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MANATEE OCCURRENCE IN THE NORTHERN GULF OF MEXICO, WEST OF FLORIDA

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ABSTRACT Reports of West Indian manatees (*Trichechus manatus*) in the US Gulf of Mexico west of Florida have increased during the last decade. We reviewed all available manatee sighting, capture, and carcass records ($n = 377$) from Alabama, Louisiana, Mississippi, and Texas since the early 1900s; only 40 of these were previously published. Manatees were reported most often in estuarine habitats, usually either near a freshwater source or natural or industrial warm-water springs/runoffs during winter months. The recent increase in manatee records may be due to a combination of increased public awareness and dispersal of manatees, most likely seasonal migrants from Florida. We caution that the presence of artificial warm-water sources outside of the manatee's traditional range may attract an increasing number of manatees and could increase the incidence of cold-related mortality in this region.

INTRODUCTION

The West Indian manatee (*Trichechus manatus*) occurs patchily along coastal areas throughout the Gulf of Mexico (GOM) and Caribbean Sea, the southeastern United States, and the northern and eastern waters of South America (Lefebvre et al. 2001). Historically, manatees were found along the entire GOM Coast from the Suwannee River in Florida to the Bay of Campeche, Mexico, and considered common in south Texas (Gunter 1941, Powell and Rathbun 1984, Lefebvre et al. 2001). Records of manatee sightings, carcasses, and captures west of Florida are limited, but have increased in recent years.

MATERIALS AND METHODS

All available historical and current (up to August 2004) sighting, carcass, and capture records (excluding archeological data) of manatees in the northern GOM, west of Florida were compiled for this report. Our goal was to provide a comprehensive document that included records collected from numerous widely scattered resources. Powell and Rathbun (1984) and Rathbun et al.

(1990) provided the most recent reviews of manatee records in this area. Resources used to provide new data included marine mammal stranding networks in each state west of Florida, current literature, as well as files of the Sirenia Project (US Geological Survey), Fish and Wildlife Research Institute (Florida Fish and Wildlife Conservation Commission [FWC]), and the US Fish and Wildlife Service [USFWS]. Since the occurrence data were compiled from a variety of sources, the precision and accuracy of the data also varied. We corrected any errors noted in published accounts. When only geographic descriptions were given, we determined coordinates as near as possible to the physical description. The locations with geographic coordinates were not assumed to be correct and were verified. If coordinates did not fit the description, the record was verified for accuracy and then moved as close to the original geographic description as possible. The October 2001 sighting of a manatee 144.8 km south of Mobile Bay in open water was excluded from Appendix I and any tabulations, since it was not attributable to any state waters. This sighting is included in the map, and information is presented in the discussion. Manatees are physically and behaviorally distinctive from all other marine mammals.

Therefore, species identification by the general public could usually be confirmed with a general description. Confirming multiple sightings of the same manatee or different animals is problematic, and unless a manatee has distinguishing marks (e.g., propeller scars), it is impossible to identify single individuals (Beck and Reid 1995).

RESULTS

We compiled 377 records from US waters west of Florida; these were 339 sightings, 30 carcasses, and 8 captures. Sighting and carcass records are presented in Appendices I and II, while captures are presented in the state summaries. Forty of the 377 records were previously published. Louisiana ($n = 147$) and Alabama ($n = 132$) accounted for the majority of the occurrence records (39% and 35%, respectively). All sighting, carcass, and capture records are plotted in Figure 1 along with major waterways and intermittent wetland habitat which serve as possible transit pathways for manatees.

Alabama

Alabama's records consisted of 128 sightings, 4 carcasses, and no captures (Appendices I, II, Figure 1). Two of these records were previously published. The years with the most records were 1995 (20 sightings), 2000 (23 sightings and 1 carcass), and 2002 (22 sightings and 1 carcass). June had the most information ($n = 29$). Sighting size varied from 1 to 11 manatees; single individuals were most frequent. Cow/calf pairs (including multiple pairs) made up 14 sightings (Appendix I). An occurrence record noted by Caldwell and Caldwell (1973) near Gulf Shores was excluded since the type (sighting or carcass) was not noted.

The Alabama Marine Mammal Stranding Network (AMMSN) received reports of a lone manatee on 13, 16, and 25 December 1991. On 13 January 1992, an adult male manatee was found dead on the east shore of Mobile Bay (Appendix II, AMMSN number SHCM 119). There was no immediate, obvious indication as to the cause of its death; however, the animal had large and round fecal obstructions in the intestine consistent with possible exposure to cold. In fact, water temperature in the bay recorded two weeks earlier was 11 °C. This assessment is consistent with description of cold stress syndrome described by Buegelt et al. (1984) and Bossart et al. (2003). Due to the proximity in sighting dates with the actual carcass recovery, this was likely the same individual sighted during December 1991 (Appendix I).

On 26 February 2002, a 260 cm dead male manatee was found in Mobile County, on the south shore of Dog

River (Appendix II, AMMSN SHCM 350). A field necropsy revealed that the entire intestinal tract was black inside, and the large intestine contained solidified masses resembling charcoal briquettes. The cause of death was cold stress, again consistent with the descriptions provided in Buegelt et al. (1984) and Bossart et al. (2003).

On 11 September 2003, 11 manatees were sighted in McReynolds Lake at the Mobile-Tensaw River Delta. Two of the 11 were matched to manatees known from the Crystal River population in northwest Florida; both were males, one known since 1982, and the other since 1987 (Sirenia Project files).

Mississippi

Mississippi's records consisted of 27 sightings, 3 carcasses, and two captures (Appendices I, II, Figure 1). Ten of these were previously published. The greatest number of sightings was recorded in 1979 (5 sightings and one capture) and 2001 (4 sightings and 1 carcass). February ($n = 7$) and August ($n = 6$) had the most records. Single individuals were most frequently sighted. Two of the three compiled carcass records indicated that the animals died from starvation and/or cold stress.

Powell and Rathbun (1984) reported one carcass and 24 manatee sightings in Mississippi between 1978 and 1981; 16 of these sightings occurred near Biloxi Bay between 28 November 1979 and 19 January 1980, but no further details were provided. A 1.8 m individual was caught in a trawl and released alive on 3 December 1981 in Graveline Bayou (30.33333, -88.66666) (Gunter and Perry 1983, Powell and Rathbun 1984). One male manatee, "Beauregard," was rescued by Sea World of Florida in January 1979 at Gulfport Harbor (30.35000, -89.16667) and relocated to Florida. He was rehabilitated in captivity and released in February 1985. Using a satellite tag, Sirenia Project biologists tracked him upon release (Gunter and Corcoran 1981, Powell and Rathbun 1984, Rathbun et al. 1990). "Beauregard" was tracked from the Homosassa River to the Suwannee River in Florida (Rathbun et al. 1990). Powell and Rathbun (1984) noted that Gunter & Corcoran (1981) erroneously reported the capture date to be 7 January 1979.

Louisiana

Louisiana's records consisted of 131 sightings, 15 carcasses, and one capture (Appendices I, II, Figure 1). Eight of these were previously published. The years with the most records were 1995 (23 sightings and 3 carcasses) and 2002 (24 sightings and 2 carcasses). Eighty-nine percent ($n = 130$) of the 147 records provided seasonal information; June and July had the most records with 21 and 31,

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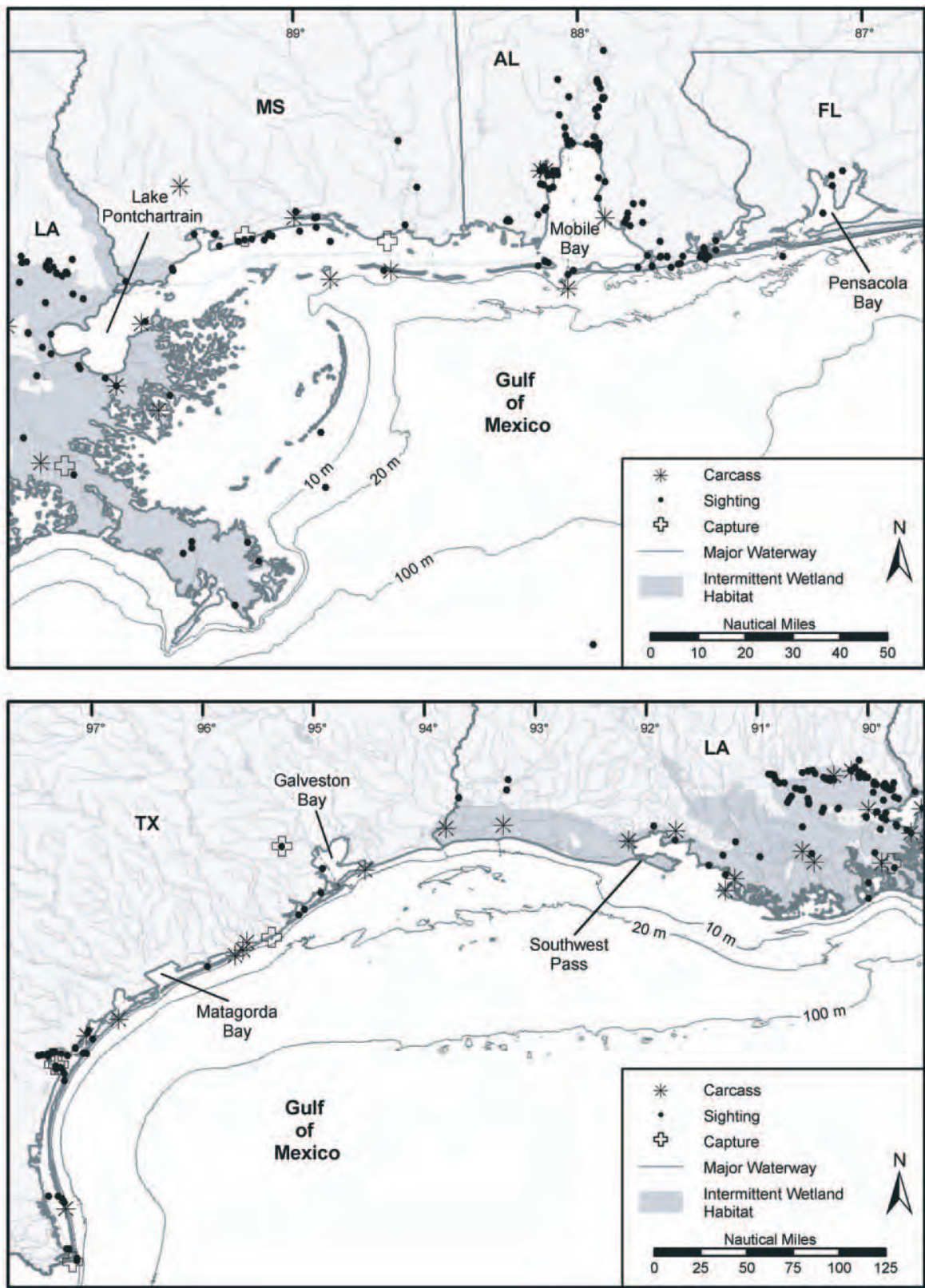


Figure 1. Distribution of manatee records ($n = 378$) from 1853–2004 in the northern Gulf of Mexico, west of Florida. Maps are separated, east and west of the Mississippi River delta, for visual clarity and resolution. Major waterways and intermittent wetland habitats (shaded areas lacking resolution to depict small waterways) are depicted; these demonstrate potential pathways of manatee movement.

respectively. Single individuals were most frequently sighted, though occasional sightings of cow/calf pairs were made (Appendix I).

