

**CHARACTERIZATION OF KEMP'S RIDLEY SEA TURTLES IN THE FLORIDA
BIG BEND AREA DURING 1997**

ANNUAL REPORT

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Introduction

The Kemp's ridley sea turtle (*Lepidochelys kempii*) is the most endangered of the seven extant marine turtle species (Ross et al. 1989). The species nests almost exclusively at Rancho Nuevo, Tamaulipas, Mexico, where nesting populations have declined approximately 98 percent in less than 25 years (Marquez 1984). Fewer than 700 individuals have nested annually in recent years (Ross et al. 1989). Lack of knowledge about early life stages of the Kemp's ridley sea turtle currently hinders recovery efforts for this federally listed species.

In the species recovery plan for the Kemp's ridley (U.S. Fish and Wildlife Service and National Marine Fisheries Service (NMFS), 1992), the recovery team identified in-water, live capture studies as a Priority I Task for recovery of the species to determine seasonal use of nearshore habitat by juvenile/subadults. The U.S. Geological Survey, Biological Resources Division (USGS-BRD) (formerly National Biological Service) has targeted marine turtles on their Biological Resource and Management Issues agenda. In addition, an independent scientific review team (Eckert et al. 1994) has recommended that research efforts for Kemp's ridley be focused on a large-scale mark and recapture program that should, in part, provide information on growth and survival rates, size-frequency distributions, sex ratios, habitat use, and movement patterns for wild and headstarted juvenile turtles.

Juvenile and subadult Kemp's ridleys are known to utilize the shallow nearshore waters of the north and central West Coast of Florida (Ogren 1989, Rudloe et al. 1991, Schmid and Ogren 1992). In the nearshore waters of Cedar Key, Florida, Schmid and Ogren (1992) have been conducting a long-term study of wild subadult Kemp's ridleys. This is one of few studies that has characterized the population of Kemp's ridleys utilizing developmental habitat in the region. The current study was undertaken as part of a collaborative effort between the NMFS, Southeast Fisheries Science Center, Panama City, Florida, and USGS-BRD, Florida Caribbean Science Center, Gainesville, Florida, to establish sampling methods for development of population indices for monitoring Kemp's ridleys in the Florida Panhandle.

Objectives

The ongoing goals of the NMFS/USGS ridley research in the Florida Big Bend area are to define patterns of occurrence, relative abundance (vis-a-vis other sea turtle species), growth rate, sex ratio, size frequency distribution, habitat use, and movement. The specific objectives addressed in FY97 were as follows:

1. Establish net capture locations for Kemp's ridley turtles in various parts of the Big Bend area.
2. Ground proof and refine capture methodologies.
3. Obtain data on size, relative abundance, and sex ratio.
4. Tag captured individuals for re-identification and subsequent definition of seasonal/annual movements.

Study Area

The study was conducted from Apalachee Bay to Suwannee Sound of the Florida Big Bend. The specific areas targeted for sampling included Apalachee and adjacent bays, between Dallus Creek and Big Grass Island (near Fisherman's Rest), and the vicinity of Pepperfish Keys. The majority of netting in 1995 was conducted in and around Dickerson and Levy Bays, where as the majority of netting in 1996 and 1997 were conducted in the other two locations. Much of the Apalachee Bay area can be characterized as estuarine habitat with seagrass or sand/mud substrate with patches of oyster beds throughout. The more southern capture areas are characterized primarily by seagrass beds with sand substrate.

Materials and Methods

Identification of Potential Capture Sites

In 1995, net sampling was conducted in: Dickerson Bay, Levy Bay, entrances to Dickerson/Levy Bays (near Fiddler's Point), adjacent to Whetstone Point, and adjacent to the lighthouse in St. Marks National Wildlife Refuge (SMNWR), see Figure 1 inset. In 1996, sampling was more dispersed due to capture methods but included the channel northwest of Pepperfish Keys, the seagrass flats from Horseshoe Beach to just north of Pepperfish Keys, a channel adjacent to Fisherman's Rest, and the seagrass flats from Fisherman's Rest to just north of Big Grass Island. New sampling sites for 97 include the Shired Island area south of Horseshoe Beach, between Pepperfish Keys and Fisherman's Rest, the Keaton Beach area north of Fisherman's Rest, the Econfina River mouth, and Oyster Bay north of Dickerson Bay.

