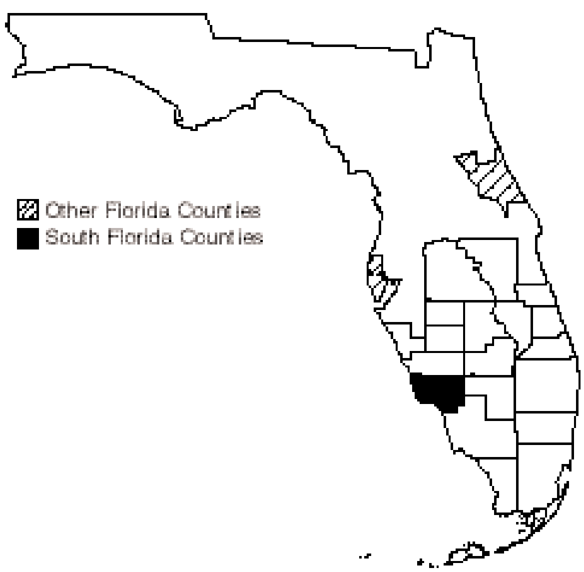
Kemp's Ridley Sea Turtle

Lepidochelys kempii

Federal Status:	**Endangered (December 2, 1970)**
Critical Habitat:	**None Designated**
Florida Status:	**Endangered**
Recovery Plan Status:	**Contribution (May 1999)**
Geographic Coverage:	**South Florida**

Figure 1. Florida nesting occurrences of the Kemp's ridley sea turtle.



Nesting emergences by the Kemp's ridley sea turtle are extremely rare in Florida; only five nests have been reported since 1989. (Two in Pinellas County, one in Lee County, and two in Volusia County.) In addition, four false crawls were reported from Palm Beach County in 1989 (Meylan *et al*. 1995)

This account was taken from the 1992 Recovery Plan for the Kemp's Ridley Sea Turtle (FWS and NMFS 1992).

Description

The Kemp's ridley and its congener, the olive ridley, are the smallest of all extant sea turtles, the weight of an adult generally being less than 45 kg and the straight carapace length around 65 cm. Adult Kemp's ridleys' shells are as wide as they are long. The coloration changes significantly during development from the grey-black dorsum and venter of hatchlings to the lighter grey-olive carapace and cream-white or yellowish plastron of adults. There are two pairs of prefrontal scales on the head, five vertebral scutes, five pairs of costal scutes and generally 12 pairs of marginals on the carapace. In each bridge adjoining the plastron to the carapace, there are four scutes, each of which is perforated by a pore. This is the external opening of Rathke's gland which secretes a substance of unknown (possibly pheromonal) function. Males are not well described but resemble the females in size and coloration. Secondary sexual characteristics, typical of males of sea turtle species, are present in *L. kempii; i.e.*, the longer tail, more distal vent, recurved claws and, during breeding, a softened, mid-plastron. The eggs are between 34 and 45 mm in diameter and 24 to 40 g in weight (Chavez *et al.* 1968a,b; Marquez 1970, 1990; Pritchard and Marquez 1973). Hatchlings generally range from 42 to 48 mm in straight line carapace length, 32 to 44 mm in width and 15 to 20g in weight (Chavez *et al.* 1967; Marquez 1972, 1990; Fontaine and Caillouet 1985). In 1984 and 1985, the NPS Service (1985) reported hatchlings with mean carapace lengths of 43.5 and 43.25 mm, respectively. For 1984, hatchlings had a mean weight of 16.37 g and in 1985, the mean was 15.74 g.

