

Diamondback Terrapin

Malaclemys terrapin

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DESCRIPTION

Taxonomy and basic description

The diamondback terrapin is a small, long-lived estuarine turtle endemic to coastal marshes, estuarine bays, lagoons and creeks ranging from Cape Cod, Massachusetts to the Gulf Coast of Texas. Currently, there are five (Hartsell 2001) or seven (Ernst et al. 1994) subspecies. More recently, Hart (2004) has identified six management units. The subspecies found in South Carolina is *Malaclemys terrapin centrata*.

Terrapins have varied coloration from black to spotted patterns on the soft tissue and dark or light-colored scutes with strong concentric layers on the carapace. The hind margin of the carapace curls up instead of flaring. Hind legs are large and toes have extensive webs. These turtles are strong, fast swimmers that feed on a variety of mollusks, crustaceans, and other invertebrates. In South Carolina, salt marsh periwinkles (*Littoraria irrorata*) and blue crabs (*Callinectes sapidus*) are among the terrapin's primary food sources (Tucker et al. 1995; Levesque 2000).



Terrapins are sexually dimorphic. Females are much larger than males and reach 15-18 cm (6-7 in) in length; males reach 10-13 cm (4-5 in) in length. Adult females also have enlarged heads. Terrapins hibernate in the mud during winter and mate in the spring. Eggs are laid May through early August and clutches have 5–12 eggs (Pritchard 1979). The number of clutches laid per female in South Carolina is undocumented; however two clutches may be common (David Owens-College of Charleston pers. comm.).



Status

The 2003 International Union for Conservation of Nature and Natural Resources (IUCN) lists terrapins as a species of lower risk/near threatened (www.redlist.org). In South Carolina since 2000, Chapter 5 Section 50-5-2300 of South Carolina law “authorizes the Department of Natural Resources to grant permits for the harvest and marketing of

diamondback terrapins.” However, there have been no permit requests for harvesting terrapins. Currently, permit requests would be considered but not issued (Dale Theiling-SCDNR pers. comm.) because the species’ status is unknown or declining (Seigel and Gibbons 1995). Prior to 2000, the law allowed a harvest season, but this has not been active since the 1970s (Robert Gault – terrapin harvester pers. comm.).

POPULATION DISTRIBUTION AND SIZE

The current status of most populations of terrapins is unknown or declining (Seigel and Gibbons 1995). The species experienced near extinction in the early 1920s because of commercial over-harvest. Commercial harvest declined in the late 1920s and terrapin populations increased (Gibbons et al. 2001). Mr. Robert Gault, the last terrapin harvester in the state, reported catches of nearly 500 turtles in two to three days of net fishing in the Beaufort area in the 1970s.

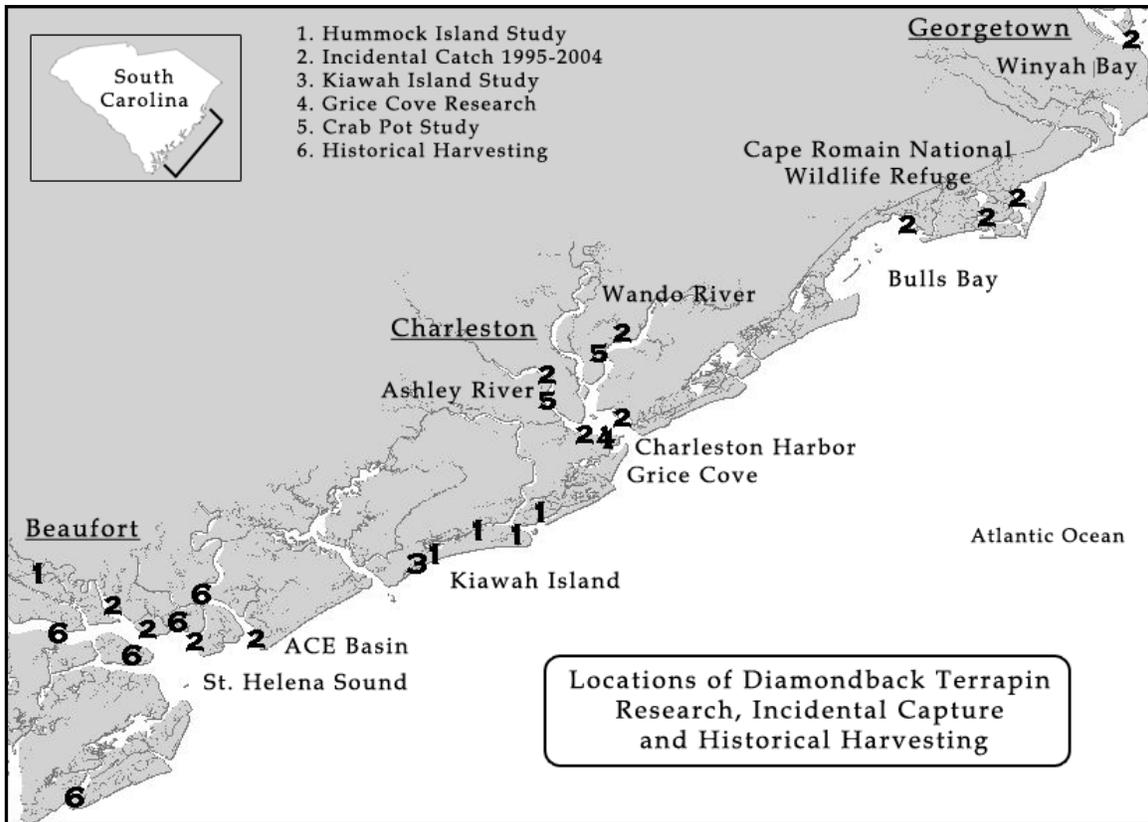
Two decades of monitoring terrapins in four creeks adjacent to the Kiawah River (see map) has documented a decline since the early 1990s and local extirpation (Gibbons et al. 2001; Tucker et al. 2001). Along the South Carolina Coast, incidental catch data (1995–2004) of diamondback terrapins in research trammel nets has remained consistent. Incidental captures north and south of the Charleston Harbor estuary are much less common (see map; Levesque 2000; Bill Roumillat and John Archambeau-SCDNR pers. comm.).