On 22 July 1995, a single manatee was sighted about 4.8 km southeast of Breton Sound Marina in a canal near Hopedale, Louisiana. This individual was later unintentionally hit and killed by an oil well crew boat (> 25 m in length) (Appendix II). The carcass (LA9501) was collected by the Louisiana Department of Wildlife and Fisheries, photographed, buried, and later recovered by the Louisiana Marine Mammal Stranding Network. Photographs were subsequently matched to an animal previously photographed in Tampa Bay, Florida, in February 1995 (Anonymous 1996).

Another individual was seen repeatedly for several weeks in November 1995 in the 21 °C warm-water effluent of the Michoud Power Plant (Appendix I). On 31 January 1996, following a sharp drop in air temperature, a dead manatee was observed floating out of a waste-water discharge pipe on the south shore of the lake (Appendix II); this was probably the same animal sighted in November. The necropsy revealed that the animal had been feeding up to the time of death. The cause of death was determined to be entrapment in the discharge pipe and subsequent drowning (J. Valade, personal communication, US Fish and Wildlife Service, 6620 Southpoint Drive South, Suite 310, Jacksonville, FL 32216-0958).

A manatee photographed on 10 August 1999 in Bayou Lacombe was later matched to a carcass (no assigned specimen number) recovered in Bayou Patout on 14 December 1999 (Appendix II). Assuming travel along the complex coastline of Louisiana, this is a distance of about 417 km, and included crossing the mouth of the Mississippi River delta. It is possible that this individual made its way through the intricate bayou system of Louisiana, though this is speculative.

On 8 September 1999, a 3.3 m individual was caught in a trawl and released alive west of the Mississippi River near West Pointe a la Hache (29.54322, -89.80227).

Texas

Texas' records consisted of 53 sightings, 8 carcasses, and 5 captures (Appendices I, II, Figure 1). Twenty-one of the 66 records were previously published. The most records were from 1995 (20 sightings and 1 capture) and 2001 (12 sightings and 1 carcass). Eighty-six percent ($n = 57$) of the 66 records provided seasonal information; October and November had the most records with 14 and 12, respectively. Single individuals were most frequently sighted, and there were repeated sightings of a cow/calf pair in the Galveston Bay area in 1995.

Six of the 21 published records were live captures from the southern Texas coast (Laguna Madre and Rio Grande) (Gunter 1941). Manatee sightings listed in Table 1 of Powell and Rathbun (1984) are in error, in that True (1884) mentions only one manatee for the GOM Coast. It was Gunter (1941) that is the correct source for a number of sightings (depending on interpretation, about 8 sightings, with some captures) in southern Texas. It appears that the numbers for those two source documents were transposed. The captures took place during 1853–1855 at Brazos, but sources did not specify Brazos Island or Brazos Santiago Pass. Specimen USNM 1375 at the US National Museum, Washington, DC, is one of those individuals.

Between 3 and 8 September 1995, a manatee cow/calf pair was sighted feeding on unidentified seagrasses in west Galveston Bay (Appendix I). There were repeated reports of these animals being sighted within 3 km of this location for the next week (Schiro and Fertl 1995). On 15 September 1995, the pair was seen near the west end of Galveston Island (Appendix I) (about 9 km east of San Luis Pass). Fishermen also sighted a cow/calf pair near North Deer Island on 18 September 1995 (Appendix I). All of these sightings were likely of the same pair.

On 25 October 1995, a manatee was sighted at the Barney Davis Power Plant located on the Laguna Madre near the town of Flower Bluff. A second sighting was made 31 October 1995 at the Naval Air Station at Ingleside. On the morning of 2 November 1995, a manatee was observed throughout the day, several kilometers away at the Rockport Harbor and boat basin. Estimated body length was 305 cm, and the individual was determined by ventral observation to be a female. A notch on the right side of the tail, white marks above both eyes and a barnacle behind the right eye were noted. On 6 November 1995, a manatee with the same markings was swimming in a debris-strewn drainage ditch at the Koch Refinery on the La Quinta Channel, Corpus Christi. The manatee later moved into the La Quinta Channel heading towards the Central Power and Light plant. Water temperature at that time was about 20 °C. On 8 November 1995, the same manatee was sighted and videotaped near the Texas State Aquarium (Appendix I). The final sighting was on 12 November 1995 in Port Aransas at the University of Texas Marine Science Institute (UTMSI) boat basin. The manatee remained in the basin throughout the day feeding on turtle grass (*Thalassia testudinum*), shoal grass (*Halodule wrightii*), and mangrove seeds. A scrape mark was observed behind the eye where the barnacle had been. The manatee was last observed and videotaped near dark at the far end of the Port Aransas Municipal Harbor (Appen-

dix I). This was the last known sighting of this individual. Throughout late November and early December 1995, a single manatee was repeatedly sighted in Buffalo Bayou, just west of downtown Houston. This individual was most often observed at the warm-water outfall of a municipal wastewater treatment plant. On occasion, however, the manatee was seen leaving the canal, moving into the Houston Ship Channel. On one occasion, the individual was sighted 16 km downstream by a tow boat captain but was resighted the next day in its original location (Russel 1996). USFWS and Texas Parks and Wildlife Department (TPWD) personnel captured the manatee on 7 December 1995. The female manatee (313 cm) was moved to Sea World of Texas in San Antonio for temporary holding and nicknamed "Sweetpea." Genetic analysis determined that she was a Florida manatee (R. Bonde, personal communication, US Geological Survey, Florida Integrated Science Center, Sirenia Project, 412 NE 16th Avenue, Room 250, Gainesville, FL 32601, Garcia-Rodriguez et al. 1998). "Sweetpea" was later transferred to Sea World in Orlando, Florida and spent the winter rehabilitating at Homosassa Springs State Wildlife Park in Citrus County, Florida (Weigle et al. 2001). She was satellite-tagged and released at the headwaters of the Homosassa River on 23 April 1996 (Weigle et al. 2001). Once released, she swam northward along the west coast to the Florida Panhandle, spending most of the spring and summer at sites around Apalachee Bay (Weigle et al. 2001). After moving west to Apalachicola Bay in September, she reversed her course and began heading south along the west coast, visiting various locations before reaching Marathon in the Florida Keys in November 1996 (Weigle et al. 2001). "Sweetpea" then took a northeast turn along the Florida Keys and wintered in south Miami. "Sweetpea's" tag stopped transmitting in mid-March 1997 in Brevard County on Florida's central east coast. Her last known location was where the Banana River joins the Indian River (Weigle et al. 2001). Her entire tag assembly, including belt, was recovered on 17 March 1999 in the Indian River, just south of Sebastian Creek (middle of Atlantic Coast of Florida) (Sirenia Project files). The belt had been cut (possibly by a propeller; however, this was not confirmed). She has not been sighted since. We believe that the manatee seen in late October and early November 1995 in Corpus Christi could be "Sweetpea", based on fluke notches, similar size, and same sex, but confirmation is not possible. On 14 July 2001, TPWD personnel sighted a manatee in the Rockport area (Appendix I). During the last week of July 2001, a manatee was spotted in the UTMSI boat basin in Port Aransas (Appendix I). On 11 September 2001 a manatee estimated to be about 2.13 m in length was sighted in the

Hampton's Landing Boat Basin in Aransas Pass (Appendix I). On 23 September 2001, a manatee, estimated to be about 1.83 m in length, was sighted in the inlet between the Texas State Aquarium and the Lexington Museum in Corpus Christi, Texas (Beaver 2001). On 3 October 2001, a manatee was videotaped near the Texas State Aquarium. Scars were observed on the left dorsum of the animal; however, the photograph quality was too poor to attempt a match to any known individual using identifying marks. This manatee spent time around the dock at the aquarium. Observers were able to determine that the individual was a male. A manatee was seen 11 Oct and 26 Oct near Portland (Appendix I), roughly 9.66 km from the aquarium. On 14 November 2001, a manatee was spotted at Valero Refining Company in Corpus Christi (Appendix I). When last seen, it was heading west towards Koch Refinery and the end of the Tule Lake Channel. On 29 November 2001, the manatee appeared emaciated to on-site biologists. A rescue attempt was initiated on 30 November 2001, but personnel from USFWS, Sea World, and UTMSI were unsuccessful in attempts to locate the manatee on 30 November 2001. The sightings from 29 and 30 November were in the inner harbor, where there are some warm-water outfalls. A manatee was seen again 5 and 12 December near Portland, in the same area as the 11 October 2001 sighting. Each of the reported sightings in November and December indicated that the manatee was becoming more lethargic and emaciated. On 12 December 2001, a cold front hit the area and dropped the air temperatures to about 7 °C. Repeated trips to the area where the manatee had been sighted yielded no further sightings of the individual.

During this same time period in October 2001, another individual was found dead and floating at Sargent Beach (Matagorda County), just off the Intracoastal Waterway, 241.4 km west of Port Aransas (Appendix II). The water temperature was about 23 °C. This manatee was a male, 3.05 m in length, and contrary to the editor's note associated with Beaver (2001), this could not be the same individual as reported above in the Port Aransas area. A tissue sample was collected from this individual and submitted for genetic analysis. This specimen matched the Florida manatee haplotype (R. Bonde, personal communication, Garcia-Rodriguez et al. 1998).

Most recently, from late June to mid-August 2004, there were several sightings of manatees in south Texas (Appendix I). Seven sightings of one or perhaps even 2 individuals were reported in the area of Port Aransas and Corpus Christi Bay.

