Assessment of Marine Turtle Aggregations in the Coastal Waters of Lee County, Florida

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Final Report to
Sea Turtle Grants Program
For Contract No. #09-050R

Submitted to:
Sea Turtle Conservancy, 4424 NW 13th St. Suite B-11
Gainesville, Florida 32609

Submitted by:
Jeffrey R. Schmid
Environmental Science Division, Conservancy of Southwest Florida
1450 Merrihue Drive, Naples, Florida 34102

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INTRODUCTION

This final report covers the period from 01 May 2009 to 29 April 2011 of a contractual services agreement between Caribbean Conservation Corporation and Conservancy of Southwest Florida as part of the Sea Turtle Grants Program. The purpose of this agreement was to assess the aggregations of marine turtles inhabiting the coastal waters of Lee County, Florida, using in-water sampling techniques.

A number of in-water tagging studies have characterized aggregations of marine turtles in certain nearshore areas of western Florida (Apalachee Bay - Rudloe et al., 1991; Deadman Bay – Barichivich, 2006; Cedar Keys/Waccasassa Bay - Schmid, 1998; Ten Thousand Islands/Gullivan Bay - Witzell and Schmid, 2004); however, information gaps still exist along the extensive west coast (Eaton et al., 2008). These gaps are of importance as this region represents developmental habitat that is critical to the viability of the Kemp's ridley turtle, *Lepidochelys kempii* (Schmid and Barichivich, 2005, 2006), as well as western Atlantic subpopulations of loggerhead, *Caretta caretta*, and green turtles, *Chelonia mydas*. A recommendation from the 5-year review of the Kemp's ridley turtle (NMFS and USFWS, 2007) and Florida's in-water monitoring program (Eaton et al., 2008) is that long-term studies are needed to monitor the status of immature turtles in the marine environment at key foraging areas. The Charlotte Harbor estuarine complex, including Pine Island Sound, was identified as a candidate index site for the in-water monitoring program.

Mote Marine Laboratory has collected extensive sighting data (250+ turtles) and conducted field surveys to study the in-water ecology of marine turtles in the Charlotte Harbor National Estuary (Eaton et al., 2008). These previous efforts have documented habitat partitioning among the species and identified certain areas in Pine Island Sound as foraging

habitat for Kemp's ridley turtles. However, hurricanes Charley (2004) and Wilma (2005), combined with logistical difficulties from their after-effects, have impeded the progress of in-water sampling in Charlotte Harbor. Furthermore, passive fishing methods (i.e., set netting) were not an overly effective method for capturing turtles in these waters. The results presented herein are a continuation of these earlier tagging studies, and a continued collaboration between the Conservancy of Southwest Florida and Mote Marine Laboratory. The purpose of the current study is to characterize aggregations of marine turtles inhabiting the coastal waters of Lee County, Florida using active fishing methods (i.e., strike netting) to capture turtles. Long-term study objectives include providing data on the species composition, relative abundance, genetic structure, trophic status, seasonality, and size-class distribution of marine turtles occurring in this region, and provide additional information on the site fidelity, growth, diet, movements, and migrations of Kemp's ridley turtles.

MATERIALS AND METHODS

Lee County is located on the southwest coast of Florida (Fig. 1) and its coastal waters include the lower portion of Charlotte Harbor proper, Pine Island Sound, San Carlos Bay, and Estero Bay. Marine turtle sampling efforts were concentrated in the southeastern portion of Pine Island Sound. Pine Island Sound is bounded by Pine Island to the east and Cayo Costa, Captiva Islands, and Sanibel Island to the west. Three passes separate the westward islands and provide access to the Gulf of Mexico: Captiva Pass, Redfish Pass, and Blind Pass. The Caloosahatchee River flows in from the east, draining Lake Okeechobee, and is the major source of freshwater inflow to the lower Charlotte Harbor estuary. Field operations were based from Mote's Charlotte

Harbor field station on Demere Key. The Conservancy's 7 m tunnel hull skiff (*RV McQueggie*) was used for all research activities (Fig. 2).

In-water surveys were conducted one week during a given month to collect wild marine turtles foraging in nearshore waters. Surveys were performed by stopping the vessel at an area of aggregation and observing turtles that surfaced to breathe. Species were identified by size and color of the head and locations of sightings were recorded via global positioning system. Per established protocols (Ehrhart and Ogren, 1999; Witzell and Schmid, 2004), turtles were captured with a 200 m strike net with 35.5 cm stretch-mesh #9 nylon webbing, 4 m deep, braided polyfoam float line, and braided leadcore line. A net with heavier twine (#18) and smaller mesh (20 cm stretch) was initially used but proved ineffective for capturing turtles. When a turtle was sighted, the net was deployed off the stern of the research vessel at high speed, encircling the turtle (Fig. 2), and held closed until the turtle was either observed entangled in the net or until 20 min. had elapsed without sighting the animal. Adult-size loggerheads were not targeted for capture given logistical difficulties with landing and handling large turtles in the boat. Additionally, the strike net was not deployed if marine mammals were in the area or the net was immediately retrieved if marine mammals were sighted after a strike. Netting activities were either moved to a different location or resumed after marine mammals had left the area. Measures were taken to retrieve netted turtles (Fig. 3) and by-catch (stingrays and sharks) immediately upon capture, the latter of which was released alive after extraction from the net.

The following morphometric measurements were recorded for captured turtles: standard straight-line carapace length (SSCL, midline of nuchal scute to posterior margin of supracaudals); minimum straight-line carapace length (MSCL, midline of nuchal scute to the posterior notch of supracaudals); minimum curved carapace length (midline of nuchal scute to

the posterior notch of supracaudals); and straight-line carapace width at the widest point. Straight-line lengths and width were measured to the nearest 0.1 cm with Vernier calipers. Curved carapace length was measured to the nearest 0.1 cm with flexible fiberglass tape. Weight was measured to the nearest 1 kg with a spring scale. Notes on the condition of the turtle were recorded if the animal was injured or deformed (e.g., tag scars, carapace and flipper wounds, fibropapillomas, etc.) and each turtle was scanned for external and internal tags. Untagged turtles were single (< 32 cm MSCL) or double tagged with Inconel tags on the trailing edge of the front flippers and a passive integrated transponder (PIT) tag inserted in the left front flipper per established protocols (FFWCC, 2007). A section of skin tissue was obtained from a rear flipper of captured turtles using a 4 mm biopsy punch and samples were archived at Mote for stable isotope analyses.

