Biology and Ecology of Sea Turtles

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Project: Biology and Ecology of Sea Turtles

Early Life History

Ocean current mediated movements of neonate Kemp's ridley and green sea turtles relating to their dispersal throughout the Gulf of Mexico remain an enigma. No documented observations or collecting records of neonate individuals from this particular developmental habitat or pelagic life stage have been recorded in the literature or are known to occur from the Gulf of Mexico for both of these species. A few old or vague accounts of very small post-hatchlings Kemp's ridleys collected from "America," or other localities in the Atlantic exist but the detailed descriptions of the habitat from where they were collected are frequently lacking; several recent records of green sea turtles in the pelagic zone of the Atlantic do exist, however. The spatial distribution of post-hatchling Kemp's ridley turtles can be inferred if they are assumed to be planktonic and enter the circulation pattern that is extant off their natal beach at Rancho Nuevo, Mexico, in the western Gulf. If the pelagic behavior of neonate Kemp's ridleys is similar to other species of sea turtles, then we may predict the movements of these young turtles during the first year(s) of their life by studying the direction, velocity and seasonal patterns of oceanic current

systems. The following discussion is restricted to Kemp's ridley early life history unless otherwise stated.

Basically, the major oceanographic features operating in the Gulf and western North Atlantic would suggest several scenarios: (1) the hatchlings remain in central-southwestern Gulf of Mexico; (2) they are carried out of the western Gulf and are entrained by the Loop Current in the eastern Gulf, and complete their pelagic development in the Florida Current; (3) they are re-entrained by a northern Loop Current westward drifting eddy and return to the western Gulf; or (4) they do not enter a major dispersing current, an/or are ejected from a current system and prematurely dumped in coastal waters where they either experience heavy predation, or succumb to low water temperatures.

The size distribution of *L. kempi* collected throughout their coastal benthic range in North America shows an increasing size gradient from New England waters south to Florida (mean carapace length = 30 cm to 37.6 cm). This suggests that turtles in the Florida Current are carried northward to the Gulf Stream, then entrained in eddies that transport them across shelf waters to the New England coast where many become cold-stunned during winter months. Later, active migration by the survivors in response to seasonal temperature changes may be responsible for the southern movement along the coast to Florida where larger juveniles are found. Tag recapture data indicates some

individuals undergo seasonal migrations along the eastern seaboard of the Atlantic for more than a year. Very few adults, however, have been recorded from Atlantic waters.

For the young turtles that undergo their entire pelagic developmental period in the Gulf, two areas where the smallest coastal-benthic sizes (20 cm carapace length) are commonly found in the coastal zone are in western Louisiana and the Florida panhandle east of Cape San Blas. Onshore wind-driven currents could be responsible for ejecting and/or transporting the young turtles from the western Gulf pelagic current systems to the coastal habitat in the former situation. Anticyclonic eddies spun off of the Loop Current may be the oceanographic mechanism responsible for assisting young turtles to shift from a pelagic developmental habitat in the eastern Gulf to the coastal panhandle habitat and/or back westward to Louisiana coastal waters.

A continuation of studies on the distribution and abundance of juvenile turtles in the coastal zone will hopefully shed more light on the dependency of the small size class of Kemp's ridleys and green sea turtles in the shallow bays and sounds of the inshore area. It is this post-pelagic developmental habitat where the feeding energetics of an air-breathing marine turtle dependent upon an aerobic diving strategy, may be restricted to these shallow depths by its small body size--and reduced lung

capacity. In this coastal habitat both species have shifted from the pelagic stage to that of benthic foragers--one a carnivore and the other a herbivore. These shallow inshore habitats provide an abundance of forage items, crustaceans and molluscs for Kemp's ridley and sea grasses for the green sea turtle and protection from large predators.

More research is in order--especially now that conservation measures mandated by law require protection of these species in inshore waters as well as in the offshore zone..

Tagging Studies

Long term studies on the distribution and abundance of juvenile and subadult turtles by fishery independent methods, as well as documented records from fishery dependent studies (incidental catch) are being conducted in the northeastern Gulf of Mexico and elsewhere off the southeastern United States in the Atlantic. Results from this research effort are providing us with information on sea turtle habitat preference according to size classes, local movements and long distance migrations, and, in the future data on growth.

The total number of turtles tagged to date from coastal areas, in the Atlantic and the Gulf of Mexico, for three species of sea turtles are: 432 Loggerhead sea turtles (*Caretta caretta*); 264 Kemp's ridley sea turtles (*Lepidochelys kempi*); and 31 green sea turtles (*Chelonia mydas*). All of these turtles were

captured in coastal offshore and inshore waters of the southeastern United States by either active fishing gear such as shrimp trawls and strike gill nets, or by turtle set nets in our fishery independent study at Cedar Key, Florida. The number of species tagged by locality are summarized as follows:

Species	Locality	Number
Lepidochelys kempi	Panacea, Fl	125
	Cedar Key, FL	77
	Cape Canaveral, FL	58
	Winyah Bay, SC	4
		264
Chelonia mydas	Panacea, FL	5
	Cedar Key, FL	7
	Cape Canaveral, FL	18
	Winyah Bay Sc.	1
		31
Caretta caretta	Panacea, FL	7
	Cedar Key, FL	2
	Cape Canaveral, FL	343
	Winyah Bay, SC	80
		432

All of the Kemp's ridleys and green sea turtles captured were juveniles or subadults. However, some of the loggerheads captured were adult-sized individuals. In general, results indicated that the smallest turtles were captured in shoal inshore waters of the coastal habitat. As mentioned in the previous section, the benthic foraging habitat that can be successfully exploited by these young turtles is probably dependent upon their diving ability and may be restricting their

activities to these shallow water habitats during their early developmental period.

The long term studies by fishery independent methods in the northeastern Gulf of Mexico are being conducted at Cedar Key, Florida. The Kemp's ridley sea turtle is the target species in this study--and the species most frequently captured. Four recent captures were tagged previously at the same net set, Corrigan Reef, and had been at large for three, nine, and ten (2) months, respectively. This is more evidence that these turtles may remain in this particular developmental habitat at Cedar Key for extended periods, or return after relatively brief periods spent away from the shallow waters in Waccasassa Bay. Perhaps this local migration is in response to colder winter temperatures or dependent upon the abundance of their preferred food--portunid crabs. Two turtles had grown over one centimeter in carapace length and had gained about 3 kilograms. Elsewhere in the northern gulf two very small ridleys and a green turtle were recently captured, tagged and released in a fishery dependent tagging study at Panacea, Florida. The two ridleys measured only 21 and 22 centimeters in carapace length, and weighed 1.25 and 1.4 kilograms, respectively; the green turtle measured 26 centimeters and weighed 2.3 kilograms. This is the minimum size of ridleys we have collected in coastal waters and bays, and probably represent new migrants from the pelagic habitat.

It is important to recognize this transitional stage of sea turtles from the open sea to inshore coastal habitats if we are to protect them from incidental capture. These juveniles, having survived the vulnerable first year(s), from their natal beach and through the pelagic life stage, have successfully adapted to their marine environment. As potential recruits to a declining adult population their importance to the successful recovery of this endangered species cannot be underestimated. They are more important to save in the long term than are the few hundred surviving adults.

Publications

Henwood, T.A. and L.H. Ogren. 1987. Distribution and migrations of immature Kemp's ridley turtles (Lepidochelys kempi) and green turtles (Chelonia mydas) off Florida, Georgia, and South Carolina. Northeast Gulf Science 9(2):153-159.

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