Capture Techniques

All species of marine turtles were targeted, although our emphasis was on Kemp's ridleys. Turtles were captured using set nets, strike nets, and by hand. Set nets measured 25 cm bar x 50 m total length. For strike netting, we used either a 25 cm bar x 150 or a 10 cm bar x 165 m nylon net. Nets were deployed across narrow channels or over shallow seagrass beds in 0.5-4.6 m water depth. Hand captures were accomplished by jumping onto the target turtle from the boat.

Biometric and Non-biometric Data

Turtles were checked for evidence of previous tagging, e.g., living, flipper, and PIT (Passive Integrated Transponder) tags. Living tags appear as a white patch near the center of a carapace scute. Living tags are formed by transplanting a piece of lighter colored plastron tissue into a scute on the darker carapace at different scute locations to distinguish between year classes (Fontaine et al. 1993). This procedure was done on all headstarted Kemp's ridley turtles (captive reared for usually less than one year by the NMFS Headstart Program in Galveston, Texas) released since the

1984 year-class. Flipper tags are commonly placed on the trailing edge of the anterior flippers. If flipper tags were not present, inconel flipper tags (National Band and Tag Co., supplied by NMFS, Miami) were placed on the trailing proximal edge of both anterior flippers of all marine turtle species captured. If a PIT tag was not detected by scanning the anterior flippers and shoulder region then one was placed subcutaneously in the dorsal left anterior flipper of all Kemp's ridleys.

Measurements including carapace lengths and widths, plastron lengths, and weights were obtained for each individual. The carapace measurements included both curved and straight-line for the following: 1) standard carapace length (from the precentral scute at carapace midline to posterior margin of postcentrals, 2) minimum carapace length, 3) notched carapace length, and 4) total carapace length. (See Pritchard et al. 1983 for full descriptions and diagrams of carapace measurements.) Curved and straight-line carapace width was measured at the widest point of the dorsal side. Tree calipers (95 cm length) were used for all straight-line measurements and a 150 cm flexible tape measure was used for all curved measurements, all to the nearest mm). Turtles weighing less than 20 kg were weighed to the nearest 0.2 kg using hanging Pesola spring scale. Photographs were taken of the full body of each individual and of deformities or mutilations.

Salinity and water temperatures were obtained at the time of capture using a YSI model 30 meter. Substrate data were also recorded whenever possible. Latitude and longitude were recorded at each capture location using a Garmin 45 GPS with an accuracy to 25 meters.

Results

Captures

A total of 23 days were spent netting or searching for turtles. Twenty-three individuals were captured with one recapture for a total of 24 captures. The majority of Kemp's ridleys, and total individuals, were captured in the vicinity of Pepperfish Keys, 91.6 and 87.5 %, respectively. Thirteen turtles were captured using set nets and 11 using strike nets (Figure 1). In 1997, 62.8 hours were spent using set nets and 13 individuals were captured for an overall capture rate of 0.20 turtles/set net hour (Table 1). Synoptic data on individuals by capture location are presented in Appendix I.

Kemp's ridleys

Kemp's ridleys ranged in size from 34.6 - 53.7 cm straight carapace length (anterior notch to posterior notch; SCL N-N) and weighed from 6.5 to over 20 kg (Appendix I). Kemp's ridleys were on average the smallest of the three species captured (\bar{x} = 42.7 cm SCL N-N, standard deviation (SD) = 7.8; Figure 2). Turtles were captured over seagrass, sand, or sand/mud substrate. Set nets captured 33 % of the ridleys, however strike netting was more effective (67 %), Figure 2.