A subset of Kemp's ridley turtles were transported to Mote's field station on Demere Key for collection of fecal samples. Turtles were placed in shaded polyethylene holding tanks with ambient seawater and held for 24-48 hours per established protocol (Witzell and Schmid, 2005; FFWCC, 2007). One turtle was held per tank (Fig. 4) and 2-3 tanks were maintained on site during sampling activities. The water was changed twice daily with seawater pumped from Pine Island Sound and all solid defecated materials were removed, placed in individually-marked plastic bags, and stored in a freezer at the Conservancy for later processing. Additionally, two Kemp's ridley turtles were instrumented with satellite transmitters (Fig. 4) and locational data were archived and evaluated in Satellite Telemetry Analysis Tool (STAT; Coyne and Godley, 2005). After processing, turtles were released near the original capture site.

RESULTS AND DISCUSSION

Sampling Effort

Ten sampling trips were conducted between August 2009 and April 2011. A strike net was constructed with heavy twine (#18) and small mesh (20 cm stretch) and used during the first 2 trips. The net was deployed on 9 turtles but did not result in any captures. On at least 4 occasions, we encircled Kemp's ridley turtles with the net and then observed the animal surfacing and "probing the perimeter" for some time without becoming entangled. It was therefore concluded the net was not fishing effectively due to the twine and mesh size of the webbing. The strike net formerly used in the Ten Thousand Islands studies was obtained and used for trips 3 – 6. As a result, capture rates increased substantially (Table 1). The webbing in the first net was replaced with smaller twine (#9) and larger mesh (35.5 cm stretch) and used for trips 7 – 10. Capture rates for the new and improved strike net were comparable to that of the one used in former studies. Marine conditions were a major factor influencing sampling effort and capture rates, whereby high winds and choppy seas hampered the ability to observe and capture turtles.

Sampling efforts were focused in southeastern Pine Island Sound in a deepwater basin off Regala Island. The bottom type in this area appears to be soft sediments with scattered sponge beds (i.e., live bottom). Live bottom has been identified as the preferred foraging habitat for Kemp's ridleys in the Cedar Keys (Schmid et al., 2003) and the Ten Thousand Islands (Schmid, 2004). Intensive tracking of turtles and benthic habitat mapping are needed to determine if Kemp's ridleys in Pine Island Sound exhibit a similar preference for live bottom. Seagrass beds occur in shallower depths peripheral to the basin and extend northward along the eastern shore of Pine Island Sound.

Marine Turtle Sightings and Captures

Locational data were collected for 138 marine turtle observations in the Pine Island Sound study area (Figs. 5 and 6). Of this total, there were 50 sightings (including net strikes without captures) and 45 captures of Kemp's ridley, 31 sightings and 5 captures of loggerhead, and 5 sightings and 2 captures of green turtles. Tagging data for captured turtles are provided in Table 2. The aggregation in Pine Island Sound was dominated by immature Kemp's ridley turtles, as has been documented in other nearshore areas of west Florida (Schmid, 1998; Witzell and Schmid, 2004; Barichivich, 2006; Table 3). Immature and mature loggerhead turtles had the second highest abundance and their aggregation was primarily composed of adult-size turtles based on observational data. Green turtles were the least abundant, perhaps owing to their more cryptic behavior (shorter surfacing intervals) and/or use of different foraging habitat (seagrass beds rather than live bottom).

Old wounds to the flipper and carapace were observed on a number of captured turtles; most notable were 3 Kemp's ridleys with damage characteristic of a boat/propeller strike (Fig. 7). Small sample size notwithstanding, at least 7% of the Kemp's ridleys captured in Pine Island Sound exhibited propeller damage compared to 2% in Ten Thousand Islands (3 out of 178 turtles; Witzell and Schmid, 2004). The seemingly higher rate of boat strikes may be a consequence of the Intracoastal Waterway near the western shoreline of Pine Island Sound and the resulting higher boat traffic. However, there was also substantial boat traffic, particularly high-speed flats boats, traversing the study area off Regala Island on the eastern shore. One of the green turtles was missing its left front flipper and had a scar on its throat resembling the entrance and exit of a fishing hook. This turtle also had a small nodule resembling a fibropapilloma on the ventral lid of its right eye.

Recaptures and Movements

Two Kemp's ridley turtles tagged in Pine Island Sound were recaptured after 28 and 162 days at large. The former demonstrates short-term (within season) fidelity to the study area and the latter long-term (between season) fidelity, both of which have been reported in other west Florida in-water tagging studies (overview by Schmid and Barichivich, 2005). One of the Kemp's ridleys instrumented with a satellite transmitter exhibited between season fidelity to the study area by leaving Charlotte Harbor in late fall, heading south and wintering off the Florida and Marquesas Keys, and returning to within a few kilometers of its capture site in early spring before transmissions ceased (Fig. 8). Barnacle fouling has been identified as a problem with Inconel flipper tags (Schmid and Ogren, 1992; Schmid, 1998) and a few small (2-3 mm) barnacles were observed on the flipper tag of the short-term recapture while those of the long-term recapture were heavily encrusted (Fig. 9). The increased drag and weight of the fouled tag and necrosis of the tissue by the barnacle cluster eventually leads to tag loss and the formation of a conspicuous notch (i.e., tag scar) in the flipper. An adult-size Kemp's ridley was captured in Pine Island Sound that exhibited tag scars (Fig. 9) but had no detectable PIT or living tags, so the capture history of this animal remains unknown. This turtle was also tracked via satellite telemetry and appeared to be a transient in the study area, immediately leaving Pine Island Sound after release and moving northward to a feeding area offshore Homosassa Bay (Fig. 10).