Taxonomy

Kemp's ridley was first described by Samuel Garman in 1880, as *Thalassochelys kempii* (or *Colpochelys kempii*). The sea turtle was named for Richard M. Kemp, a fisherman interested in natural history who submitted the type specimen from Key West, Florida. Later *L. kempii* was allocated to the genus, *Lepidochelys*, Fitzinger 1843, by Baur (1890) when it was realized that Kemp's ridley and the Indo-Pacific olive ridley, *Lepidochelys olivacea*, were congeneric. Several others subsequently considered *L. kempii* to be a subspecies of *L. olivacea*, but currently it is recognized as a full species (see below) clearly distinct from *Lepidochelys olivacea* (Bowen *et al.* 1991). The latter species is distributed in the Pacific and Indian oceans and in the southern Atlantic, and individuals occasionally reach the southeastern Caribbean (Trinidad, Isla Margarita, Guadeloupe) but are nowhere sympatric with *L. kempii*, a more northern species in the Atlantic. A taxonomic review of the genus was made by Pritchard (1969) including a detailed morphological description of the two species, establishing that they have enough morphological differentiation to justify designation as separate species (Pritchard 1989). This status is accepted by most authors *(e.g.*, Marquez 1970, 1990; Brongersma 1972, Marquez *et al*. 1982, Smith and Smith 1979, Frair 1982, Pritchard and Trebbau 1984, Marquez and Bauchot 1987, Bowen *et al*. 1991).

Distribution

Movements of the adult females away from the nesting beach have been recorded by Chavez (1969), Pritchard and Marquez (1973), Marquez *et al*.(1990), and Byles (1988). Byles (1988) also found that post-nesting adult females stayed nearshore in water of 50 m or less during their movements away from the beach. During the nesting season, Mendonca and Pritchard (1986) found post-nesting females made slow and seemingly random movements offshore near the nesting beach for 1 to 2 days, then more rapid, longshore movements at least 10 km (and up to 100 km) north or south of their last nesting site before returning to lay eggs again or leaving the area entirely. They deduced that *L. kempii* exhibits extensive inter-nesting movements and that there may be some factors grouping turtles nesting on the same day together until the subsequent nesting emergence. Although they postulated that preferred inter-nesting aggregation sites existed adjacent to the nesting beach, small sample size and imprecise positioning did not allow them to clearly map these sites.

Juvenile/subadult *L. kempii* have been found along the eastern seaboard of the U.S. and in the Gulf of Mexico. Atlantic juveniles/subadults travel northward with vernal warming to feed in the productive, coastal waters of Georgia through New England, returning southward with the onset of winter to escape the cold (Lutcavage and Musick 1985, Henwood and Ogren 1987, Ogren 1989). In the Gulf, juvenile/subadult ridleys occupy shallow, coastal regions. Ogren (1989) suggested that in the northern Gulf they move offshore to deeper, warmer water during winter. Little is known of the movements of the post-hatching, planktonic stage within the Gulf.

Kemp's ridley sea turtle.
Original photograph courtesy of U.S. Fish and Wildlife Service.

Kemp's ridley nesting is extremely rare in Florida. However, two nests have been reported from Pinellas County (one in 1989, and one in 1994), one from Lee County in 1996, and two from Volusia County in 1996 (Figure 1).

Habitat

The major nesting beach where *L. kempii* emerges in any concentration to lay eggs is on the northeastern coast of Mexico. This location is near Rancho Nuevo in southern Tamaulipas. *L. kempii* (together with the flatback turtle, *Natator depressus*, of Australia) has the most restricted distribution of any sea turtle. The species occurs mainly in coastal areas of the Gulf of Mexico and the northwestern Atlantic Ocean. Occasional individuals reach European waters (Brongersma 1972). There is a single record from Malta in the Mediterranean (Brongersma and Carr 1983), a few from Madeira and the Moroccan coast (Fontaine *et al*. 1989), and a record from Bermuda (Mowbray and Caldwell 1958). Recently, a juvenile ridley was found in the Azores (Bolten and Martins 1990).

Adults of this species are usually confined to the Gulf of Mexico, although adult-sized individuals sometimes are found on the eastern seaboard of the United States. The post-pelagic stages are commonly found dwelling over crab-rich sandy or muddy bottoms. Juveniles frequent bays, coastal lagoons, and river mouths. Adults are present seasonally near the Mississippi River mouth and the Campeche Banks, converging annually on the Rancho Nuevo nesting grounds (Carr 1963, Pritchard 1969, Pritchard and Marquez 1973). What appeared to be winter dormancy was observed in Canaveral Channel during seasonally low temperatures (Carr *et al.* 1980).