Green Turtles

Green turtles averaged slightly larger than Kemp's ridleys, although we captured them in the same areas ($\bar{x} = 44.1$ cm, SD = 4.7, range = 36.6 - 49 cm; Figure 2). Weights ranged from 7 - 17 kg. The majority (72.7 %) of green turtles were captured using set nets (Figure 1). The occurrence of green turtle fibropapillomatosis was 18.1% a substantially lower figure than last years 55% incidence (see Appendix I).

Loggerheads

The loggerhead was the largest turtle we captured (SCL N-N 82.7 cm; Appendix I). This individual was determined to be a female by external characteristics.

Discussion and Recommendations

The majority of marine turtles captured during this study in the Florida Big Bend area were wild juvenile Kemp's ridleys. Our data suggest that the shallow waters in this area are important summer developmental habitat for the species and that this area may figure prominently in attempted recovery of the highly endangered Kemp's ridley. We have identified two sites in the lower Big Bend, Pepperfish Keys and Fisherman's Rest, in which this species could consistently be located and sampled during summer months.

A few sites in the Apalachee and adjacent Bays (Fiddler's Point and Levy Bay) were also productive sites for capturing juvenile ridleys during this study. In addition, Rudloe et al. (1991) reported Levy Bay as a capture location for juvenile ridleys. We preliminarily recommend these four locations for long-term monitoring. Sampling efforts should also be conducted at additional sites to identify other capture locations for long-term monitoring in the Big Bend. Based on reports from local fisherman, we also recommend that future netting efforts in Apalachee Bay include the area near Live Oak Point, Elmour's Cove, Goose Creek Bay, and East Flats. In addition to monitoring, future research efforts should include habitat use and movement patterns, particularly migrational movements in the nearshore coastal waters.

Unlike last year, strike netting over seagrass beds (and channels depending on channel depth) was the most effective method of capturing ridleys. This is possibly an artifact of the refinement of the crew's skill as well as the addition of a spotting tower and a more effective strike net. Although strike netting is somewhat limited to use in areas of high water clarity it may be superior to set netting under these conditions. We recommend nets of 25 cm bar x 50 - 70 m for set netting and 15 - 25cm bar x 150 - 200 m for strike netting. Additionally, we have had success with adding long hedges of 10 cm bar net to led turtles into set nets.

The lower number of strike net captures of green turtles ($n = 3$) compared to ridleys ($n = 8$) is probably less a reflection of their true abundance in the seagrass beds of the lower Big Bend, but rather the greater difficulty of capturing green turtles due to

their speed and agility.

In summary, the shallow seagrass flats and associated channels of the Florida Big Bend are used by at least three species of marine turtles. However, this area seems to be particularly important developmental habitat for the Kemp's ridley, the most endangered marine turtle. Continued monitoring and research efforts in this area are imperative to evaluating population trends and defining life history patterns of Kemp's ridleys in the Gulf of Mexico.

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Table 1. Capture rates of marine turtles captured in the Florida Big Bend by capture location using set nets during 1996.

CAPTURE LOCATION	SET NET HOURS	# OF TURTLES CAPTURED	CAPTURE RATE* (Turtles/hr)
Pepperfish Keys	54.3	10	0.18
Fisherman's Rest	6.45	2	0.16
Fiddler's Point	2	1	0.5
Total	62.75	13	0.21