Diet Studies

Twenty-six fecal samples were collected from 32 Kemp's ridley turtles that were temporarily held in captivity at Mote's field station. Two of the turtles were recaptures and yielded 2 samples each. A detailed examination of the fecal and biopsy samples will be performed in a subsequent investigation of the trophic status and foraging ecology Kemp's ridley

turtles inhabiting the Charlotte Harbor estuary (Schmid, Tucker, and Seminoff, Sea Turtle Grant #11-008R). Nonetheless, cursory examination of the samples indicated that all but one contained spider crab (*Libinia* sp.) and a few samples also had fragments identified as purse crab (*Persephona mediterranea*) or calico crab (*Hepatus epheliticus*). The one sample without spider crab contained only blue crab (*Callinectes sapidus*).

Kemp's ridleys are considered cancivorous and the aforementioned crab species have been reported in other dietary studies (Table 4). The perceived diet in Pine Island Sound is most similar to that reported for smaller-size turtles in Deadman Bay (Barichivich et al., 1998), located approximately 369 km to the north, rather than similar-size turtles in the Ten Thousand Islands (Witzell and Schmid, 2005), located approximately 91 km to the south. Kemp's ridleys appear to be opportunistic foragers and utilize readily available prey in a given area (Shaver, 1991: Werner, 1994: Witzell and Schmid, 2005). Spider crabs are occasionally entangled in the net during fishing operations and blue crabs have been observed swimming near the surface, but the relative availability of prey within the Pine Island Sound study area is unknown. A Kemp's ridley was observed feeding on a horseshoe crab (*Limulus polyphemus*) in Charlotte Harbor proper (Barleycorn and Tucker, 2005), suggesting that diet and prey availability may vary in other portions of the estuary.

CONCLUSIONS

The relatively large number of sightings and captures in Pine Island Sound reinforce the importance of the Charlotte Harbor estuary as marine turtle developmental habitat, particularly for the critically endangered Kemp's ridley turtle. Preliminary examination of Kemp's ridley fecal samples has revealed that spider crabs are the primary component in their diet. The isotope

composition of Kemp's ridleys will be compared to those of their prey and habitat components in one of the first and most comprehensive investigations into the trophic ecology of this species. Tag recaptures and satellite tracking data suggest that Kemp's ridleys exhibit both short-term and long-term fidelity to Lee County waters but further in-water surveys are needed to compare with the results of other west Florida studies. Tracking efforts will be expanded in the following years to provide a better understanding of how Kemp's ridleys use Charlotte Harbor estuary and surrounding waters.

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Table 1. Summary of sampling effort for in-water marine turtle surveys in Pine Island Sound, Florida. LK – *Lepidochelys kempii*, CC – *Caretta caretta*, and CM – *Chelonia mydas*.

Trip	Dates	Species	Sighting w/out strike	Strike w/out capture	Strike w/ capture	Capture rate
1	Aug. 11 - 14, 2009	LK	3	4	0	0%
		CC	3	0	0	
		CM	0	1	0	
2	Sep. 28 - Oct. 2, 2009	LK	3	4	0	0%
		CC	5	0	0	
		CM	1	0	0	
3	Oct. 19 - 22, 2009	LK	1	0	3	100%
		CC	2	0	0	
		CM	1	0	0	
4	April 12 - 16, 2010	LK	3	3	1	50%
		CC	2	0	1	
		CM	1	0	1	
5	May 3 - 7, 2010	LK	3	3	7	73%
		CC	4	0	1	
		CM	0	0	0	
6	Sep. 20 - 24, 2010	LK	4	1	10	91%
		CC	1	0	0	
		CM	0	0	0	
7	Oct. 18 - 22, 2010	LK	5	2	7	78%
		CC	6	0	0	
		CM	1	0	0	
8	Nov. 15 - 19, 2010	LK	2	2	4	71%
		CC	4	0	1	
		CM	0	0	0	
9	Mar. 14 - 17, 2011	LK	3	2	6	78%
		CC	2	0	1	
		CM	0	0	0	
10	Apr. 25 - 29, 2011	LK	1	1	7	90%
		CC	2	0	1	
		CM	0	0	1	

Table 2. Tagging data for marine turtles captured in Charlotte Harbor Estuary. RFF – right front flipper, LFF – left front flipper, LAT – latitude, LON – longitude, MSCL – minimum straight carapace length (cm), and WGHT – weight (kg).