DISCUSSION

Manatees occurring west of Florida and to the north of Mexico generally are considered to be strays originating from populations in either Florida or Mexico (e.g., Gunter 1941, Lowery 1974, Powell and Rathbun 1984, Domning and Hayek 1986). Many manatees in Florida make seasonal movements northward in spring and southward in the fall (Moore 1951a, Powell and Rathbun 1984). Coinciding with these movements, manatees in Mexico move north into Tamaulipas (near the US/Mexico border) during the rainy season (May through September) (Lazcano-Barrero and Packard 1989). The most likely source of emigrants along the GOM coast would be manatees that over-winter in the headwaters of the Crystal and Homosassa rivers, as well as perhaps the Tampa–Ft. Myers region (Bonde and Lefebvre 2001). This is supported by the photographic matches made to manatees sighted in Alabama and Louisiana, as well as genetic analyses of tissue samples from two individuals found in Texas.

Researchers have documented wide-ranging movements by some West Indian manatees. Data for some individuals in Florida suggest a traditional long-range seasonal migration along the Atlantic coast (Reid et al. 1991, Deutsch et al. 2003). Annual movements in excess of 1,700 km (round trip) have been documented for one radio-tagged manatee on the Atlantic coast. “Chessie” moved between Florida and the Chesapeake Bay in multiple years and one year migrated as far as Rhode Island (Deutsch et al. 2003). “Gina,” a manatee photo-identified as a calf and juvenile in the Homosassa River on the GOM coast of Florida, has been living in the Bahamas since about 1996 (Reid 2000, Lefebvre et al. 2001). A manatee hit by a crew boat in Louisiana was photo-identified in the Tampa Bay area (Anonymous 1996, FWC files), a minimum coastal distance of 618 km. Two manatees were sighted in the Dry Tortugas in 1982 (Reynolds and Ferguson 1984), and a wayward manatee radio-tagged at Crystal River in north-west Florida was rescued just six weeks later off the Dry Tortugas in 1998 (Sirenia Project files). Hartman (1979) also mentioned sightings of manatees in the Dry Tortugas. The impetus for wide ranging movements is not always apparent but is likely in response to environmental cues; for males, it may be a strategy for mate-searching as well (Deutsch et al. 2003).

We found manatees to be most common in estuarine and river mouth habitats and rare in the open ocean. This observation mirrors their natural history, although data collection is heavily skewed to coastal observations. This habitat preference has been noted by other sources (Moore 1951b, Hartman 1979, Rathbun et al. 1982). Occasionally

manatees may wander into deep waters. Schwartz (1995) commented on the rare occurrence of open ocean sightings off North Carolina. A manatee was sighted about 12.87 km off the Louisiana coast in early July 1979 (Gunter and Corcoran 1981). More recently, a manatee was sighted on 15 October 2001 about 144.8 km south of Mobile Bay, in waters over the Mississippi Canyon in Minerals Management Service’s Lease Block Mississippi Canyon 85 during oil and gas exploration operations (Anonymous 2001; T. Pitchford, personal communication, Florida Fish and Wildlife Conservation Commission, Marine Mammal Pathobiology Laboratory, 3700 54th Avenue, South, St. Petersburg, FL 33711; Sirenia Project files). The exact location of the manatee was not recorded, but the center coordinates for this 3 square mile block are $-87.94482, 28.91394$, with a bottom depth greater than 1,524 m (Sirenia Project files), not 914.4 m as reported by Anonymous (2001). The manatee was sighted for a few days around operating vessels and was even observed to feed on algae growth on the bottom of the vessel. Efforts were underway to attempt a rescue, but the manatee disappeared when several large sharks were seen in the vicinity. The manatee was last sighted on 17 October 2001, and its fate remains unknown.

During the warm season, adult males are considered to range over wider areas than females and subadults (Bengtson 1981, Deutsch et al. 2003). Based on five manatees captured or stranded in South Carolina and Georgia, Rathbun et al. (1982) suggested that extralimital animals would mostly be males. Information on the age or sex for most of the individuals in this review was not available; however, we were able to determine that all age and sex classes appear to make extended range movements. Interestingly, 7% of all the occurrence records were of cow/calf pairs. Deutsch et al. (2003) found that subadults in the Atlantic subpopulation demonstrated strong philopatry to specific warm-season ranges that they had occupied as calves, and some followed the same migratory patterns as their mothers.

Access to warm water, freshwater, and food is required by manatees (Hartman 1979). Temperature is the overriding factor in determining the geographic extent of suitable habitat to manatees (Smith 1993). The vulnerability of manatees to cool ambient water temperatures is well-documented (Moore 1951b, O’Shea et al. 1985, Miculka and Worthy 1995). Manatee deaths attributed to exposure to cold were recorded as early as the 19th century (Moore 1951b, O’Shea et al. 1985, Ackerman et al. 1995). Data suggest that manatees possess metabolic rates that are only 25–30% of predicted values (Gallivan and Best 1980, Irvine 1983, Miculka and Worthy 1995), resulting in a lack

of cold tolerance. Young manatees (< 300 kg) are even more susceptible to cold than adults because they are apparently incapable of increasing metabolic rate at low temperatures (Miculka and Worthy 1995), possibly resulting in hypothermia and death. To offset these metabolic insufficiencies, manatees respond to cold weather by relocating to thermal refuges, either natural spring or warm-water industrial effluents. As noted by Moore (1951b), large springs have immense flow averages that can supply water at 22 °C much faster than the air can chill it. Mothers introduce their offspring to warm-water refuges during the prolonged period of dependence common to the species (Hartman 1979, Deutsch et al. 2003). This suggests the possibility that in the future there may be increased dependence on warm-water sites along the northern GOM. We observed signs similar to those described as cold-stress in many of the manatees found dead west of Florida. Several of the winter sightings were at natural warm springs and industrial warm-water effluents.

Residents near some warm-water springs in Alabama report regularly seeing manatees over the past 40 years. They consider these sightings unremarkable. There are probably other localized areas along the northern GOM coast where forage is available and water temperatures might be high enough and consistently reliable to support manatees through the winter. For example, manatees have been seen near power plant and wastewater treatment plant effluents in both Louisiana and Texas, particularly during winter months. Additionally, the USFWS (2001) noted that canals and boat basins, where warmer water temperatures persist as temperatures in adjacent bays and rivers decline, might also be used as temporary thermal refuges. Manatees in this study were often observed in such habitats.

Gunter (1941) reported that all manatees observed in Texas at the time were seen during the summer months and that manatee presence would be precluded in any part of Texas during midwinter. Powell and Rathbun (1984) suggested that sightings have declined in frequency and that all have occurred during the summer. While there were many records for summer, we noted a considerable number of more recent winter sightings as well. These individuals concentrated their movements in boat basins and at power plant effluents. In addition, the public is more aware of the sensitivity of manatees to cold than in the past.

Access to freshwater also influences the movements of manatees. Manatees are attracted to freshwater from natural sources such as rivers and springs, as well as from anthropogenic sources such as wastewater or storm-water outfalls, drainage pipes, and garden hoses (O'Shea and Kochman 1990, Lefebvre et al. 2001, Weigle et al. 2001). Osmoregulatory studies demonstrate that while manatees

can cope with brackish water environments, they cannot survive prolonged exposure to the marine environment unless they can visit freshwater sources on a regular basis (Ortiz et al. 1998).

Seagrasses are a main component of a manatee's diet in coastal areas (Lefebvre et al. 2000); although Florida manatees are generalists, feeding on a wide variety of aquatic vegetation, emergent or terrestrial vegetation, algae, grass trimmings from mowing, and fish carcasses (e.g., Powell 1978, Smith 1993, Baugh et al. 1999, Lefebvre et al. 2000, 2001). Some seagrass-associated invertebrates may be incidentally consumed during foraging on vegetation (e.g., Mignucci and Beck 1998); however, they may also be preferentially ingested (Courbis and Worthy 2003). Lefebvre et al. (2000) suggested that Florida manatees benefit the most by eating available forage in proximity to their refuges or travel routes. Seagrass beds of *Thalassia* and *Halodule* are more extensive from Mobile Bay to Florida Bay than in the rest of the GOM (Handley 1995). These seagrasses west of Mobile Bay exist only in isolated patches and in narrow bands to Aransas Bay, Texas (Handley 1995). Freshwater submerged aquatic vegetation also occurs throughout GOM estuaries and river deltas (Handley 1995). Manatee grass (*Syringodium filiforme*) and shoal grass (*Halodule wrightii*) are the dominant seagrasses found in the shallow water on the northern side of the barrier islands of Mississippi (Handley 1995). Coastal Louisiana has a large amount of submerged aquatic vegetation, with only a small portion of this being seagrasses (Handley 1995). The only remaining seagrass beds in coastal Louisiana exist in Chandeleur Sound (Handley 1995). There is a wide distribution of seagrasses, predominantly shoal grass and widgeon grass (*Ruppia maritima*), in the Galveston Bay estuary (Handley 1995). Seagrasses are prevalent in Laguna Madre (Onuf 1995). Seagrass meadows are increasing in upper Laguna Madre; however, they are on the decrease in lower Laguna Madre (Onuf 1995). There are small patches of shoal grass and widgeon grass (*Ruppia maritima*) in the Corpus Christi Bay area (McCullough 2001, Pulich et al. 1997) and patches of red turf algae (*Gelidium* spp.) and sea lettuce (*Ulva* spp.) (L. Price-May, personal observation).

We compiled various reports of manatees feeding west of Florida. One manatee in Port Aransas, Texas was observed to feed on loose sea grasses such as turtle grass (*Thalassia testudinum*), shoal grass, cordgrass (*Spartina* spp.), mangrove seeds, and other vegetable material. A manatee cow-calf pair was seen feeding on seagrasses (unidentified species) in Galveston Bay, Texas. Additionally, one manatee sighted in the Natalbany River

(Louisiana) was feeding on lilies (unidentified species), a second was sighted in Lake Maurepas (Louisiana) in a Hydrilla (*Hydrilla* spp.) bed, while another in open water off the southwest tip of the Chandeleur Islands was feeding on a weed line at the water's surface.

There is evidence that manatees can be temporarily independent of warm water, perhaps moving to nearby seagrass beds to feed (Bengtson 1981, Shane 1984, Deutsch et al. 2003). Some of the animals reported in the present study in the vicinity of New Orleans, Houston, and Port Aransas (described in detail earlier) were often observed leaving warm-water refuges, only to return several hours later, perhaps having consumed food. Periodic movements from wintering sites at Blue Springs, Florida, and at power plants have been noted (Bengtson 1981, Irvine 1983, Deutsch et al. 2003). As suggested by Smith (1993), it is probable that manatees may leave warm-water areas only after air and adjacent water temperatures have risen in the afternoon and only after cold fronts have passed. Several Alabama manatees were sighted in warm-water refuges without food resources; however, nearby waters could supply an abundance of food. Irvine (1983) noted that manatees would leave warm-water refuges to feed in cooler waters only if they can shortly return to the warmer water temperatures to digest their food.