*Calculations are based on a 50m net

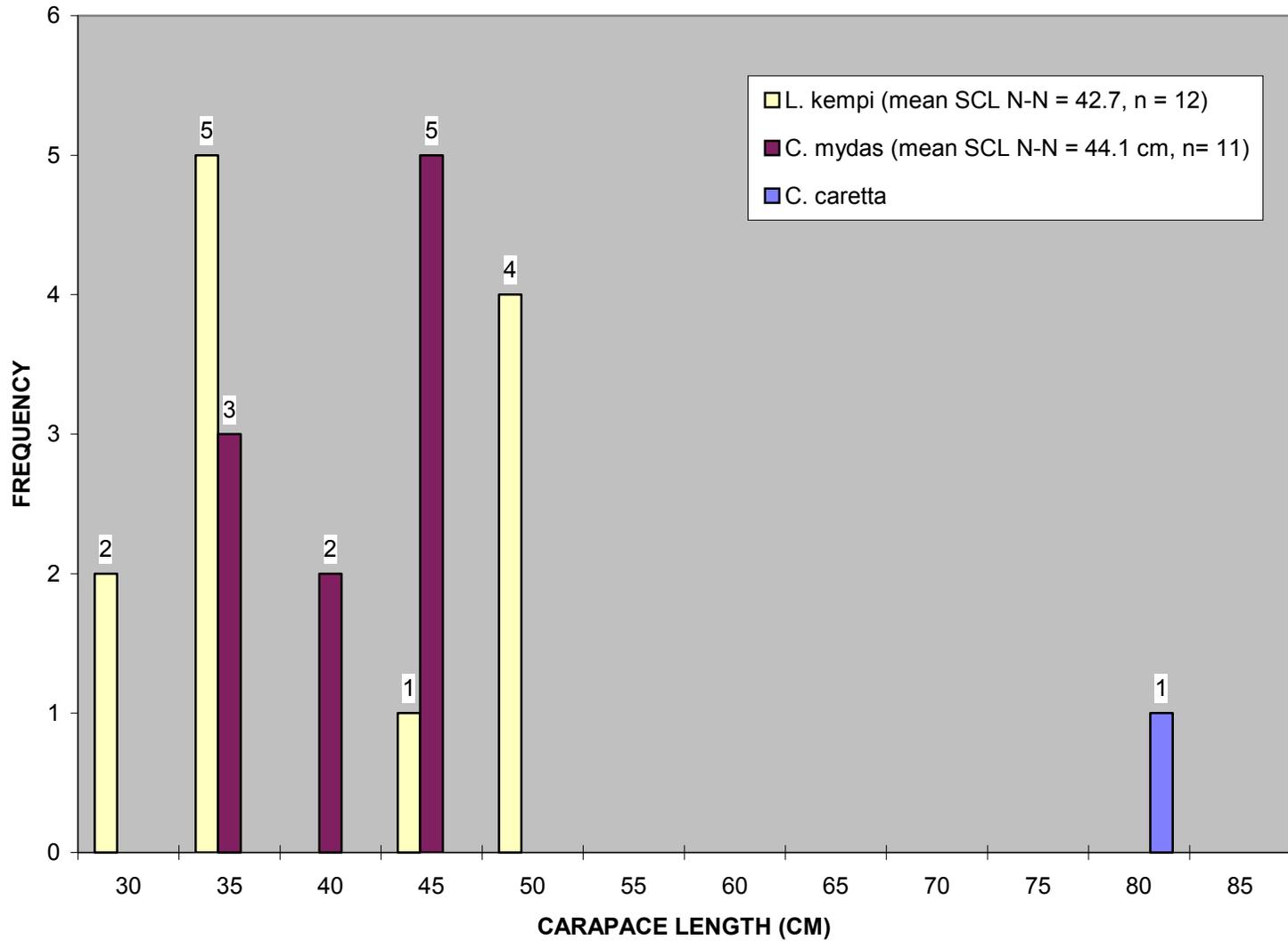


Figure 2. Straight carapace length (notch-to-notch) distribution by 5 cm increments of all species captured in the Florida Big Bend during the 1997 season.