Genetic studies in North and South Carolina indicate that terrapin populations from these states are not significantly different (Hart 2004; Hauswaldt 2004) and should be treated as one management unit. A previous genetic study using a different genetic marker was unable to detect a difference between the Carolinas and Georgia (Lamb and Avise 1992). The Diamondback Terrapin Working Group (DTWG) was formed in September 2004. Georgia and both Carolinas comprise the southeastern section of this working group.

It should be noted that in 1947, several thousand diamondback terrapins were released into Cape Romain National Wildlife Refuge (CRNWR) waters from the North Carolina Beaufort Fishery Station (Anonymous 1947). The genetic stock of these terrapins is not known. This should be taken into consideration when determining the genetic stock of diamondback terrapins in South Carolina waters.

HABITAT(S) / NATURAL COMMUNITY REQUIREMENTS

Terrapins are endemic to estuarine habitats. They are the only emydid turtle that can survive in a high salinity environment without accessing a freshwater source. Terrapins nest on land and require access to dry soft sand/soil to deposit their eggs. There is also evidence of high site fidelity and low recruitment and/or dispersal among tidal creeks. If a population is extirpated from a tidal creek, recruitment from other creeks would be very slow to repopulate the area.



THREATS

Terrestrial

Major threats faced by diamondback terrapins include loss or degradation of nesting habitat resulting from coastal development. Nests are destroyed by native (raccoons and mink) and non-native predators (fire ants) as well as erosion and storm events. Vehicle inflicted mortality of females during the nesting season is common where a highway separates nesting sites from tidal creeks. Mortality related to mowing of causeway shoulders also poses a threat.

Marine

Major threats in the marine environment include recreational, commercial and abandoned/ghost crab pots. In the Ashley and Wando Rivers (see map), Bishop (1983) estimated that the mean daily terrapin catch per baited crab pot was 0.16 in April and May with 10% mortality. A statewide survey in fall 2003, documented nearly 10,000 commercial hard crab pots (Mark Maddox-SCDNR pers. comm.). Other threats include commercial harvesting (if permitted), destruction of food resources, environmental degradation and contamination (increased sedimentation, nutrient enrichment, oil spills and filling/draining marshes), boat and propeller mortality and the commercial pet trade.

CONSERVATION ACCOMPLISHMENTS

- A diamondback terrapin working group for the species' entire range has been organized to facilitate information exchange and to set research and management priorities (formed September 2004).
- In 2000, South Carolina legislature recognized the value of science-based management of marine resources and has changed commercial access to the South Carolina terrapin resource from a seasonally open fishery to one managed with discretion by the Department of Natural Resources.

There have been local research findings and accomplishments throughout South Carolina. However, no large- scale conservation efforts have been undertaken in the past and none are currently taking place. Local accomplishments include:

- Sonic telemetry has been useful in studying site fidelity of terrapins. Habitat use, season, time of day, tidal cycle and reproductive status should be considered when monitoring terrapins (Becky Estep-College of Charleston pers. comm.).
- Genetic studies indicate: high site fidelity is not reflected in population genetic structure; no significant genetic differentiation exists among estuaries in North and South Carolina; terrapins between South Carolina and New York are more similar to those from Texas than terrapins in Florida (possibly because of intentional mixing); multiple paternity does occur but at lower frequencies than other species of turtles (Hauswaldt 2004).
- Genetic management units are not estuary specific and therefore terrapins within the units defined by Hart (2004) can be translocated to areas where terrapins are extirpated (Hauswaldt 2004).
- Diamondback terrapin nesting was apparent on five of 16 hummock islands (see map) inventoried during a 2003-2004 South Carolina Department of Health and Environmental Control/SCDNR preliminary study in South Carolina (Billy McCord-SCDNR pers. comm.).
- Seasonal reproductive activity of Charleston Harbor estuary terrapin populations has been determined and may be used to reduce anthropogenic threats during these times (Lee 2003).
- Grice Cove Beach in the Charleston Harbor estuary (see map) was identified as an important nesting beach for diamondback terrapins compared with other beaches in this system. Highest nesting activity was early May to mid June (Riollana 2003).
- A terrapin population study in four tidal creeks adjacent to the Kiawah River (see map) has been ongoing since 1983. There have been 1336 individual terrapins captured and 1323 recaptures (Gibbons et al. 2001).
- Recreational crab pots have been shown to adversely affect diamondback terrapin populations in the Kiawah River (Hoyle and Gibbons 2000).
- From 1995 to 2004, terrapins have been consistently caught in research trammel nets (see map; Levesque 2000; Bill Roumillat and John Archambeau-SCDNR pers. comm.). Terrapins play an active role in the salt marsh food chain and are an important predator of salt marsh periwinkles, *L. irrorata* (Levesque 2000).

- A diamondback terrapin spring mating aggregation has been identified in Grice Cove in the Charleston Harbor estuary (see map; Becky Estep and David Owens-College of Charleston pers. comm.).
- Baseline data on clutch and egg size was documented for Kiawah Island, South Carolina (Zimmerman 1989).
- Artificial propagation of the diamondback terrapin is a successful management strategy for this species (Hay 1917; Barney 1922; Hildebrand 1929).
- Five hundred BRDs (bycatch reduction devices) were made available to Kiawah Island residents, visitors and merchants. BRDs were provided for both commercial and recreational crab pots in the vicinity of Kiawah Island, John's Island and Beaufort (Marilyn Blizard and Elizabeth King – Kiawah Island pers. comm.).
- The Town of Kiawah Island sponsored a “Save the Diamondback Terrapin” program. Numerous educational materials have also been printed (Marilyn Blizard and Elizabeth King pers. comm.).

PRIORITY CONSERVATION OBJECTIVES AND IMPLEMENTATION RECOMMENDATIONS / OPPORTUNITIES

Priority research and survey needs

1. Develop and implement long-term coastwide standardized surveys to estimate the abundance and distribution of South Carolina's terrapin population.
2. Quantify anthropogenic sources of terrapin mortality, with focus on life stage and sex specific mortality rates.
3. Determine effectiveness of bycatch reduction devices on crab pots.
4. Identify sites of significant or potential mortality from vehicles and mowers.
5. Determine habitat of one- and two-year-old juveniles.
6. Establish several intensive studies to determine population parameters required for evaluating the status of the species, such as mortality rates and nesting effort/success.

Habitat protection

1. Identify and protect critical nesting habitats throughout the state, especially from beach disturbances from visitors, boaters and dogs during the nesting season.
2. Develop predator control programs for critical nesting beaches.
3. Identify and protect critical mating aggregations throughout the state.

Management

1. Declare a moratorium on commercial harvest and possession without a permit.
2. Require effective BRDs (bycatch reduction devices) in recreational and commercial crab pots. Crab pots with BRDs showed an increase in the number of legal crabs caught (Guillory and Prejean 1998).
3. Require effective degradable panels or panel attachments in recreational and commercial crab pots.
4. Develop an abandoned/ghost crab pot collection program with the South Carolina Sea Grant Consortium.
5. Change the status of the terrapin from a harvestable game species to a species “in need of management” under the South Carolina Nongame and Endangered Species Conservation Act.
6. Work with SCDOT at the supervisory level to restrict causeway mowing during the terrapin nesting season.
7. Encourage the salvage of eggs from road-killed females for an incubation and release program by local animal care groups.

Monitoring

1. Continue coastwide standardized surveys every year to determine the status of the population.

Education, public outreach and cooperative efforts

1. Educate the public about the species and how they can help, specifically emphasizing responsible actions when using crab pots. Produce education materials to be distributed coastwide (i.e. bumper stickers, brochures).
2. Erect crossing signs along roadways alerting motorists about diamondback terrapins. Signs should be theft proof or removed each year.
3. Develop a South Carolina Department of Natural Resources web page on diamondback terrapins. Web site will enhance collaboration for the southeastern portion of the DTWG.
4. Participate in and contribute to the DTWG by attending triennial meetings.

5. Collaborate with institutions, partners and nongovernmental organizations on future research and management.

PERFORMANCE MEASURES (INDICATORS OF SUCCESS)

As results from current research and surveys are identified and analyzed, we will initiate projects to address specific needs that arise from these results.

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