Behavior

Reproduction and Demography

Principal courtship and mating areas for *L. kempii* are not well known. Anecdotal information supplied by fishermen revealed that mating presumably occurs at or before the nesting season in the vicinity of the nesting beach (Chavez *et al*. 1967, Pritchard 1969, Marquez 1970). Shaver (1991b) reported a mating pair of ridleys in Mansfield Channel at the southern boundary of Padre Island National Seashore (PAIS). Reproduction for the majority of the extant population appears to be annual (Marquez *et al*. 1982). Nesting occurs from April into July, and is essentially limited to the beaches of the western Gulf of Mexico, primarily in the Mexican state of Tamaulipas. The mean clutch size between 1978 and 1991 was 100.8 eggs. The hatchlings emerge after 45 to 58 days, depending upon the incubation conditions, especially temperature. See Pritchard and Marquez (1973) for a complete description of the nesting process.

Although growth data for wild *L. kempii* are sparse, it is unlikely that most adults grow very much after maturity. Recent work by Zug 1989, suggests juveniles may grow rapidly and that 20 cm ridleys are about two years old. Standora *et al*. (1989) found that five juvenile *L. kempii* (mean initial size = 31.6 cm) from Long Island, New York, waters had a mean increase in carapace length of about 0.8 cm per month from spring to summer after release following a fall hypothermic event. Head-started ridleys and captive juveniles of the species apparently grow rapidly, as do other sea turtles maintained in captivity (Fontaine *et al*. 1985). Two individuals of *L. kempii* at Cayman Turtle Farm fed high protein diets began to lay eggs at 5 years old and at a much smaller size than seen in the wild. These two examples Wood and Wood (1984) gave were 20 and 24.5 kg with curved carapace lengths (CCL) of 48.3 and 53.3 cm, respectively. Marquez (1970) states the minimum and maximum nesting sizes are 58 cm and 68.5 cm CCL, respectively. Marquez (1972) calculated the age to maturity based on captive growth, recapture data and minimum nesting size as 6 to 7 years. The recovery team for the Kemp's ridley feels that this estimate may be too low based on growth rates for other carnivorous cheloniids, namely loggerheads (*Caretta caretta*). Frazer and Ehrhart (1985) estimated the age of maturity for loggerheads as 12 to 30 years.

Foraging

Neonatal *L. kempii* presumably feed on the available sargassum and associated infauna or other epipelagic species found in the Gulf of Mexico. In the post-pelagic stages, the ridley is largely cancrivorous (crab eating), with a preference for portunid crabs. From studies of stomach contents, usually of stranded dead turtles, *L. kempii* appears to be a shallow water, benthic feeder (De Sola and Abrams 1933; Carr 1942, 1952; Smith and List 1950; Liner 1954; Dobie *et al*. 1961; Hardy, Jr. 1962; Montoya 1966; Marquez 1970; Ernst and Barbour 1972; Pritchard and Marquez 1973; Hendrickson 1980; Hildebrand 1982; Mortimer 1982; Lutcavage and Musick 1985). Shaver (1991a) gives a good review of the dietary items consumed by *L. kempii* (taken from specimens stranded along the Texas coast) in her comparison of the stomach contents of wild and head-started turtles.

Relationship to Other Species

Although Kemp's ridley nesting is extremely rare in South Florida, it shares nesting beaches with the threatened loggerhead turtle, and the endangered green (*Chelonia mydas*) and leatherback (*Dermochelys coriacea*) turtles. Other federally listed species that occur in coastal dune and coastal strand habitat, and that need to be considered when managing nesting beaches, are the southeastern beach mouse (*Peromyscus polionotus niveiventris*) and the beach jacquemontia (*Jacquemontia reclinata*). Beach nourishment projects, in particular, could affect these species as well as the turtles. The range of the beach mouse in South Florida is estimated to include Indian River County south to Broward County. The beach jacquemontia is found in Palm Beach County south to Miami, Miami-Dade County.