Traveling manatees use warm-water refuges along their migratory routes during both the early spring and late fall in a 'stepping-stone' strategy, which may permit them to migrate earlier in the spring as well as remain at sites later into the fall (Reid et al. 1991, Deutsch et al. 2003). Individuals may disperse during intervening periods of mild weather with warmer temperatures (Moore 1956, Hartman 1979, Shane 1984, Reid et al. 1991).

Numerous sightings, for example in lakes St. Catherine and Pontchartrain in Louisiana, northern Mobile Bay in Alabama, and Corpus Christi Bay/Laguna Madre in Texas, suggest repeated use of certain areas. Individual manatees in Florida and Georgia are known to return to the same winter ranges each year, and some may also return to the same summer ranges (Rathbun et al. 1982, 1990, Koelsch 1997, Deutsch et al. 2003). Seasonal site fidelity has also been noted for some radio-tagged manatees frequenting southeastern Georgia (Zoodma 1991). It is not known whether the manatees mentioned in this paper were the same individuals returning annually to the same area. More attempts to photo-identify these strays would provide additional information. Studies also should be conducted to characterize the habitat in these areas to determine what might attract individuals and ensure proper management strategies.

The reasons are not known for the large number of extralimital sightings of this species along the GOM. Collard et al. (1976) noted that as the health of northern GOM estuaries and their associated flora improves, the excursion range of manatees may broaden. Bonde and Lefebvre (2001) suggested that the increase in sightings might have been made possible by man-made sources of warm waters (such as industrial effluents), as well as a decade of relatively warm winters. Storm events and a climatic trend of warmer winters and summers may also help to explain increased extralimital movements by manatees (Lefebvre et al. 2001). In Texas and Louisiana, we noted a peak in 1995 of the number of manatee sightings west of Florida. The 1995 hurricane season was a notably active one for major storms, with 19 named storms (the mean is nine), 11 of which became hurricanes (the mean is five) (Williams and Duedall 1997). It was not a record but a close second to the 1933 season of 21 storms (Williams and Duedall 1997). Langtimm and Beck (2003) determined significant annual variation in adult manatee survival in years when intense hurricanes and a major winter storm occurred in the northern GOM. Many of the manatee sightings we compiled for west of Florida occurred after four hurricanes and three tropical storms entered the GOM in 1995; several of these storms directly impacted Florida and the Yucatan Peninsula. As noted by Langtimm and Beck (2003), a storm might cause manatees to emigrate from Florida either voluntarily (in response to cooled surface waters which follow in the wake of a hurricane and can persist for days) or involuntarily (e.g., by strong long-shore currents or high-energy waves). For example, a manatee was sighted in Theodore Channel in Alabama during Hurricane Opal in October 1995. The growing public awareness of the manatee also may be a sufficient explanation for the increased number of reports (Rathbun et al. 1982, Schwartz 1995, Lefebvre et al. 2001, Schleifstein 2004). Lastly, the increase in extralimital sightings west of Florida is probably due to animals moving from the southern Big Bend coast, where their numbers have increased (Rathbun et al. 1990, Bonde and Lefebvre 2001).

From this review, it is obvious that small numbers of manatees occasionally migrate through the northern GOM from Florida and possibly Mexico. Because of these movement patterns, environmental planners and managers need to consider the likelihood that manatees may be affected by a variety of human activities in coastal waters (as well as deeper waters, on occasion) of the northern GOM. Increased attention also must be given to the protection of habitat resources throughout the manatee's travel corridors (Smith 1993). For example, Handley (1995) notes that losses of seagrasses in the northern GOM have been exten-

sive, varying 20–100% for most estuaries. As in Florida, alterations to both natural and industrial warm-water refuges along the rest of the GOM coast have significant implications for manatees (USFWS 2001). For example, human activities in the vicinity of these springs and the use of aquifer waters are a threat to the availability and suitability of spring waters to manatees. If the volume of water flowing from springs decreases, available and accessible habitat and water temperature around springs may drop, increasing manatees' exposure to cold waters and its associated health risks. The status of manatees as an endangered species makes the loss of individual manatees biologically significant. We hope that this compilation will stimulate further investigations of manatee distribution west of Florida in the northern GOM and serve as continued encouragement for people to report occurrences of manatees to appropriate personnel. To that end, it is requested that future manatee observations be reported to the appropriate authorities in each state and to the USFWS' Jacksonville Field Office, which is charged with the daily management of the Florida manatee and holds the recovery lead for the species. A secure, electronic database is maintained to record and track all manatee sightings, rescues, and deaths outside the state of Florida. To contribute data to the manatee sighting and stranding network contact the USFWS office at 904-232-2580, extension 123 to receive a username and password. A yearly summary for all out-of-state manatee activity is sent to all manatee stranding network partners.

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APPENDIX I

Sighting records of manatees in the northern Gulf of Mexico, west of Florida. c/c = cow/calf pair

Date	Location description	Latitude	Longitude	No. Individ.	Source
ALABAMA					
13 Jun 1985	Tensaw River, 25 mi south of Jackson, Baldwin County	31.00329	-87.90777	1	O'Shea (1988), Rathbun et al. (1990)
21 Oct 1986	Bon Secour Bay, 0.5 mi east of Highway 59 bridge	30.28000	-87.68333	1	O'Shea (1988) ¹
13 Dec 1991	Fish River, app. 1.6 km north of Highway 98	30.43283	-87.82217	1	unpub. data
16 Dec 1991	Fish River at Highway 98	30.41467	-87.82500	1	unpub. data
25 Dec 1991	Theodore Channel turning basin	30.53283	-88.11883	1	unpub. data
31 May 1993	1 mi west of Perdido Pass	30.27833	-87.56783	1	unpub. data
31 May 1993	Gulf State Park Resort, south beach, Gulf side	30.25350	-87.64467	3	unpub. data
1 Jun 1993	lagoon at Bon Secour National Wildlife Refuge	30.24133	-87.78550	1	unpub. data
29 Sep 1993	Mobile River	30.73500	-88.04400	1	unpub. data
29 Oct 1994	Theodore Channel turning basin	30.53133	-88.11883	1	unpub. data
31 Oct 1994	north side of Dauphin Island	30.25833	-88.10000	1	unpub. data
4 Nov 1994	west Mobile Bay, north of Dog River	30.58167	-88.07217	1	unpub. data
8 Nov 1994	Dog River, Alligator Bayou	30.56867	-88.10250	1	unpub. data
9 Nov 1994	Intracoastal Waterway	30.27883	-87.68333	1	unpub. data
11 Nov 1994	Dog River, Grand Mariner Marina	30.58217	-88.08500	1	unpub. data
11 Nov 1994	Dog River, Rabbit Creek	30.58217	-88.13033	1	unpub. data
14 Nov 1994	Dog River, mouth of Halls Mill Creek	30.59667	-88.11467	1	unpub. data
15 Nov 1994	Blakely River, south of I-10	30.65417	-87.92550	1	unpub. data
16 Nov 1994	Fowl River, near Bellingrath Gardens	30.43200	-87.13717	1	unpub. data
18 Nov 1994	Mobile Bay, west side near I-10	30.68783	-88.02450	1	unpub. data
26 Nov 1994	Mobile Bay, near I-10	30.68867	-88.03533	1	unpub. data
6 Dec 1994	Dog River, Rabbit Creek	30.59033	-88.12117	1	unpub. data
1 Apr 1995	Mobile Delta, McReynolds Lake	30.88967	-87.92467	1	unpub. data
3 Apr 1995	Perdido Bay, Terry Cove	30.29167	-87.55083	1	unpub. data
9 Apr 1995	Perdido Bay, Orange Beach	30.27917	-87.55467	1	unpub. data
10 Apr 1995	Perdido Bay, Terry Cove	30.29167	-87.55083	1	unpub. data
24 May 1995	Tensaw River	30.79717	-87.93400	1	unpub. data
29 May 1995	Mobile River, Cedar Creek near Mt. Vernon	31.05565	-87.99986	1	unpub. data
18 Jun 1995	Fowl River, west of Highway 163	30.44217	-88.11550	2(c/c)	unpub. data

¹O'Shea (1988) reported Hwy 57, but the correct location is Hwy 59 (Sirenia Project files)

APPENDIX I (continued)

Date	Location description	Latitude	Longitude	No. Individ.	Source
ALABAMA (continued)					
week of 25 Jun 1995	mouth of Fowl River, western shore side	30.45133	-88.10817	2 (c/c)	unpub. data
4 Jul 1995	Tensaw River, Hurricane Bayou	30.83750	-87.90467	1	unpub. data
14 Sep 1995	Tensaw River, south end of Gravine Island	30.77283	-87.92933	4	unpub. data
24 Sep 1995	Tensaw River, south end of Gravine Island	30.77283	-87.92950	1	unpub. data
25 Sep 1995	Mobile Delta, east side, north of Highway 90	30.67833	-87.92133	1	unpub. data
4 Oct 1995	Theodore Channel, turning basin	30.53167	-88.11833	1	unpub. data
21 Oct 1995	Apalachee River, near Blakely River	30.69917	-87.94000	1	unpub. data
6 Nov 1995	Mobile River, Alabama State Docks	30.70667	-88.04117	1	unpub. data
14 Nov 1995	Fish River, Farragut Cove	30.46550	-87.80300	1	unpub. data
16 Nov 1995	Fish River, Farragut Cove	30.46550	-87.80300	1	unpub. data
18 Nov 1995	Fish River, Farragut Cove	30.46550	-87.80300	1	unpub. data
21 Nov 1995	Fish River, Farragut Cove	30.46550	-87.80300	1	unpub. data
7 Dec 1995	Fish River at Hwy. 98	30.41467	-87.82467	1	unpub. data
3 Apr 1996	Mobile Bay near Dog River	30.56633	-88.08550	1	unpub. data
16 Apr 1996	Gulf of Mexico, Gulf Shores	30.25450	-87.63717	1	unpub. data
29 Apr 1996	Gulf of Mexico, south of Fort Morgan	30.21717	-88.03083	1	unpub. data
2 Jul 1996	Tensaw River, south end of Hurricane Bayou	30.83333	-87.91083	1	unpub. data
3 Jul 1996	Tensaw River, The Basin, Smith Creek	30.87083	-87.91850	1	unpub. data
20 Aug 1996	Theodore Ship Channel	30.53333	-88.12717	1	unpub. data
29 Aug 1996	Tensaw River, The Basin	30.80550	-87.92383	2	unpub. data
19 Sep 1996	Mobile Bay, west side and North of Dog River	30.58083	-88.07183	2	unpub. data
22 Sep 1996	Tensaw River, near railroad bridge	30.83883	-87.91083	2	unpub. data
10 Jul 1997	Mobile Bay, 0.75 mi east of Ft. Morgan	30.23167	-88.01333	1	unpub. data
10 Aug 1997	Dog River, mouth of Rabbit Creek	30.58833	-88.12167	1	unpub. data
15 Aug 1997	Mobile Bay, mouth of Fly Creek	30.54167	-87.90167	1	unpub. data
8 Sep 1997	Mobile Bay, 0.5 mi north of Dog River	30.56800	-88.06717	1	unpub. data
25 May 1998	Mobile Bay, mouth of Pinto Pass	30.67767	-88.01767	1	unpub. data
18 Jul 1998	Mobile Bay, north edge Hwy 90	30.67583	-87.96667	1	unpub. data
24 Oct 1998	Mobile Bay, north edge Hwy 90	30.67583	-87.96667	3(c/c)	unpub. data
24 May 1999	south side of Dauphin Island	30.24717	-88.13583	1	unpub. data
9 Oct 1999	confluence of Tensaw and Blakeley Rivers	30.69767	-87.93583	5(c/c)	unpub. data
25 Apr 2000	Perdido Bay, east of Bear Point	30.30150	-87.51250	1	unpub. data
15 May 2000	Theodore Ship Canal	30.53333	-88.12967	1	unpub. data
4 Jun 2000	head of Bayou La Batre	30.40417	-88.23767	2(c/c)	unpub. data