SPECIES	NEW_RFF	NEW_LFF	OLD_RFF	OLD_LFF	PIT_LFF	DATE_TIME	LAT	LON	MSCL	WGHT
Lepidochelys kempii	YYX 860				4A62696215	10/21/09 16:30	26.5308	-82.1283	28.2	
Lepidochelys kempii	YYX 857				4A3953400F	10/22/09 9:55	26.5307	-82.1291	38.2	
Lepidochelys kempii	YYX 869	YYX 758			4A7F115005	10/22/09 15:08	26.5393	-82.1301	40.9	
Chelonia mydas	YYX 759				4A79074C0B	4/14/10 10:10	26.5340	-82.1266	52.4	
Lepidochelys kempii	YYX 865	YYX 860			4A0F263B26	4/15/10 15:32	26.5322	-82.1258	38.4	9.0
Caretta caretta	YYX 761	YYX 762			4B126B0816	4/16/10 9:30	26.5300	-82.1274	64.2	
Lepidochelys kempii	YYX 894	YYX 892			4B06143F2E	5/3/10 16:45	26.5308	-82.1286	38.4	7.0
Lepidochelys kempii	YYX 895	YYX 896			4A0B0C4412	5/4/10 16:10	26.5176	-82.1258	48.3	17.0
Lepidochelys kempii	YYX 765	YYX 766			4A0C210A14	5/5/10 10:40	26.5300	-82.1277	32.0	4.0
Lepidochelys kempii	YYX 767	YYX 768			4A0C123F58	5/5/10 13:40	26.5275	-82.1257	43.2	12.0
Lepidochelys kempii	YYX 764				4A0B31320C	5/5/10 15:45	26.5310	-82.1263	31.3	4.0
Lepidochelys kempii	YYX 769	YYX 770			4A0A667B06	5/6/10 14:55	26.5155	-82.1253	42.3	11.0
Lepidochelys kempii	YYX 772	YYX 771			4A0C173D74	5/6/10 16:10	26.5339	-82.1279	43.5	12.0
Caretta caretta	YYX 773	YYX 763			4A0B242032	5/7/10 12:55	26.5790	-82.1454		
Lepidochelys kempii	UUR 809	UUR 808			4C133C0074	9/21/10 8:55	26.5392	-82.1293	46.4	13.0
Lepidochelys kempii	YYX 775	YYX 774			4C132C1066	9/21/10 9:55	26.5288	-82.1302	38.6	
Lepidochelys kempii	UUR 811	UUR 810			4A0B274A49	9/22/10 13:10	26.5399	-82.1326	51.8	18.0
Lepidochelys kempii	UUR 813	UUR 812			4A0A647113	9/23/10 9:30	26.5351	-82.1315	41.4	9.0
Lepidochelys kempii	UUR 817	UUR 816			4C13364F76	9/23/10 9:30	26.5351	-82.1315	39.3	7.0
Lepidochelys kempii	UUR 819	UUR 818			4A0B370B7F	9/23/10 9:58	26.5347	-82.1315	49.8	15.0
Lepidochelys kempii	UUR 815	UUR 814			4B030F225F	9/23/10 10:42	26.5337	-82.1323	39.1	7.0
Lepidochelys kempii	UUR 821	UUR 820			4C133B154C	9/24/10 10:34	26.5346	-82.1316	52.3	21.0
Lepidochelys kempii	UUR 823	UUR 822			4C132D2B5E	9/24/10 11:34	26.5349	-82.1314	39.2	8.0
Lepidochelys kempii	UUR 825	UUR 824			4C133C554A	9/24/10 11:34	26.5349	-82.1314	35.0	5.0
Lepidochelys kempii	UUR 827	UUR 826			4C132C4C3D	10/19/10 9:35	26.5324	-82.1293	41.1	8.0
Lepidochelys kempii	UUR 829	UUR 828			4A0B257F6A	10/19/10 17:05	26.5340	-82.1283	38.8	6.0
Lepidochelys kempii	UUR 832	UUR 831			4C132F1853	10/20/10 10:15	26.5335	-82.1292	43.8	10.0
Lepidochelys kempii		UUR 830			4C132B7140	10/20/10 11:40	26.5343	-82.1289	29.5	3.0

Table 2. (continued)

SPECIES	NEW_RFF	NEW_LFF	OLD_RFF	OLD_LFF	PIT_LFF	DATE_TIME	LAT	LON	MSCL	WGHT
Lepidochelys kempii	UUR 834	UUR 833			4C132B5060	10/21/10 11:00	26.5319	-82.1284	51.8	19.0
Lepidochelys kempii	UUR 836	UUR 835			4C13311271	10/21/10 15:00	26.5292	-82.1279	42.2	8.0
Lepidochelys kempii	UUR 838	UUR 837			4C132A1700	10/22/10 11:50	26.5307	-82.1283	40.4	8.0
Lepidochelys kempii	UUR 839				4C132C4142	11/15/10 14:25	26.5337	-82.1313	24.2	< 1.0
Lepidochelys kempii	UUR 843	UUR 842			4A0B1E6234	11/16/10 17:00	26.5381	-82.1315	51.1	15.0
Lepidochelys kempii				UUR 830	4C132B7140	11/17/10 9:35	26.5333	-82.1287	29.6	2.0
Caretta caretta	UUR 841	UUR 840			4A0B1D5A7C	11/17/10 11:20	26.5361	-82.1282	84.5	
Lepidochelys kempii	UUR 845	UUR 844			4A0B7A6E12	11/17/10 16:12	26.5395	-82.1306	37.4	5.0
Lepidochelys kempii		UUR 848			4C13382F30	3/14/11 17:04	26.5336	-82.1308	30.5	2.5
Caretta caretta	UUR847	UUR 846			4A731A5A05	3/15/11 11:04	26.5345	-82.1308	74.1	
Lepidochelys kempii	UUR854	UUR853	*	*	4C132D0B5D	3/15/11 16:42	26.5352	-82.1311	62.7	
Lepidochelys kempii	UUR850	UUR849			4A71626E58	3/15/11 17:20	26.5374	-82.1298	39.8	8.0
Lepidochelys kempii	UUR856	UUR855			4C132C2401	3/16/11 10:20	26.5349	-82.1314	43.0	9.0
Lepidochelys kempii	UUR852	UUR851			4C13366A4C	3/16/11 11:50	26.5355	-82.1304	49.5	16.0
Lepidochelys kempii	UUR857				4C133C3530	3/17/11 14:05	26.5398	-82.1313	26.4	1.0
Lepidochelys kempii	UUR864	UUR865			4C13330D23	4/25/11 15:43	26.5328	-82.1321	42.1	8.0
Lepidochelys kempii	UUR862				4C132F4A60	4/25/11 16:15	26.5326	-82.1310	28.5	1.0
Lepidochelys kempii	UUR866	UUR865			4C13303937	4/26/11 8:57	26.5333	-82.1302	41.3	6.0
Chelonia mydas	UUR859	UUR858			4C132F3E7E	4/26/11 11:15	26.5343	-82.1317	20.4	16.0
Caretta caretta	UUR861	UUR860			4C13321618	4/26/11 11:15	26.5343	-82.1317	79.0	
Lepidochelys kempii	UUR868	UUR867			4A0A6E5419	4/26/11 16:55	26.5344	-82.1305	42.6	7.5
Lepidochelys kempii	UUR870	UUR869			4A716E7853	4/28/11 13:38	26.5211	-82.1269	41.6	7.5
Lepidochelys kempii			UUR845	UUR844	4A0B7A6E12	4/28/11 12:30	26.5228	-82.1263	38.7	6.0
Lepidochelys kempii	UUR872	UUR871			4A0A717044	4/29/11 11:45	26.5347	-82.1306	54.8	

Table 3. Carapace lengths (cm) for marine turtle aggregations in the coastal waters of western Florida. MSCL - minimum straight-line carapace length and SSCL - standard straight-line carapace length.