Status and Trends

The Kemp's ridley was listed as endangered on December 2, 1970 (35 FR 18320). The endangered status was continued with the status review performed by NMFS in 1985 (NOAA 1985). Internationally, *L. kempii* is considered the most endangered sea turtle (Zwinenberg 1977, Groombridge 1982, Magnuson *et al.* 1990). It is listed in Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

Less than 50 years ago the Kemp's ridley was an abundant sea turtle in the Gulf of Mexico. Populations were able to generate a synchronized reproductive effort that resulted in an estimated 40,000 females nesting in one day on the single known nesting beach on the northeastern coast of Mexico (Carr 1963, Hildebrand 1963). Such former aggregations could only have been produced by a very large adult population. *L. kempii* has experienced one of the most dramatic declines in population numbers recorded for an animal. Dr. Archie Carr and others sought the nesting areas of Kemp's ridleys throughout the Gulf of Mexico, the Caribbean and southeast U.S. over many years (Carr 1963). When the Mexican nesting beach was first discovered by scientists in 1961, the population was already severely depleted. By the mid-1980s, nesting numbers had declined from the estimated 40,000 to about 700 nests per year (Turtle Expert Working Group 1998). However, due to the recovery efforts of a joint U.S.-Mexico partnership, the Kemp's ridley population now appears to be in the early stages of an exponential expansion. In 1998, more than 3,600 nests were recorded (FWS news release 1998).

Because nearly the entire adult female population nests at a single locality (about 60 km of beach on the east coast of Mexico), it is possible to estimate the female reproductive population by counting all the nests laid at this site. Marquez *et al*. (1982) previously calculated from tag recapture data that females average 1.5 nests/per season. However, recently Pritchard (1990) deduced 2.31 nests/season/female were likely at the nesting beach. Recent work using ovarian ultrasonography and endocrinology of female Kemp's at Rancho Nuevo led Rostal (1991) to estimate 3.075 nests/female for the 1990 season. The number of nests/female/season has a profound effect on the estimated number of females in the population. Using the older 1.5 figure yields an estimate of 770 females (1155 nests/1.5 nests/female) for the 1991 season. The difference in calculated number of females in the breeding population using an average of Pritchard's and Rostal's figures (about 2.7) results in a 45 percent reduction compared to using 1.5 nests/season/female. Using 2.7 nests/season/female yields a considerably lower estimate of 428 females in the population that oviposited in 1991. If only 58 percent of the turtles nest every year (Marquez *et al*. 1982), the total female population would be about 738 individuals. If the number of turtles nesting annually (58 percent) is underestimated because of unknown tag loss in the population, the number in the nesting population will be overestimated even more and will be less than 738 females. The estimate excludes males, immature turtles, and the small breeding groups or solitary nesters dispersed between Padre Island, Texas and Isla Aguada, Campeche. These small nesting groups, solitary females, and the number of males (or sex ratio), need to be evaluated quantitatively so that the estimate of total population can be refined to obtain a better assessment of the total adult population in the Gulf of Mexico. Until such data are available, an index of adult female population trends is generated by comparing the number of nests/season laid at the Rancho Nuevo nesting beach.

Environmental Threats

A number of threats exist to sea turtles in the marine environment, including: oil and gas exploration, development, and transportation; pollution; trawl, purse seine, hook and line, gill net, pound net, longline, and trap fisheries; underwater explosions; dredging; offshore artificial lighting; power plant entrapment; entanglement in debris; ingestion of marine debris; marina and dock development; boat collisions; and poaching. For this recovery plan, we discuss the threats to the Kemp's ridley on its nesting beach in Mexico; some of these same threats, as well as others, are present in South Florida (refer to the loggerhead account as an example of additional threats in South Florida).

Threats to the nesting beach for Kemp's ridley in Mexico are presently few, but potentially serious. Human population growth and increasing developmental pressure will ultimately result in escalating threats to the nesting beach. Only the central part of the prime nesting area is protected by Mexican presidential decree, and legislation has never been enacted to fully implement the decree. A primary concern is human encroachment and access along the entire nesting area. The wording of the Mexican decree is so vague that construction of commercial fishing facilities proceeded in 1987 immediately adjacent to the main turtle camp at Rancho Nuevo. Occasionally, plans for massive expansion of La Pesca (just to the north of the nesting area) as a fishing center, or dredging the Gulf Intercoastal Waterway from Brownsville, Texas, to Barra del Tordo (in the south part of the nesting beach) are reported. These projects would result in detrimental and possibly disastrous effects on the nesting environment if they were to be completed.