APPENDIX I (continued)

Date	Location description	Latitude	Longitude	No. Individ.	Source
	ALABAMA (continued)				
11 Jun 2000	Intracoastal Waterway, in connector canal from Mobile Bay to Perdido Bay	30.27917	-87.70633	1	unpub. data
11 Jun 2000	Intracoastal Waterway, west of Highway 59	30.27867	-87.70883	1	unpub. data
17 Jun 2000	South Fork Deer River upstream from confluence with Theodore Ship Canal	30.51717	-88.09833	1	unpub. data
17 Jun 2000	South Deer River, near Theodore Ship Canal	30.52250	-88.08417	1	unpub. data
22 Jun 2000	Theodore Ship Canal	30.52250	-88.08417	1	unpub. data
22 Jun 2000	Dog River, near Alligator Bayou	30.56667	-88.09283	1	unpub. data
22 Jun 2000	Dog River, near mouth to Mobile Bay, near Texaco Dock	30.56667	-88.09017	1	unpub. data
23 Jun 2000	Fish River	30.43167	-87.82283	1	unpub. data
25 Jun 2000	Confederate Bay, north side of Dauphin Island, near marina, east of bridge to mainland	30.26500	-88.11250	3(c/c)	unpub. data
25 Jun 2000	Dauphin Island Bay, Hudson Bay, near marina, east of bridge to mainland	30.26133	-88.11183	3(c/c)	unpub. data
29 Jun 2000	McReynolds Lake Basin	30.89433	-87.92883	6-8(c/c)	unpub. data
5 Jul 2000	Bayou Sara off Mobile River	30.84050	-88.03000	1	unpub. data
6 Jul 2000	Bayou La Batre	30.40533	-88.24833	1	unpub. data
9 Jul 2000	Bayou La Batre	30.41050	-88.24333	1	unpub. data
14 Jul 2000	Dog River	30.59083	-88.11300	3	unpub. data
14 Jul 2000	Dog River	30.58950	-88.12250	3	unpub. data
14 Aug 2000	Bon Secour River	30.33200	-87.70783	5	unpub. data
3 Oct 2000	confluence of Tensaw and Blakeley Rivers	30.69767	-87.93583	5(2 c/c?)	unpub. data
13 Oct 2000	Under a fishing pier, Gulf of Mexico	30.24250	-87.66867	1	unpub. data
28 Nov 2000	mouth of Chickasaw Creek	30.77883	-88.06117	1	unpub. data
25 Feb 2001	Intracoastal Waterway	30.27867	-87.70867	1	unpub. data
30 Apr 2001	The Basin	30.89083	-87.92583	2(c/c)	unpub. data
2 Aug 2001	Weeks Bay	30.40000	-87.83200	1	unpub. data
13 Aug 2001	west side of Mobile Bay at McNally Park	30.90117	-88.06833	4	unpub. data
26 Aug 2001	Blakely River, Marker 2	30.66283	-87.92367	1	unpub. data
29 Aug 2001	Blakely River, north of Hwy 90	30.66950	-87.92500	1	unpub. data
31 Aug 2001	east shore of Mobile Bay at Point Clear	30.48500	-87.92550	4	unpub. data
17 Dec 2001	Fowl River near Bellingrath Gardens	30.42633	-88.13583	1	unpub. data
17 Jan 2002	Magnolia River headwaters	30.40000	-87.76833	1	unpub. data
26 Feb 2002	south bank of Dog River	30.58117	-88.10967	1	unpub. data

APPENDIX I (continued)

Date	Location description	Latitude	Longitude	No. Individ.	Source
ALABAMA (continued)					
1 Apr 2002	Perdido Pass area	30.28033	-87.54833	1	unpub. data
17 Apr 2002	Perdido Bay, Old River, under bridge to Ono Island	30.28033	-87.53617	1	unpub. data
18 Apr 2002	Perdido Bay, Old River by Ono Island	30.28033	-87.53617	1	unpub. data
27 Apr 2002	The Basin, Maple Creek	30.90200	-87.92950	1	unpub. data
12 Jun 2002	Intracoastal Waterway	30.30583	-87.55367	1	unpub. data
14 Jun 2002	Little Lagoon Pass	30.27050	-87.54967	1	unpub. data
15 Jun 2002	east shore of Mobile Bay at Point Clear	30.48500	-87.92617	2(c/c)	unpub. data
16 Jun 2002	Intracoastal Waterway	30.27967	-87.27767	1	unpub. data
17 Jun 2002	Bay La Launch at Intracoastal Waterway marker #72	30.30972	-87.55333	1	unpub. data
28 Jun 2002	The Basin, Maple Creek	30.90200	-87.92967	1	unpub. data
30 Jun 2002	Little Lagoon Pass	30.27050	-87.54967	1	unpub. data
2 Jul 2002	Intracoastal Waterway	30.28283	-87.75383	1	unpub. data
6 Jul 2002	Alabama Point	30.27967	-87.62833	1	unpub. data
24 Jul 2002	Theodore Industrial Canal	30.52917	-87.10467	1	unpub. data
19 Aug 2002	mouth of the Dog River	30.56533	-87.10700	1	unpub. data
27 Aug 2002	Little Lagoon	30.24550	-87.73717	1	unpub. data
29 Aug 2002	Buccaneer Yacht Club	30.58167	-87.06783	4	unpub. data
30 Aug 2002	Buccaneer Yacht Club	30.58167	-87.06783	4	unpub. data
4 Oct 2002	Pinto Pass, Mobile County, just south of <i>USS Alabama</i>	30.67861	-88.01667	4(2 c/c?)	unpub. data
28 Oct 2002	Intracoastal Waterway	30.38800	-87.81333	1	unpub. data
25 May 2003	Little Lagoon, Baldwin County	30.24639	-87.73722	1	unpub. data
1 Aug 2003	just west of the pass from Gulf into Perdido Bay	30.27972	-87.55250	1	unpub. data
11 Sep 2003	McReynolds Lake, Mobile-Tensaw River Delta	30.67229	-88.03221	11	unpub. data
30 Sep 2003	Bayou La Batre	30.40500	-88.24833	6(2 c/c)	unpub. data
5 May 2004	Perdido Pass	30.33436	-87.51311	1	unpub. data
7 May 2004	Terry Cove, near Perdido Bay	30.28810	-87.54920	1	unpub. data
24 May 2004	Intracoastal Waterway near Highway 59, in canal	30.27917	-87.68278	1	unpub. data
5 Jun 2004	McReynolds Lake	30.55639	-87.92472	1	unpub. data
8 Jun 2004	delta north of Mobile Bay, Tensaw River slough	30.67183	-87.94333	1	unpub. data
12 Jun 2004	Fish River	30.41600	-87.82367	1	unpub. data
15 Jun 2004	Perdido Bay, north side of west tip of Perdido Key	30.28038	-87.54557	1	unpub. data
18 Jun 2004	Perdido Bay, in canal leading to Orange Beach Marina	30.28625	-87.56365	1-2	unpub. data
30 Jun 2004	Fish River near Farragut Cove	30.46883	-87.76933	2(c/c)	unpub. data

APPENDIX I (continued)

Date	Location description	Latitude	Longitude	No. Individ.	Source
ALABAMA (continued)					
24 Jul 2004	west side of Mobile Bay at McNally Park	30.58033	-88.07200	5(2 adults; 3 calves)	unpub. data
26 Jul 2004	canal that is tributary to Alligator Bayou (tributary to Dog River)	30.56600	-88.10500	1	unpub. data
MISSISSIPPI					
31 Dec 1978	Wolf River, near the Cueres Bridge	30.35779	-89.27396	1	Powell and Rathbun (1984)
1 Jan 1979	Wolf River, near the Cueres Bridge	30.35870	-89.27216	1	Powell and Rathbun (1984)
3 Jan 1979	Gulfport Coast Guard Station	30.36000	-89.08170	1	Powell and Rathbun (1984)
5 Jan 1979	Gulfport Harbor	30.35506	-89.08552	1	Powell and Rathbun (1984)
18 Jan 1979	Pascagoula River, 0.5 mi from Mississippi Sound	30.52316	-88.56308	1	Gunter and Corcoran (1981), Powell and Rathbun (1984)
4 Jul 1979	12 mi east of Breton Island, Louisiana	29.46667	-88.88333	1	Gunter and Corcoran (1981), Powell and Rathbun (1984) ²
28 Nov 1979– 19 Jan 1980	Biloxi Bay	30.41751	-88.91401	1	Powell and Rathbun (1984)
Summer 1992	Pearl River, near railroad bridge closest to Mississippi Sound	30.19205	-89.58450	1	unpub. data
Summer 1992	Jourdan River, north end of St. Louis Bay	30.35879	-89.34588	1	unpub. data
26 Nov 1992	Mississippi Power's Plant Watson, in intake canal, Gulfport	30.33186	-89.18880	1	unpub. data
16 Feb 1993	Mississippi Sound, near rock jetty adjacent to Buccaneer State Park (near Waveland)	30.34020	-89.14210	1	unpub. data
10 Aug 1994	Bay St. Louis. Bayou Caddy fishing dock	30.23839	-89.42107	1	unpub. data
13 Aug 1994	just off the Long Beach Harbor Jetty Pier (west of Gulfport)	30.33747	-89.16674	1	unpub. data
20 Aug 1994	Hidden Creek Bayou, near power plant (north of Biloxi)	30.36854	-88.97535	2	unpub. data
15 Jun 1996	Gulfport, Whitehouse Sand Bar, 1 mi offshore	30.33333	-88.86667	1	unpub. data
early Aug 1997	Front Beach, Biloxi	30.38333	-88.91667	1	unpub. data
19 Aug 1997	Back Bay, near mouth of Biloxi River, by Mississippi River	30.43684	-88.98744	1	unpub. data
27 Aug 1997	West Pascagoula River, Gautier-Hickory Hills area north of the mouth of Bluff Creek, Jackson County	30.68689	-88.62812	1	unpub. data