	Kemp's ridley			Loggerhead			Green		
Geographic location	n	mean	range	n	mean	range	n	mean	range
Charlotte Harbor - MSCL (present study)	44	40.9	24.2 - 62.7	5	77.5	64.2 - 85.7	2	51.4	50.4 - 52.4
Gullivan Bay - MSCL (Witzell and Schmid, 2004)	191	40.4	21.4 - 65.2	9	65.5	54.4 - 73.7	13	51.6	42.4 - 58.7
Waccasassa Bay - SSCL (Schmid, 1998)	253	44.5	26.8 - 58.6	19	65.0	50.0 - 77.4	4	56.8	42.9 - 70.9
Deadman Bay - SSCL (Barichivich, 2006)	121	35.0	20.7 - 64.2	11	63.5	24.7 - 100.0	27	42.2	27.9 - 70.7

Table 4. Reported frequencies of crab species consumed by immature Kemps ridley turtles.

Geographic location	Mean carapace length (cm)	*n*	Crab species	Percent occurrence
Long Island Sound (Burke et al., 1994)	32.3	19	*Libinia emarginata*	58.0
			Cancer irroratus	36.0
			Ovalipes ocellatus	16.0
Chesapeake Bay (Seney and Musick, 2005)	37.9	18	*Callinectes sapidus*	72.2
			Libinia sp.	66.7
			Persephona mediterranea	44.4
			Pagarus sp.	33.3
			Cancer irroratus	27.8
			Ovalipes ocellatus	5.6
Texas-Louisiana (Werner, 1994)	33.1	79	*Callinectes* sp.	43.0
			Menippe sp.	4.7
			Persephona aguilonarius	1.2
			Clibanarius vittatus	1.2
South Texas (Shaver, 1991)	43.3	50	*Callinectes sapidus*	44.0
			Persephona sp.	40.0
			Libinia sp.	32.0
			Hepatus epheliticus	28.0
			Arenaeus cribarius	30.0
			Isocheles wurdemanni	16.0
			Menippe adina	10.0
Northwest Florida (Barichivich et al., 1998)	32.7	30	*Libinia* sp.	100.0
			Callinectes sp.	20.0
			Menippe sp.	13.0
			Persephona sp.	7.0
Southwest Florida (Witzell and Schmid, 2005)	41.2	66	*Libinia* sp.	42.4
			Persephona mediterranea	37.9
			Hepatus epheliticus	13.6
			Pitho sp.	10.6
			Hexapanopeus sp.	10.6
			Menippe mercenaria	9.1
			Petrochirus diogenes	7.6
			Rithropanopeus harrisii	6.1
			Callinectes sapidus	4.5
			Pinnotheres maculatus	4.5
			Eurypanopeus depressus	1.5