Other nesting environment threats such as armoring, nourishment, or cleaning of the beach; motorized equipment; and non-native dune vegetation do not currently exist. Erosion, nest depredation, and other nest loss agents are not considered problems at present because every nest possible is moved to protected central corrals. At a future date, when increasing numbers of nests necessitate a change in management from corral protection to leaving the nests *in situ*, these factors will have to be addressed.

A threat that comes about due to management practices at Rancho Nuevo is the problem of concentrating all of the collected nests in corrals. This concentration makes the eggs more susceptible to reduced viability from manipulation, disease vectors and inundation. The former two do not seem to have been factors over the time of the binational project, but inundation was a severe problem in 1980 and 1983, drowning nests and reducing the overall percentage hatch by significant margins.

Direct exploitation of Kemp's ridley eggs occurred at the Rancho Nuevo nesting beach in the 1940s through the early 1960s prior to the initiation of protection of the beach in 1966 (Chavez *et al*. 1967). Prior to the late 1960s, the eggs were taken out in mule trains, by truck and by horseback (Hildebrand 1963). Hildebrand felt that continued exploitation could lead to the demise of the species, and he listed anecdotal information as to the disappearance of other arribada beaches to the south of Rancho Nuevo from heavy fishing and egg harvest pressures.

Dredging operations affect *L. kempii* through incidental take and by degrading the habitat. Incidental take of ridleys by hopper dredges has been documented. NMFS consulted with the COE in November 1991 and issued a biological opinion under Section 7 of the ESA finding that the unrestricted operation of hopper dredges from North Carolina to Cape Canaveral, Florida, jeopardized the continued existence of sea turtles, particularly Kemp's ridley. In addition to direct take, channelization of the inshore and nearshore areas can degrade foraging and migratory habitat through spoil dumping, degraded water quality/clarity and altered current flow.

Management

Because the presence of the Kemp's ridley is occasional throughout South Florida, there is no specific management ongoing for this species. Conservation measures to protect nesting beaches for sea turtles in general, however, will also benefit the Kemp's ridley. The following discussion is taken from the 1992 Recovery Plan for the Kemp's Ridley Sea Turtle (FWS and NMFS 1992), as examples of specific management and conservation measures being implemented for the species in Mexico.

The Kemp's ridley has been protected under U.S. law since its Federal listing as an endangered species on December 2, 1970. Protection from international trade has been afforded by CITES under which Kemp's is listed on Appendix 1. The species has been afforded some legal protection by Mexico since the 1960s. In 1977, a refuge was established at the only known nesting beach (Anon. 1977) and a Mexican presidential decree included the Rancho Nuevo nesting beach natural reserve as part of a system of reserves for sea turtles (Anon. 1986). On May 28, 1990 a complete ban on the taking of sea turtles was effected by Mexican presidential decree (Anon. 1990). In addition, the Mexican government Secretaria de Desarrollo Urbano y Ecologia and Secretaria de Pesca has proposed a national plan *"Programa Nacional de*

Proteccion y Conservation de Tortugas Marinas (Propuesta)" which could be a major force, if adopted and implemented, in the protection of all of the remaining sea turtle resources of Mexico (Anon. 1991).

Nesting beach protection in the vicinity of Rancho Nuevo has been significantly increased over the past two decades. The collaboration of Mexican and U. S. conservationists under Instituto Nacional de Pesca (INP) and FWS is now used as a model for an international multi-agency effort. Protection efforts on the Rancho Nuevo nesting beach were initiated in 1966 by the Mexican Government. From 1966 to 1977, an average of 23,000 hatchlings were released annually (FWS and NMFS 1992). From 1978 to 1991, under a cooperative beach patrol effort involving both FWS and INP, the number of released hatchlings was increased to a yearly average of 54,676 individuals. For adult females, a downward trend in population numbers continued through 1985, in spite of the efforts since 1966 to stop the egg poaching and harm to the nesting females on the beach. There has been an increase in the number of nests documented at Rancho Nuevo since 1985. The increase is in part due to wider coverage of the nesting beach by the binational protection team and in part due to increased numbers of nests laid. How much of the increase is attributable to new recruits to the nesting population versus increased efforts to patrol north and south of the reserve (after a dispersion of nesting females since Hurricane Gilbert altered large expanses of the primary nesting area) is difficult to say (Burchfield *et al*. 1990). Regardless of the recent apparent increase in nests laid, the view is quite different when all known nests are plotted over time since 1947. In this perspective, the recent increase is overwhelmed by the decline since 1947, and the numbers of nests seen since 1978 form little more than a horizontal line on the graph.