²Powell and Rathbun (1984) reported this record as being west, and not east, of Breton Island contrary to Gunter and Corcoran (1981)

APPENDIX I (continued)

Date	Location description	Latitude	Longitude	No. Individ.	Source
MISSISSIPPI (continued)					
8 Feb 2001	Horn Island	30.23000	-88.68000	1	unpub. data
7 Jul 2001	Moses Pier, Gulfport Harbor	30.35364	-89.07972	1	unpub. data
30 Oct 2001	Gulfport small craft harbor, next to Mississippi Aquarium	30.33714	-89.09977	1	unpub. data
early Nov 2001	Gulfport Harbor	30.35311	-89.07246	1	unpub. data
17 Feb 2002	Harrison, Biloxi	30.41706	-88.92133	1	unpub. data
20 Feb 2002	Pass Christian, Mallini Bayou, app. 300 yards from St. Louis Bay	30.31637	-89.25769	1	unpub. data
22 Jun 2002	Vancleave, along sandbar in Pascagoula River in 5 ft of water	30.39138	-88.60314	1	unpub. data
18 May 2003	Wolf River, 1 mi south of I-10 in Harrison County	30.36067	-89.27067	1	unpub. data
18 Dec 2003	Bayou Caddy near the Mississippi/Louisiana border	30.23051	-89.41935	1	unpub. data
LOUISIANA					
17 May 1943	Lake St. Catherine near Grand Point	30.13215	-89.73512	1	Lowery (1974), Gunter and Corcoran (1981)
8 Apr 1975	Norco Shell Oil Plant	30.01103	-90.41778	1	Powell and Rathbun (1984)
10 Jul 1976	Atchafalaya River Swamp, 7 km SW of Morgan City	29.62077	-91.31142	1	Powell and Rathbun (1984)
22 Apr 1985	Amite River, 0.5 mi north of confluence of Bayou Manchac	30.35172	-90.90090	1	O'Shea (1988), Rathbun et al. (1990)
29 Apr 1985	Blind River, I-10 highway bridge	30.12668	-90.71951	1	O'Shea (1988), Rathbun et al. (1990)
11 May 1985	Pass Manchac, 3 mi west of Lake Pontchartrain	30.29727	-90.35292	1	O'Shea (1988), Rathbun et al. (1990)
21 May 1985	Pass Manchac, 1 mi west of Lake Pontchartrain	30.29995	-90.34176	1	O'Shea (1988), Rathbun et al. (1990)
22 Jun 1986	Ascension Parish, Amite River canal, 3 km upstream from Port Vincent	30.34849	-90.87216	1	unpub. data
9 Sep 1988	Tchefuncta River at Marina Del Rey Condos near Madisonville	30.41703	-90.12505	1	unpub. data
Oct or Nov 1989	mouth of Tchefuncta River	30.37705	-90.16102	1	unpub. data
21 Apr 1990	pond adjacent to canal at Chevron Plant, Venice	29.23610	-89.38390	1	unpub. data
13 Oct 1990	Amite River just above Port Vincent bridge	30.34510	-90.85293	1	unpub. data
14 Jun 1991	Intracoastal Canal in Homa/Morgan City area	29.60421	-90.98066	1	unpub. data
18 Jul 1991	Amite River near Diversion Canal and Blind River	30.27642	-90.81250	1	unpub. data
21 Jul 1991	Caernarvon Canal	29.85870	-89.89867	1	unpub. data
Mar 1992	Bonnet Carre Spillway	30.04706	-90.40687	2	unpub. data
6-12 Nov 1993	Eden Isles development, North Shore	30.22053	-89.79255	1	unpub. data

APPENDIX I (continued)

Date	Location description	Latitude	Longitude	No. Individ.	Source
	LOUISIANA (continued)				
27 May 1994	Grand Isle, Three Oaks Center	29.23491	-90.00534	1	unpub. data
16 May 1995	Oil rig slip off Blind River, 0.25 mi from Lake Maurepas	30.21507	-90.60213	1	unpub. data
17 May 1995	at abandoned marina in Bayou Liberty near Slidell, 1 mi up bayou from Lake Pontchartrain	30.26269	-89.85345	1	unpub. data
Jun 1995	North Pass at Manchac	30.32116	-90.40715	1	unpub. data
15 Jun 1995	North Pass just west of Middle Bayou	30.31381	-90.35476	1	unpub. data
17 Jun 1995	North Pass and Pass Manchac	30.30554	-90.32442	1	unpub. data
17 Jun 1995	Pass Manchac, just west of Lake Pontchartrain	30.30002	-90.31339	1	unpub. data
early Jul 1995	US Coast Guard Station, Venice	29.25556	-89.35236	1	unpub. data
10 Jul 1995	North Pass and Middle Bayou	30.30278	-90.33453	1	unpub. data
10 Jul 1995	Lake Pontchartrain, 3 mi out in lake from Bayou Lacombe	30.19021	-89.95863	2(c/c)	unpub. data
22 Jul 1995	App. 3 miles southeast of Breton Sound Marina in canal. near Hopedale. St. Bernard Parish	29.82267	-89.61985	1	unpub. data
26 Jul 1995	North Pass at Manchac	30.30700	-90.38800	1	unpub. data
7 Oct 1995	Retainer Canal adjacent to Mississippi/ Gulf outlet between Violet Canal and Bayou Bienvenue Canal	29.95889	-89.87937	1	unpub. data
13 Oct 1995	Reserve Relief Canal near Airline Hwy	30.08447	-90.54424	1	unpub. data
29 Oct 1995	Reserve Relief Canal just west of LaPlace between Airline Hwy and Lake Maurepas	30.10275	-90.54152	1	unpub. data
Nov 1995	Reserve Relief Canal just west of LaPlace between Airline Highway and Lake Maurepas	30.10275	-90.54152	1	unpub. data
12 Nov 1995	Eden Isles	30.21869	-89.79004	1	unpub. data
12 Nov 1995	Michoud Power Plant canal on the Mississippi River	30.01312	-89.92717	1	unpub. data
17 Nov 1995	Michoud Power Plant canal on the Mississippi River	30.01312	-89.92717	1	unpub. data
18 Nov 1995	Michoud Power Plant canal on the Mississippi River	30.01312	-89.92717	1	unpub. data
5 Dec 1995	In Lake Pontchartrain 2 mi from Chef Pass heading toward the Rigolets, near Irish Bayou, app. 5 mi offshore	30.14867	-89.76949	1	unpub. data
14 Dec 1995	Eden Isles development near Slidell	30.21869	-89.79004	1	unpub. data
mid-Dec 1995	Michoud Power Plant	30.01000	-89.92900	1	unpub. data
18 Dec 1995	Tickfaw River at Hwy 22, Killian	30.37724	-90.54779	1	unpub. data
9 Jul 1996	Eden Isles development near Slidell	30.21869	-89.79004	1	unpub. data
10 Jul 1996	Lake Borgne	30.05000	-89.51500	1	unpub. data
28 Sep 1996	Lake Borgne at mouth of Bayou Bienvenue	30.00577	-89.84812	1	unpub. data
25 Jun 1997	Mouth of Alligator Bayou, Blind River	30.22709	-90.65445	1	unpub. data

APPENDIX I (continued)

Date	Location description	Latitude	Longitude	No. Individ.	Source
LOUISIANA (continued)					
26 Jun 1997	Mouth of Alligator Bayou, Blind River	30.22709	-90.65445	1	unpub. data
1 Jul 1997	Bourgeois Canal off Blind River just north of I-10	30.15497	-90.69688	1	unpub. data
late Jul 1997	Amite River	30.30000	-90.84000	1	unpub. data
late Jul 1997	“The Weir” Amite at Diversion Canal	30.33480	-90.85830	1	unpub. data
9 Aug 1997	Lake Maurepas at mouth of Blind River	30.21295	-90.58940	1–2	unpub. data
12 Oct 1997	confluence of Natalbany and Tickfaw Rivers	30.36069	-90.48620	1	unpub. data
mid-Jun 1998	mouth of Blind River near Lake Maurepas	30.21220	-90.59441	1	unpub. data
29 Jun 1998	In Jefferson/St. Charles Canal heading from Lake Pontchartrain into swamp	30.03625	-90.27769	3	unpub. data
March thru mid-Jul 1998	Blind River near the mouth	30.21082	-90.60991	1	unpub. data
9 Aug 1998	Bayou Lacombe near gas pipeline company seaway (near seaplane base)	30.28128	-89.95272	1	unpub. data
29 Oct 1998	passing through lock on Inner Harbor Navigational Canal near New Orleans	29.96582	-90.02349	1	unpub. data
22 Nov 1998	near mouth of Bayou Liberty/Bayou Bonfouca near Lake Pontchartrain	30.24937	-89.86533	1	unpub. data
Jan 1999	Atchafalaya Delta	29.44681	-91.29490	1	unpub. data
13 Jun 1999	near where Violet Canal meets Lake Borgne (near Martello Castle)	29.93743	-89.84788	1–2	unpub. data
25 Jun–19 Jul 1999	north shore of Lake Pontchartrain. Mandeville Boat Harbor	30.37083	-90.08308	2(c/c)	unpub. data
10 Aug 1999	Flat Lake, near Morgan City	29.74359	-91.20041	1	unpub. data
Summer 1999	Blind River near Airline Hwy, (within 3 mi of St. James Boat Club)	30.09553	-90.72939	1	unpub. data
Summer 1999	around Mandeville harbor	30.34856	-90.06206	> 1	unpub. data
Summer 1999	around the Causeway at Lake Pontchartrain, Mandeville	30.36242	-90.08878	> 1	unpub. data
Summer 1999	Green Point, off Fontainebleau State Park in Lake Pontchartrain	30.32364	-90.04163	> 1	unpub. data
10 Aug 1999	Bayou Lacombe	30.25833	-89.95000	> 1	unpub. data
1 Sep 1999	High Bridge Canal between Madisonville and the lighthouse	30.38475	-90.16550	1	unpub. data
10 Sep 1999	Tchefuncte River, St. Tammany Parish	30.38793	-90.15710	1	unpub. data
8 Nov 1999	Sabine River just north of I-10 bridge	30.14023	-93.69567	1	unpub. data