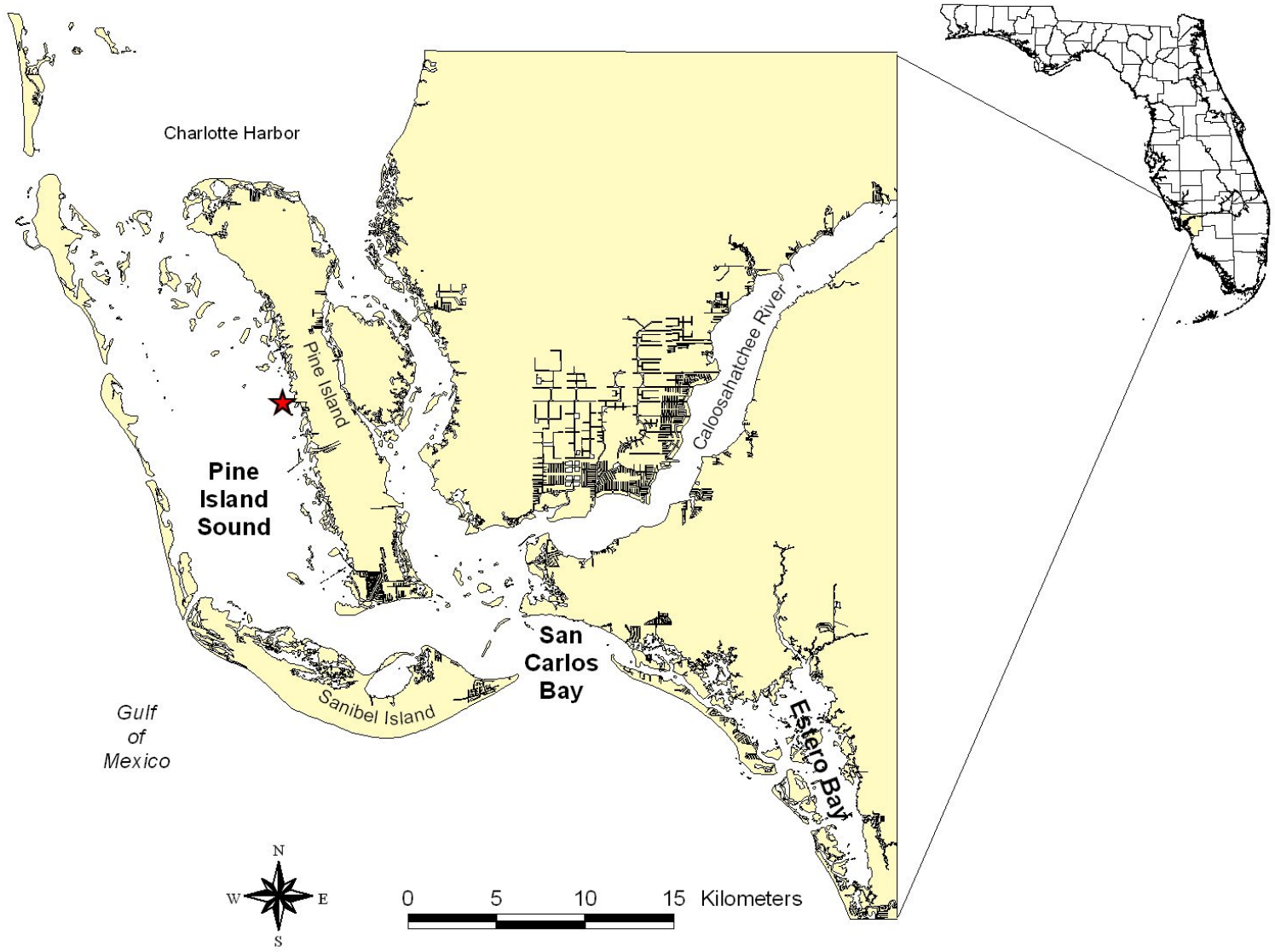

Figure 1. Map of the coastal waters in western Lee County, Florida. The red star indicates the location of the Mote Marine Laboratory's Charlotte Harbor field station on Demere Key.

Figure 2. Photographs of (top) research vessel *RV McQueggie* and (bottom) strike net deployed in a circle.

Figure 3. Photographs of (top) loggerhead turtle tangled in net and (bottom) Kemp's ridley turtle being removed from net.

Figure 4. Photographs of (top) Kemp's ridley turtle being held for fecal sample collection and (bottom) Kemp's ridley turtle, "Kyra", instrumented with satellite transmitter.

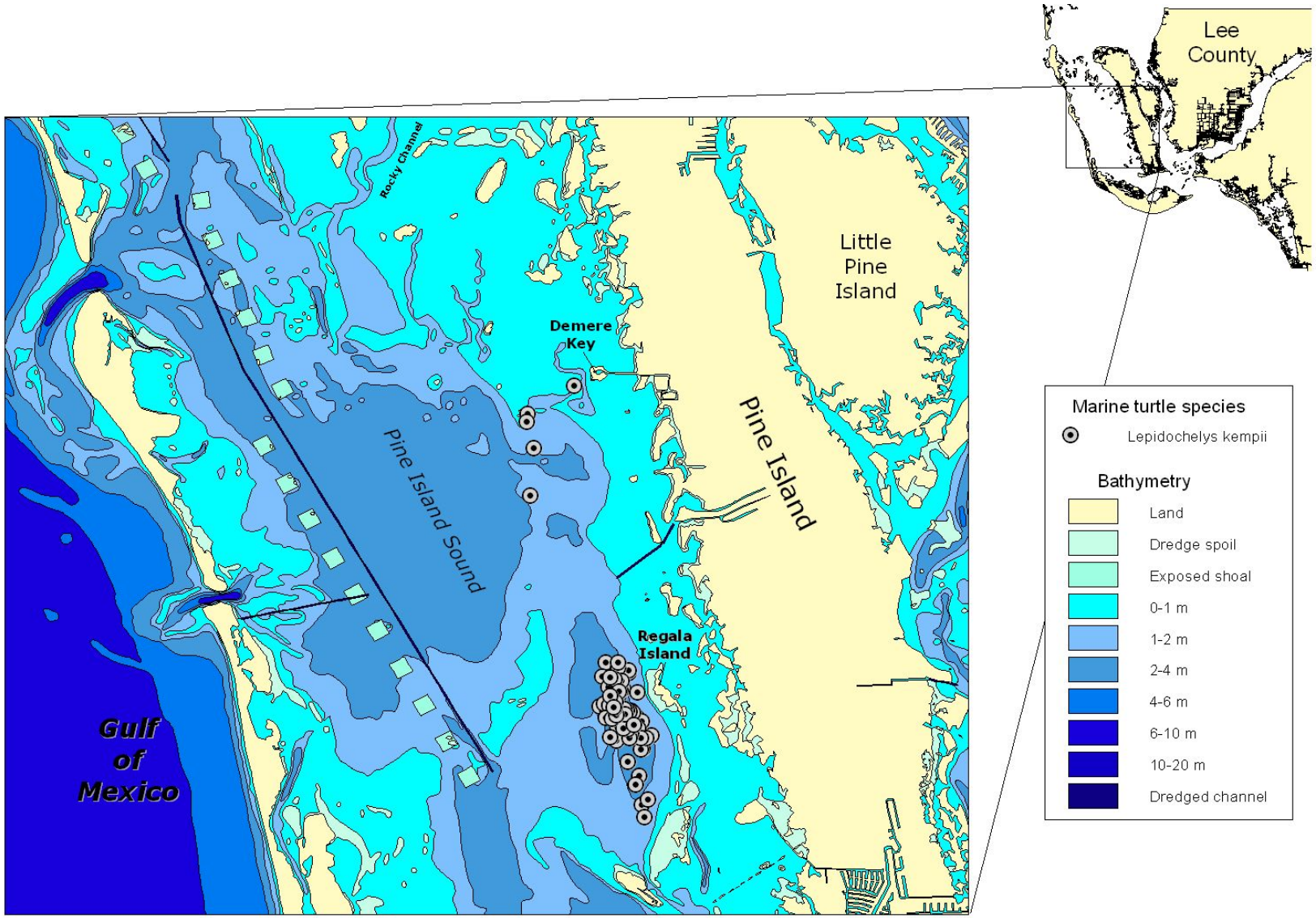

Figure 5. Map of the coastal waters of western Lee Co., Florida showing the locations of Kemp's ridley turtles recorded during the study period (August 2009 – April 2011).