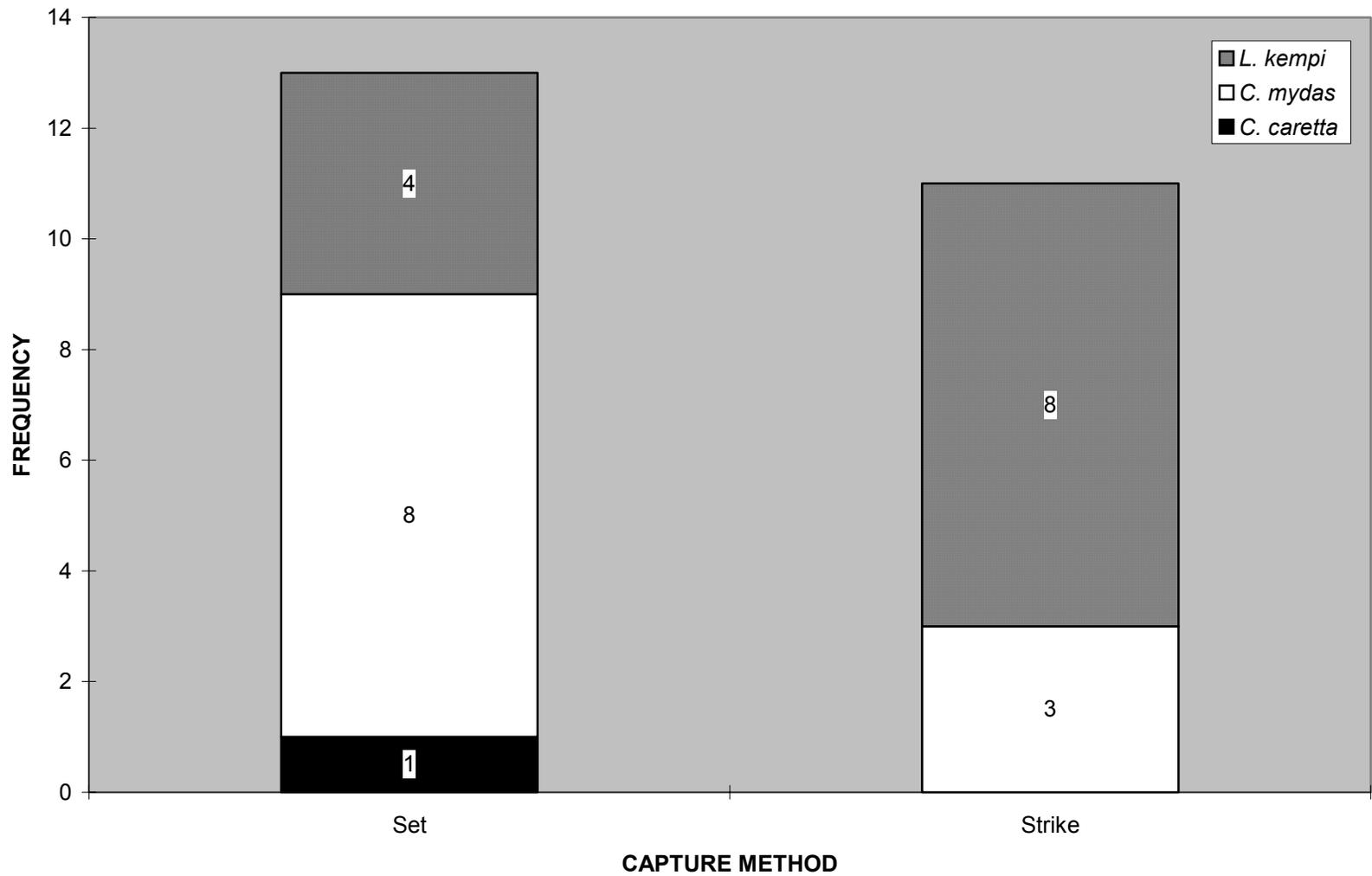


Figure 1. Number of turtle captures in the Florida Big Bend by species and capture method during the 1997 season.

APPENDIX I: Synoptic capture data for Kemp's Ridley and other sea turtle species from the NMFS/USGS-BRD sampling FY97.