APPENDIX I (continued)

Date	Location description	Latitude	Longitude	No. Individ.	Source
	LOUISIANA (continued)				
21–24 Nov 1999	west fork of Calcasieu River and Calcasieu River, Lake Charles	30.29794	-93.24755	1	unpub. data
28 Nov 1999	boat slip off salt mine canal on southeast end of Avery Island	29.88327	-91.93877	1	unpub. data
5 Dec 1999	Bayou Patout, northeast of Weeks Island, west of junction of Patout Canal & Iberia/St. Mary Canal	29.75671	-91.74669	1	unpub. data
7 Dec 1999	between Socola Canal #1 and Foster's Canal in Grand Bayou	29.51090	-89.76691	1	unpub. data
10 Dec 1999	between Socola Canal #1 and Foster's Canal in Grand Bayou	29.51090	-89.76691	1	unpub. data
21 Apr 2000	Martello Castle, Lake Bourne	29.88517	-89.74491	1	unpub. data
12 Jun 2000	Reserve Canal from near Lake Maurepas to near I-10	30.13155	-90.54696	1	unpub. data
mid-Jul 2000	Near Point-Aux-Chene	29.52771	-91.43816	1	unpub. data
21–23 Jul 2000	Bayou Lafourche from Raceland to Matthews	29.63682	-90.51146	1	unpub. data
12 Aug 2000	edge of Gulf north of Pass A L'oultre near mouth of Mississippi River	29.20770	-89.11896	1	unpub. data
4 Mar 2001	Amite River	30.27004	-90.76221	1	unpub. data
4 Jun 2001	Bogue Falaya near the old train trestle at the US 190 overpass in Covington	30.48109	-90.08441	1	unpub. data
9 Jul 2001	Inner Harbor Canal Lock (Industrial Canal at Mississippi River)	29.96034	-90.02560	1	unpub. data
18 Aug 2001	Calcasieu River, app. 1 mi east of I-210 bridge, Lake Charles	30.21198	-93.25891	1	unpub. data
15 Oct 2001	Lake Boeuf	29.87336	-90.59723	1	unpub. data
22 Oct 2001	Near Rigolets, St. Tammany Parish	30.22490	-89.79440	1	unpub. data
Nov 2001	Eden Isles, near entrance to Lake Pontchartrain	30.21983	-89.82734	1	unpub. data
2001	near jetty connecting Lake Bourne with ship channel	29.89557	-89.75230	1	unpub. data
9 May 2002	Bonnet Carre Spillway, southwest of Lake Pontchartrain	30.04944	-90.27500	1	unpub. data
11 May 2002	Faciane Canal at 301 Carr Drive	30.24177	-89.84100	1	unpub. data
12 May 2002	Irish Bayou Canal, town of Little Woods	30.11610	-89.86600	1	unpub. data
19 May 2002	Faciane Canal at 411 Carr Drive	30.23268	-89.85360	1	unpub. data
1 Jun 2002	Bay Eloi side of Mosquito Bayou	29.79000	-89.43000	1	unpub. data
9 Jun 2002	Mandeville Harbor	30.34100	-90.09500	1	unpub. data
18 Jul 2002	east side of sea wall (Mandeville)	30.34100	-90.09500	2	unpub. data

APPENDIX I (continued)

Date	Location description	Latitude	Longitude	No. Individ.	Source
LOUISIANA (continued)					
20 Jul 2002	between Tchefuncte River and Causeway near Mandeville	30.38997	-90.15536	1	unpub. data
23 Jul 2002	Sunset Point (2 miles from harbor). Mandeville, Lake Pontchartrain	30.34100	-90.09500	2	unpub. data
23 Jul 2002	marina at Causeway	30.34100	-90.09500	1	unpub. data
24 Jul 2002	Bayou Castine, at Causeway	30.34100	-90.09000	1	unpub. data
24 Jul 2002	Mandeville Harbor	30.34100	-90.09500	1	unpub. data
26 Jul 2002	Sunset Point, Mandeville. Lake Pontchartrain	30.34100	-90.09500	1	unpub. data
29 Jul 2002	Sunset Point, Mandeville, Lake Pontchartrain	30.34100	-90.09500	1	unpub. data
7 Aug 2002	Sunset Point, Mandeville, Lake Pontchartrain	30.34100	-90.09500	2	unpub. data
12 Aug 2002	Mandeville Harbor	30.34100	-90.09500	1	unpub. data
17 Aug 2002	jetties at South Pass	29.05165	-89.20135	1	unpub. data
19 Aug 2002	Sunset Point, Mandeville, Lake Pontchartrain	30.34100	-90.09500	2	unpub. data
19 Aug 2002	Slidell	30.22200	-89.83000	1	unpub. data
28 Aug 2002	Venice, in nearshore waters	29.27643	-89.35320	2(c/c)	unpub. data
Sep 2002	mouth of Tchefuncte River at Madisonville	30.37711	-90.16016	1	unpub. data
9 Sep 2002	Faciane Canal toward Paradise Island	30.23472	-89.85750	1	unpub. data
29 Sep 2002	Green Point (near Fontainebleau State Park), Mandeville	30.32368	-90.03954	1	unpub. data
10 Oct 2002	Mandeville Harbor	30.32022	-90.08827	4	unpub. data
8 Apr 2003	Slidell	30.24185	-89.86494	1	unpub. data
1 Jun 2003	Eden Isles	30.21983	-89.82777	1	unpub. data
2 Jun 2003	Conway Canal, swimming towards Blind River	30.22709	-90.66263	1	unpub. data
6 Jun 2003	Marina del Ray, Madisonville	30.27028	-89.77330	1	unpub. data
29 Jun 2003	Natalbany River	30.38901	-90.50471	1	unpub. data
16 Jun 2003	Goose Point (near Lacombe), St. Tammany Parish	30.26179	-89.93313	1	unpub. data
4 Jul 2003	Bayou Paquet near its junction with Bayou Liberty, Slidell	30.26330	-89.85710	2(c/c?)	unpub. data
13 Jul 2003	in open water at southwestern tip of the Chandeleur Islands	29.66000	-88.90000	1	unpub. data
17 Jul 2003	Mandeville Harbor	30.34100	-90.09500	1	unpub. data
30 Jul 2003	Indian Landing Marina (Bayou Castine)	30.35270	-90.04800	2	unpub. data
16 Aug 2003	Mouth of Cane Bayou, close to Lacombe	30.32000	-90.01000	1	unpub. data
22 Aug 2003	Leisure Landing on Tickfaw River, end of Hwy 1037, close to Springfield	30.36520	-90.59480	1	unpub. data
25 Aug 2003	North Shore Beach, outside Slidell and then in the North Shore canal	30.21000	-89.81000	2(c/c)	unpub. data
Sep 2003	Mandeville Harbor	30.34100	-90.09500	1	unpub. data

APPENDIX I (continued)

Date	Location description	Latitude	Longitude	No. Individ.	Source
LOUISIANA (continued)					
Nov 2003	Myrtle Grove, Plaquemines Parish	29.64043	-89.94495	1	unpub. data
6 May 2004	northwest side of the Barataria Bay island, Plaquemines Parish	29.37500	-90.00000	1	unpub. data
10 May 2004	Bayou Bienvenue, Mississippi outlet	29.27387	-89.15762	1	unpub. data
21 May 2004	Gulf outlet of Mississippi River	29.85053	-89.65748	1	unpub. data
1 Jul 2004	Amite River, app. 2 mi north of Port Vincent	30.34529	-90.87423	1	unpub. data
11 Aug 2004	Amite River	30.34178	-90.86118	1	unpub. data
TEXAS					
Summer 1912	Laguna Madre	27.72300	-97.31702	N/A	Gunter (1941, 1954), Powell and Rathbun (1984)
1913 or 1914	2 mi above mouth of Rio Grande River	25.98987	-97.12387	2	Gunter (1941), Powell and Rathbun (1984)
1915-1919	Mouth of Rio Grande River	25.96531	-97.12668	N/A	Gunter (1941)
2 Oct 1976 ³	Fish Pass near Corpus Christi, Mustang Island	27.64888	-97.24066	1	Powell and Rathbun (1984), Fernandez and Jones (1990)
late May 1977	North Padre Island, off 2nd sandbar, in surf southeast of Padre Island Beach Hotel	26.52291	-97.26163	1	unpub. data
late Jul 1977	North Padre Island, off 2nd sandbar, in surf southeast of Padre Island Beach Hotel	26.48997	-97.24366	1	unpub. data
9 Nov 1992	Port Isabel, lower Laguna Madre	26.07611	-97.22222	1	unpub. data
7 Jul 1994	lower Laguna Madre, near swing bridge, South Padre Island	26.07083	-97.20000	1	unpub. data
Summer 1994	Arroyo Colorado	28.61667	-95.95000	1	unpub. data
Sep 1994	Laguna Madre	27.71177	-97.28558	1	unpub. data
Aug 1995	Port Mansfield Pass	26.55000	-97.30000	1	unpub. data
3-8 Sep 1995	west Galveston Bay near San Luis Pass	29.08333	-95.13333	2(c/c)	Schiro and Fertl (1995)
15 Sep 1995	Galveston, 8 km east of San Luis Pass	29.13333	-95.08333	2 c/c)	Schiro and Fertl (1995)
18 Sep 1995	Sea Isle, Galveston	29.13333	-95.08333	2 c/c)	Schiro and Fertl (1995)
18 Sep 1995	North Deer Island, Galveston Bay	29.28333	-94.93333	2(c/c)	Schiro and Fertl (1995)
early Oct 1995	Port Mansfield area	26.55000	-97.38333	2(c/c)	Schiro and Fertl (1995)
8 Oct 1995	Laguna Madre, Gulf Intracoastal Waterway near marker 5	27.70129	-97.27135	1	unpub. data
15 Oct 1995	35 mi south of John F. Kennedy Causeway, Laguna Madre	27.69538	-97.31998	1	Schiro and Fertl (1995)

³Powell and Rathbun (1984) listed an incorrect date; Sirenia Project Files have date as 2 Oct 1976

APPENDIX I (continued)