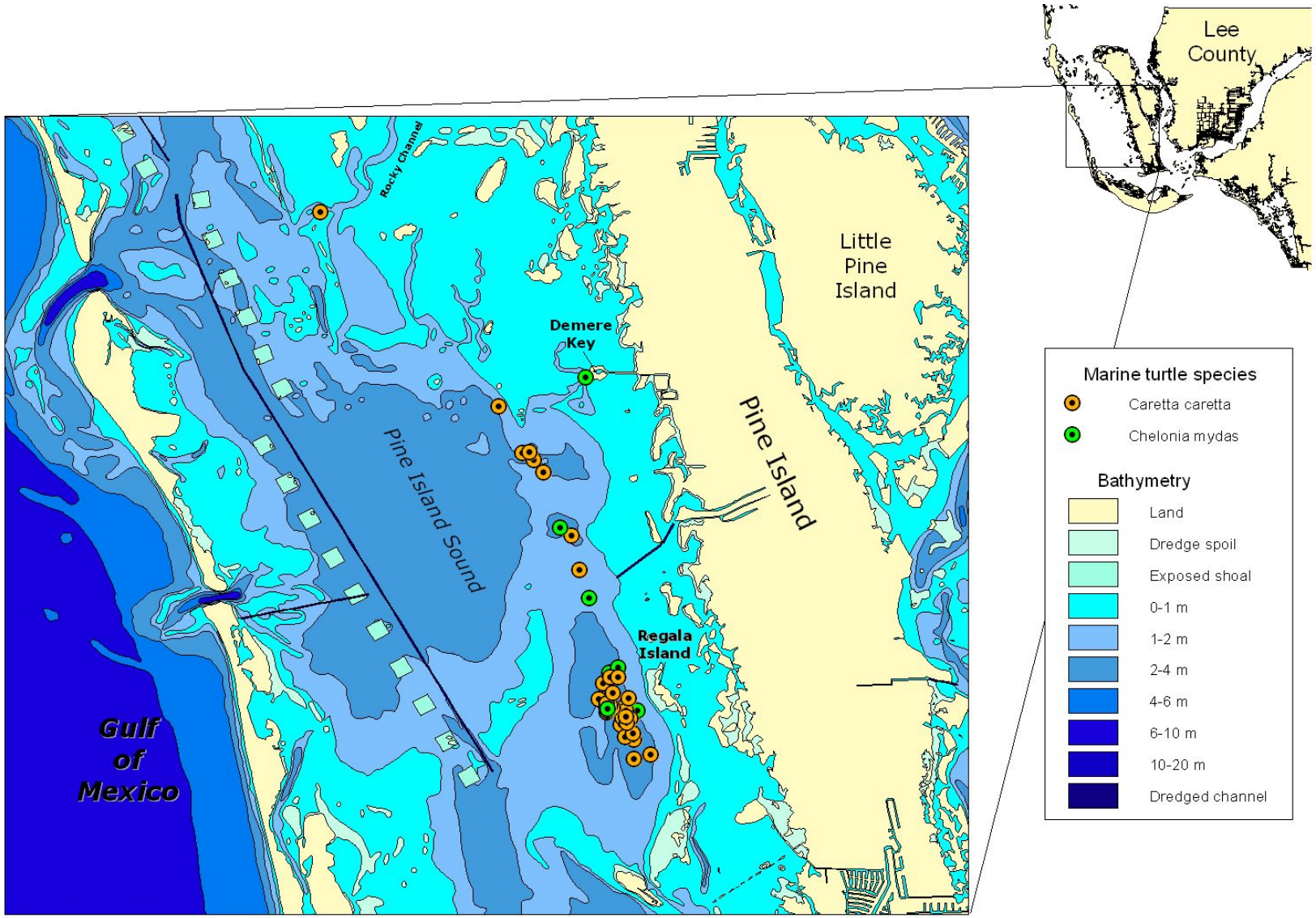

Figure 6. Map of the coastal waters of western Lee Co., Florida showing the locations of loggerhead and green turtles recorded during the study period (August 2009 – April 2011).

Figure 7. Photographs of Kemp's ridley turtles exhibiting healed wounds characteristic of boat/propeller strikes.

