in Puerto Rico, they require sheltered waters as well as access to fresh water and food. The canal at the Cuban power plant satisfies all three conditions. This female, after crossing deep oceanic water and arriving at the high energy northern coast of Cuba, may have found familiar, as well as protected, habitat inside this canal.

Conversations with local people indicated that manatees often enter the river mouth in Santa Cruz town, about 1.5 km east of the power plant. It is possible that CR131 and her calf were able to find suitable habitat not far from the plant, explaining why they have not reappeared at this site, or elsewhere in Cuba or Florida, since April 2007. Power plant personnel reported that manatees have been seen in the intake canal previously, but no photographic documentation exists.

Manatees are protected by law in Cuba (Decree 164, Article 51.a) and in the U.S. (the Endangered Species Act of 1973 and the Marine Mammal Protection Act of 1972). Manatees are considered endangered in both countries, but little is known about the status of the species in Cuba. In Florida, existing population information is considered inadequate (U.S. Fish & Wildlife Service, 2007). Exchanges of individuals between these two populations may have important genetic implications, particularly since current genetic information suggests that there has been little reproductive exchange between the Florida subspecies and the Antillean subspecific populations in the Caribbean such as Puerto Rico and the Dominican Republic (García-Rodríguez et al., 1998; Vianna et al., 2006; Kellogg et al., 2008). Information on population genetics of manatees in Cuba is currently lacking, but the CMR is working toward acquiring and analyzing tissue samples for genetic comparisons.

Based on preliminary observations and surveys, the northern coast of Cuba with its extensive lagoons and sheltered waters appears to be excellent habitat for manatees. Manatee sightings by fishermen and others working on the water are not uncommon, but the species faces numerous threats from incidental catch in fishing gear, opportunistic hunting, and modification of habitat. Manatee research, awareness, and conservation actions continue to grow and strengthen in Cuba. Through these initiatives and new ones, it is hoped that the future for manatees in Cuba may be secured for future generations.

Acknowledgments

Many thanks to the power plant staff who informed us quickly of each manatee sighting, enabling us to collect the data for this paper. We are very grateful to Oyaima Gonzalez-Ontivero, Reinaldo Estrada, and Robert Bonde who contributed the manatee pictures. We also wish to thank the townspeople of Santa Cruz who gave us information regarding

other manatee reports in this region. Amy Teague and Gaia Meigs-Friend verified the match of CR131 and searched thousands of images for additional photographic documentation from 2005 through 2007. Kari Rood and Sheri Barton reviewed manatee photographic records from southwest Florida for a match to CR131 as well. We are appreciative for their close scrutiny of so many images. We thank the Liz Claiborne and Art Ortenberg Foundation and the John D. and Catherine T. MacArthur Foundation for supporting the manatee conservation work in the Caribbean, and R. K. Bonde, J. Gregg, and three anonymous reviewers who provided very helpful comments to improve this manuscript.

Literature Cited

Beck, C. A., & Reid, J. P. (1995). An automated photo-identification catalog for studies of the life history of the Florida manatee. In T. J. O'Shea, B. B. Ackerman, & H. F. Percival (Eds.), *Population biology of the Florida manatee (*Trichechus manatus latirostris*)* (Information and Technology Report) (pp. 120-134). Washington, DC: National Biological Service.

Deutsch, C. J., Reid, J. P., Bonde, R. K., Easton, D. E., Kochman, H. I., & O'Shea, T. J. (2003). Seasonal movements, migratory behavior and site fidelity of West Indian manatees along the Atlantic coast of the United States. *Journal of Wildlife Management*, *67*, 1-77.

Domning, D. P., & Hayek, L-A. C. (1986). Interspecific and intraspecific morphological variation in manatees (SIRENIA: *Trichechus*). *Marine Mammal Science*, *2*, 87-144. doi: 10.1111/j.1748-7692.1986.tb00034

Fertl, D., Schiro, A. J., Regan, G. T., Beck, C. A., Adimey, N., Price-May, L., et al. (2005). Manatee occurrence in the northern Gulf of Mexico, West of Florida. *Gulf and Caribbean Research*, *17*, 69-94.

Garcia-Rodriguez, A. I., Bowen, B. W., Domning, D. P., Mignucci-Giannoni, A. A., Marmontel, M., Montoya-Ospina, R. A., et al. (1998). Phylogeography of the West Indian manatee (*Trichechus manatus*): How many populations and how many taxa? *Molecular Ecology*, *7*, 1137-1149. doi: 10.1046/j.1365-294x.1998.00430

Hartman, D. S. (1979). *Ecology and behavior of the manatee (*Trichechus manatus*) in Florida*. Ithaca, NY: The American Society of Mammalogists.