Date	Location description	Latitude	Longitude	No. Individ.	Source
TEXAS (continued)					
18 Oct 1995	near Paul's Mott Lake behind San Jose Island, Aransas Bay	27.96667	-96.98333	1	unpub. data
25 Oct 1995	Barney Davis Power Plant, Corpus Christi	27.60250	-97.30500	1	unpub. data
26 Oct 1995	fishing pier at Naval Air Station Corpus Christi	27.71018	-97.30112	1	unpub. data
31 Oct 1995	Naval Station Ingleside	27.81833	-97.20833	1	unpub. data
2 Nov 1995	Rockport Harbor and boat basin	28.02952	-97.02458	1	unpub. data
6 Nov 1995	Koch Refinery on the La Quinta Channel, Corpus Christi	27.81432	-97.39074	1	unpub. data
8 Nov 1995	near Texas State Aquarium	27.83000	-97.39000	1	unpub. data
11 Nov 1995	south jetty of the Aransas Pass	27.83667	-97.04500	1	unpub. data
12 Nov 1995	University of Texas Marine Science boat basin	27.83667	-97.05167	1	unpub. data
12 Nov 1995	Port Aransas Municipal Harbor	27.83833	-97.06667	1	unpub. data
27 Nov 1995	69th Street Wastewater Treatment Plant, Houston	29.70000	-95.28333	1	Schiro and Fertl (1995)
6 Dec 1995	69th Street Wastewater Treatment Plant, Houston	29.70000	-95.28333	1	unpub. data
May 1996	San Leon, Galveston Bay	29.50000	-94.91667	1	unpub. data
14 Jul 2001	Rockport	28.04100	-97.02261	1	unpub. data
late Jul 2001	University of Texas Marine Science Institute boat basin	27.83667	-97.05167	1	unpub. data
11 Sep 2001	Hampton's Landing boat basin in Aransas Pass	27.88034	-97.13994	1	unpub. data
23 Sep 2001	inlet between Texas State Aquarium and Lexington Museum	27.81833	-97.38472	1	Beaver (2001)
3 Oct 2001	near Texas State Aquarium	27.83000	-97.39000	1	unpub. data
11 Oct 2001	near Portland	27.83569	-97.35056	1	unpub. data
26 Oct 2001	near Portland	27.85083	-97.35028	1	unpub. data
14 Nov 2001	dock at Valero Refining Company, Corpus Christi	27.81833	-97.47500	1	unpub. data
29 Nov 2001	near Portland	27.82246	-97.43557	1	unpub. data
30 Nov 2001	near Portland	27.80821	-97.38879	1	unpub. data
5 Dec 2001	near Portland	27.84852	-97.32349	1	unpub. data
12 Dec 2001	near Portland	27.83569	-97.35056	1	unpub. data
8 Oct 2003	Port Isabel, lower Laguna Madre	27.69148	-97.25848	1	unpub. data
27 Jun 2004	Port Aransas Municipal Harbor/Trout Street Marina	27.84000	-97.06000	1	unpub. data
20 Jul 2004	south jetty of the Aransas Pass	27.83785	-97.05050	1	unpub. data
21 Jul 2004	south jetty of the Aransas Pass	27.83417	-97.04583	1	unpub. data
26 Jul 2004	Padre Isles residential channel off Fortuna Bay Drive	27.59117	-97.24333	1	unpub. data
2 Aug 2004	near Hampton's Landing, Aransas Pass	27.88534	-97.13994	1	unpub. data
6 Aug 2004	south jetty of the Aransas Pass	27.83333	-97.04167	1	unpub. data
7 Aug 2004	near Reynold's Aluminum Plant (La Quinta Channel)	27.83317	-97.26680	1	unpub. data
15 Aug 2004	Willacy County Navigation District Ramp (south ramp)	26.5854	-97.4471	1	unpub. data

APPENDIX II

Mortality records for manatees in the northern Gulf of Mexico, west of Florida. Each record represents a single individual. FWC MMPL - Florida Fish and Wildlife Commission, Marine Mammal Pathobiology Lab, St. Petersburg, Florida; FWSJX—US Fish and Wildlife Service, Jacksonville, Florida; LA—Louisiana; PI—Padre Island, Texas; PO—Port O’Connor, Texas; SHCM—Spring Hill College, Mobile, Alabama; TCWC—Texas Wildlife Cooperative Collection, Texas A&M University, College Station, Texas; USNM—US National Museum, Washington, DC; VM—belongs to Houston Museum of Natural Science, Vertebrate Mammalogy department, Houston, Texas.

Date	Location description	Latitude	Longitude	Specimen number	Cause of death	Source	Notes
ALABAMA							
13 Jan 1992	Mobile Bay, east junction of Highway 98 and County Road 1	30.41660	-87.90083	SHCM 119	cold stress	unpub. data	3.2 m male; 554.5 kg
20 Jul 2000	near the Beer Cans Rig off Mobile	30.16670	-88.03330	N/A	N/A	unpub. data	floater
26 Feb 2002	south shore of Dog River	30.58170	-88.11030	SHCM 350	cold stress	unpub. data	2.6 m male
4 Jan 2004	Rabbit Creek near end of Le Blanc Road	30.58080	-88.12972	SHCM 370	N/A	unpub. data	3.3 m male
MISSISSIPPI							
3 Jan 1980	1/4 mile east of eastern end Ship Island, north shore	30.20000	-88.86667	Sirenia Project salvage records M-179	starvation and cold stress	Gunter and Corcoran (1981), Powell and Rathbun (1984)	2.3 m female; 240.4 kg
8 Feb 2001	Horn Island, south beach bout 1/2 mi east of ranger station trail	30.22890	-88.65440	FWC MMPL MS2001UNK	cold stress	unpub. data	2.8 m individ.
17 Feb 2002	shore of Back Bay in Biloxi (6500 Old Bay Rd)	30.41580	-88.99417	FWC MMPL MS2002UNK	unknown	unpub. data	2.4 m male; 680 kg
LOUISIANA							
Jan 1929	McFaddens Beach, Calcasieu Lake	29.88880	-93.28894	USNM 257406	dynamite blastings by oil survey party	Gunter (1941, 1954), Lowery (1943), Moore (1951a), Lowery (1974), Gunter and Corcoran (1981), Hartman (1974), Powell and Rathbun (1984)	skull length of 381 mm
15 Jun 1995	canal between middle Bayou (off North Pass) and Tangipahoa River	30.33860	-90.31247	N/A	human interaction	unpub. data	2.7 m individ.
*22 Jul 1995	App. 3 mi southeast of Breton Sound Marina in canal, near Hopedale, St. Bernard Parish	29.82270	-89.61985	LA 9501	human interaction	unpub. data	2.7 m individ. > 454 kg

APPENDIX II (continued)

Date	Location description	Latitude	Longitude	Specimen number	Cause of death	Source	Notes
LOUISIANA (continued)							
5 Dec 1995	Vermilion Bay	29.75078	-92.15983	N/A	N/A	unpub. data	floater
31 Jan 1996	Bally's Casino Lakeshore Resort, southern shore of Lake Pontchartrain	30.03420	-90.00216	FWSJX 9601	caught in pumping station pipe	unpub. data	3.2 m individ.
9 Sep 1997	Locust Bayou near Pt. Au Fer, near the Mobil Oil facility, Terrebonne Parrish	29.30050	-91.29127	LA-035-97	undetermined	unpub. data	3.2 m male
14 Dec 1999	Bayou Patout, northeast of Weeks Island, west of junction of Patout Canal and Iberia/St. Mary Canal	29.84040	-91.74000	N/A	N/A	unpub. data	> 3.0 m male
11 Dec 2000	Creole Bayou area between Atchafalaya and 4 League Bays	29.40890	-91.20928	N/A	N/A	unpub. data	1.8-2.7 m individ.; 227-454 kg
10 Dec 2001	Lake Borgne, 17 mi southeast of Bay St. Louis	30.52530	-89.39388	N/A	N/A	unpub. data	N/A
21 Feb 2001	Intracoastal Waterway, 7-8 mi west of Larose	29.56040	-90.49310	N/A	N/A	unpub. data	N/A
early Apr 2002	Pointe a la Hache (Plaquemines Parish)	29.55230	-89.88416	N/A	N/A	unpub. data	N/A
29 May 2002	Eloi Bay, near Shell Beach	29.73760	-89.46840	N/A	N/A	unpub. data	carcass disappeared
26 Mar 2003	Raceland, in canals north of Lake Field	29.66030	-90.59994	N/A	N/A	unpub. data	N/A
3 Aug 2003	mouth of Tchefuncte River	30.37710	-90.16016	N/A	N/A	unpub. data	> 454 kg
end of Feb 2004	Biloxi Wildlife Management Area	30.04292	-89.53004	N/A	N/A	unpub. data	N/A
TEXAS							
Jul 1928	north end of Shellbank Reef in Copano Bay near town of Bayside	28.83330	-95.60000	TCWC 1528	N/A	Gunter (1941, 1944), Moore (1951a), Hartman (1974), Powell and Rathbun (1984), Fernandez and Jones (1990), Jefferson and Baumgardner (1997)	578 cm male
prior to 1929	San Jose Island, east of Rockport	27.99175	-97.04487	VM.132 and VM.133	N/A	Baumgardner and Brooks (2001)	N/A
1937	mouth of Cow Bayou, near Sabine Lake, Cameron Parish	29.86300	-93.80562	N/A	N/A	Gunter (1941, 1944), Lowery (1943 ¹ , 1974), Hartman (1981), Powell and Rathbun (1984)	male

¹Lists incorrect date of July 1928 for this account.

APPENDIX II (continued)

Date	Location description	Latitude	Longitude	Specimen number	Cause of death	Source	Notes
TEXAS (continued)							
4 Feb 1986	1 mi west of Caplen. Bolivar Peninsula	29.48560	-94.53527	TCWC 49000	7 holes and a recent rope mark	O'Shea (1988) ² ; Fernandez and Jones (1990), Jefferson and Baumgardner (1997) ²	2.7 m male
30 Nov 1992	40 km north of Brazos Santiago Pass	26.43670	-97.22833	PI53	N/A	unpub. data	> 2.7 m individ.; 544 kg
31 Oct 1993	15.7 mi east of beach turnoff (Matagorda County Jetty Park)	28.71670	-95.70600	P0274	Human interaction (bullet hole in head caused death; old bullet in rib; caught in monofilament)	unpub. data	2.5 m male; 172.2 kg
18 Dec 1999	3 mi north of Wynn access road, Calhoun County	28.14500	-96.75350	PO375	starvation and cold stress	unpub. data	2.6 m female
14 Oct 2001	Gulf Intracoastal Waterway by County Park, Sargent Beach	28.76400	-95.62917	PO386	not determinable (malnourished?)	Beaver (2001)	3.0 m male; > 454 kg

²Source provides incorrect date of 1983.