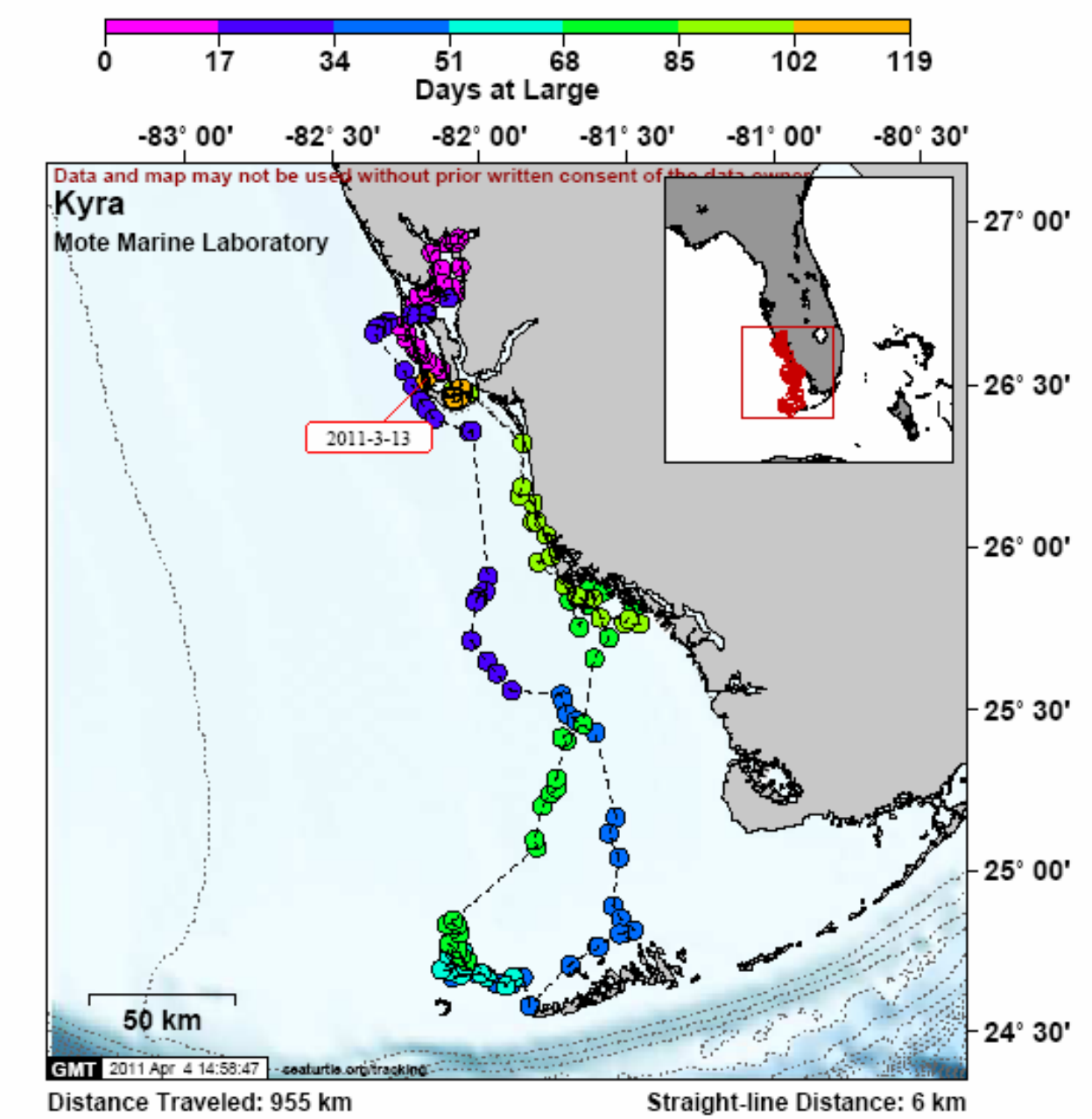

Figure 8. Track of Kemp's ridley turtle, "Kyra", instrumented with satellite transmitter and released Nov. 19, 2010. http://www.seaturtle.org/tracking/index.shtml?tag_id=62687

Figure 9. Photographs of (top) barnacle encrusted tag and (bottom) tag scar of recaptured Kemp's ridley turtles.

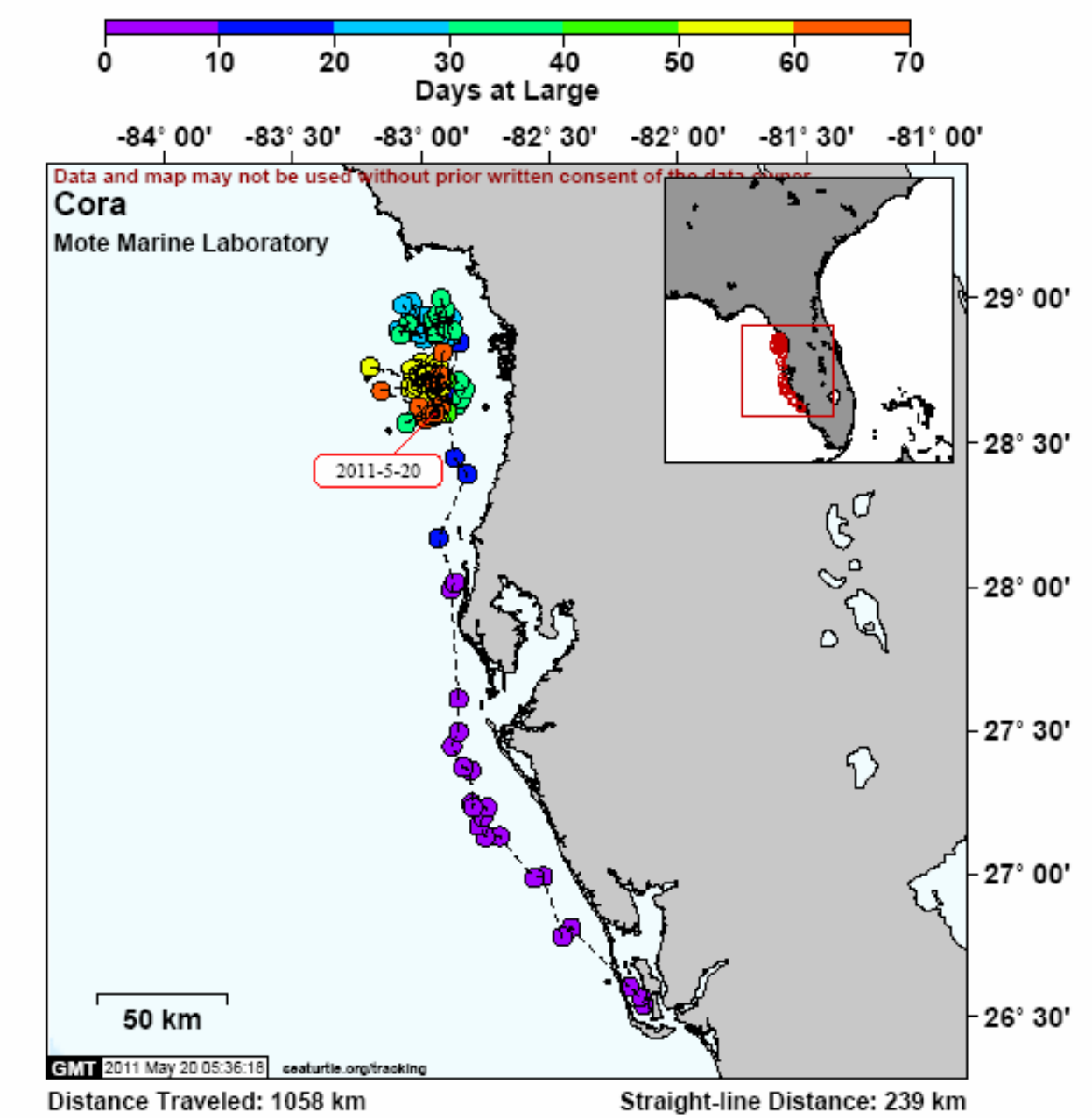

Figure10. Track of Kemp's ridley turtle, "Cora", instrumented with satellite transmitter and released Mar. 17, 2011. http://www.seaturtle.org/tracking/index.shtml?tag_id=57786