Kellogg, M. E., Pause, K. C., Clark, A., Bonde, R. K., Mignucci-Giannoni, A. A., & McGuire, P. M. (2008, May). *Preliminary genetic comparisons of the Florida and Puerto Rico manatee populations.* Proceedings of the International Association of Aquatic Animal Medicine Conference, Rome, Italy.

Laist, D. W., & Reynolds III, J. E. (2005). Influence of power plants and other warm-water refuges on Florida manatees. *Marine Mammal Science*, *21*, 739-764. doi: 10.1111/j.1748-7692.2005.tb01263

Langtimm, C. A., Beck, C. A., Edwards, H. H., Fick-Child, K. J., Ackerman, B. B., Barton, S. L., et al. (2004). Survival estimates for Florida manatees from the photo-identification of individuals. *Marine Mammal Science*, *20*, 438-463. doi: 10.1111/j.1748-7692.2004.tb01171

Lefebvre, L. W., Marmontel, M., Reid, J. P., Rathbun, G. B., & Domning, D. P. (2001). Status and biogeography of the West Indian manatee. In C. A. Woods & F. E. Sergile (Eds.), *Biogeography of the West Indies* (2nd ed., pp. 425-474). Boca Raton, FL: CRC Press.

Marmontel, M., O'Shea, T. J., Kochman, H. I., & Humphrey, S. R. (1996). Age determination in manatees using growth-layer-group counts in bone. *Marine Mammal Science*, *12*, 54-88. doi: 10.1111/j.1748-7692.1996.tb00305.x

O'Shea, T. J., & Reep, R. L. (1990). Encephalization quotients and life-history traits in the Sirenia. *Journal of Mammalogy*, *71*, 534-543. doi: 10.2307/1381792

Powell, J. A. (2002). *Manatees: Natural history and conservation.* Vancouver, BC: Voyageur Press.

Powell, J. A., & Rathbun, G. B. (1984). Distribution and abundance of manatees along the northern coast of the Gulf of Mexico. *Northeast Gulf Science*, *7*, 1-28.

Powell, J. A., Belitsky, D., & Rathbun, G. B. (1981). Status of the West Indian manatee in Puerto Rico. *Journal of Mammalogy*, *62*, 642-646. doi: 10.1046/j.1469-7580.2003.00170

Reep, R. L., & Bonde, R. K. (2006). *The Florida manatee: Biology and conservation.* Gainesville: The University Press of Florida.

Reid, J. P., Rathbun, G. B., & Wilcox, J. R. (1991). Distribution patterns of individually identifiable West Indian manatees (*Trichechus manatus*) in Florida. *Marine Mammal Science*, *7*(2), 180-190. doi: 10.1111/j.1748-7692.1991.tb00564.x

Reynolds III, J. E., & Ferguson, J. C. (1984). Implications of the presence of manatees (*Trichechus manatus*) near the Dry Tortugas Islands. *Florida Scientist*, *47*, 187-189.

Reynolds III, J. E., & Wilcox, J. R. (1994). Observations of Florida manatees (*Trichechus manatus latirostris*) around selected power plants in winter. *Marine Mammal Science*, *10*, 163-177. doi: 10.1111/j.1748-7692.1994.tb00258

Rommel, S. A., & Caplan, H. (2003). Vascular adaptations for heat conservation in the tail of Florida manatees (*Trichechus manatus latirostris*). *Journal of Anatomy*, *202*, 343-353. doi: 10.1046/j.1469-7580.2003.00170

U.S. Fish and Wildlife Service. (2007). *5-year review: West Indian manatee*, Trichechus manatus. Jacksonville, FL: Author. Retrieved 28 April 2010 from www.fws.gov/northflorida/Manatee/2007%205-yr%20Review/Final-5-year-review-040907.htm.

U.S. Geological Survey (USGS). (2010, April 10). *Celebrity manatee survived Florida's harsh freeze.* Retrieved 28 April 2010 from www.usgs.gov/newsroom/article.asp?ID=2440.

Vianna, J. A., Bonde, R. K., Caballero, S., Giraldo, J. P., Lima, R. P., Clark, A., et al. (2006). Phylogeography, phylogeny and hybridization in trichechid sirenians: Implications for manatee conservation. *Molecular Ecology*, *15*, 433-447. doi: 10.1111/j.1365-294X.2005.02771

Worthy, G. A. J., Miculka, T. A., & Wright, S. D. (2000, August). Manatee response to cold: How cold is too cold? In U.S. Fish and Wildlife Service (Ed.), *Florida manatees and warm water: Proceedings of the warm-water workshop* (Section 3.1-6). Jupiter, FL: U.S. Fish and Wildlife Service.