Species	Tag #'s Right Left PIT	Capture Date	Capture Location	Capture Method	Straight Carapace Length N-N (cm)	Weight (kg)	Comments
C. mydas	SSN925 SSN927	8-Aug-97	Pepperfish Keys 0266323N 3266644E	Strike	42.7	10	Missing left rear flipper.
L. kempi	SSN923 SSN924 224023212D	8-Aug-97	Pepperfish Keys 0267019N 3264084E	Strike	34.7	7	Large notch in 3rd and 4th left marginal scute.
L. kempi	SSN921 SSN922 224FC5E63	1-Aug-97	Pepperfish Keys 29° 23.663' 82° 25.057'	Strike	36.4	8.5	
L. kempi	SSN919 SSN920 22422C5E3D	30-Jul-97	Pepperfish Keys 0265953N 3265585E	Strike	51.2	19.5	Notched right rear flipper.
C. mydas	SSN917 SSN918	29-Jul-97	Pepperfish Keys 0264399N 3268776E	Strike	48.9	15	
L. kempi	SSN915 SSN916 223817724C	29-Jul-97	Pepperfish Keys 0264433N 3267675E	Strike	53.2	20+	
L. kempi	SSN913 SSN914 2242312468	28-Jul-97	Pepperfish Keys 0264372N 3267544E	Strike	51.5	19.5	Large scar over frontal scale, 3 remoras attached, traveling w/ <i>C. caretta</i> .
L. kempi	SSN911 SSN912 22421E2457	28-Jul-97	Pepperfish Keys 0264535N 3267356E	Strike	53.7	20+	Fresh cranial wound- frontal scale missing-bone exposed.
C. mydas	SSN901 SSN902	8-Jul-97	Fiddler's Pt.	Set	36.6	7	
C. mydas	SSN889 SSN900	30-Jun-97	Pepperfish Keys PEPIN ^a	Set	44.6	13	
C. caretta	SSN897 SSN898	19-Jun-97	Fisherman's Rest FISHRE3 ^b	Set	82.7	70+	

Species	Tag #'s Right Left PIT	Capture Date	Capture Location	Capture Method	Straight Carapace Length N-N (cm)	Weight (kg)	Comments
C. mydas	SSN895	13-Jun-97	Pepperfish Keys	Set	38	11.25	
	SSN896		PEPIN ^a				
C. mydas	SSN893	13-Jun-97	Pepperfish Keys	Set	47	15.75	Medium-sized papillomas on front flippers, loosing many scutes.
	SSN894		PEPIN ^a				
C. mydas	SSN892	13-Jun-97	Pepperfish Keys	Set	49	16.75	
	SSN891		PEPIN ^a				
L. kempi	SSN889	14-Jul-97	Pepperfish Keys	Set	39.2	9.4	Recapture
	SSN890		PEPIN ^a				
	22423D6264	30-May-97		Strike	38	8.75	
L. kempi	SSN887	30-May-97	Pepperfish Keys	Set	47	15.5	
	SSN888		PEPIN ^a				
	22421D174E						
L. kempi	SSN885	30-May-97	Pepperfish Keys	Set	37.6	8.5	
	SSN886		PEPIN ^a				
	2242317C29						
L. kempi	SSN883	23-May-97	Pepperfish Keys	Set	34.6	6.5	
	SSN884		PEPIN ^a				
	224007390E						
C. mydas	SSN881	23-May-97	Pepperfish Keys	Set	47.3	15.5	
	SSN882		PEPIN ^a				
C. mydas	SSN880	11-May-97	Pepperfish Keys	Set	44.9	13	Only right flipper tagged due to papilomas, many large debilitating papilomas ventrally
			PEPIN ^a				
L. kempi	SSN878	6-May-97	Fisherman's Rest	Strike	35.5	7.1	
	SSN879		0254550N				
	223D05322		3288981E				
C. mydas	SSN876	2-May-97	Pepperfish Keys	Strike	37.8	7.6	
	SSN877		0267912N				
			3266433E				
C. mydas	SSN874	2-May-97	Pepperfish Keys	Set	48	17	
	SSN875		0267999N				
			3266445E				

^a 0267306N
3266437E

^b 0267899N
32664440E