As far as we know, no adult turtle has suffered non-human predation on the beach since 1966 when the Mexican program began. Because of the intensive vigilance of the binational protection team, adequate motorized beach patrols ,and the presence of armed marines, poaching of adult turtles on the nesting beach has not been documented since 1980, and only occasionally is a clutch of eggs taken by humans.

Nearly all nests laid on the beach are moved the same day to fenced and guarded corrals near the camps. Hatching success has been improved in the corrals since the binational project began. The mean from 1987 to 1991 was 72 percent, nearly that of undepredated *in situ* nests. Almost all of the nests left *in situ* suffer predation, primarily by coyotes, skunks, and raccoons. The few missed nests that are discovered a day or more after being laid and are too old for safe transport to a corral are preferentially protected with plastic mesh *in situ* and monitored for hatching. Alternatively, if those older nests cannot be protected *in situ*, they are carefully transferred to a sandpacked styrofoam box for incubation at one of the camps.

Habitat research now underway promises to provide us with a much improved picture of the biology of this species. Netting studies in the northern Gulf of Mexico (Ogren 1989), east coast habitat use and tracking studies (Byles 1989, Standora *et al*. 1990), and adult migratory and wintering studies

(Byles 1988) are continuing. These studies will contribute considerably to our understanding of Kemp's ridley habitat use and requirements and thus to our ability to protect foraging and migratory habitats.

"Head-start" is the term used to describe the process whereby sea turtles are maintained in captivity for a period following hatching, so that the (presumably) very high neonatal mortality may be circumvented. The animals are released when they have outgrown threats from avian and the majority of non-avian predatory species. The Kemp's ridley head-start experiment began in 1978 as part of a complex, binational agreement to undertake several conservation and research measures at Rancho Nuevo, PAIS and at the NMFS Galveston Lab (Magnuson *et al.* 1990). The head-start experiment was undertaken as a last-ditch effort in the face of the alarming decline in turtles nesting at the Rancho Nuevo nesting beach. In 1977, when the project was conceived, protection of the beach lacked manpower and funds, and whether protection would continue was unclear. In fact, the major cause of mortality resulting from man's activity, shrimping, was just becoming established and no turtle excluder devices (TED) were available to eliminate this type of mortality. Currently, protection of the nesting beach is reasonably secure and TED regulations are in place and being expanded in the U.S. shrimp fleets, while Mexico is embarking on a program of TED placement in their shrimp fleets. Between 1978 and 1992, about 18,000 head-started Kemp's were released. In 1992, the program was ended.

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Recovery for the Kemp's Ridley Sea Turtle

Lepidochelys kempii

Recovery Objective: DELIST the species once recovery criteria are met.

South Florida Contribution: SUPPORT delisting actions..

Recovery Criteria

The best scientific information available raises questions about whether the Kemp's ridley sea turtle utilizes nesting beaches within the coastal counties of South Florida. Unless new information demonstrates that this species occurs in South Florida, no recovery criteria will be developed or proposed as part of this recovery plan.

Species-level Recovery Actions

S1. **Continue standardized surveys of nesting beaches to determine if Kemp's ridley sea turtles nest in South Florida.** Nesting surveys are undertaken on the majority of nesting beaches. In the past, beach coverage varied from year to year, as did the frequency of surveys, experience and training of surveyors, and data reporting. Consequently, no determination of nesting population trends had been possible with any degree of certainty. However, in 1989, to better assess trends in nesting, DEP, in cooperation with FWS, initiated an Index Nesting Beach Survey (INBS) program to collect nesting data that can be used to statistically and scientifically analyze population trends. The INBS program should continue to gather a long-term data base on nesting activities in Florida that can be used as an index of nesting population trends.