

Striped Mud Turtle (Lower Keys)
(also **Key Mud Turtle**)
Kinosternon baurii

This profile is a short summary of information to introduce the species and does not summarize all available information on the species.

Listing status: USFWS = None
FWC = Endangered (applies to Lower Florida Keys populations only)

Trend: *Kinosternon baurii* is a small, aquatic turtle found from eastern Virginia south to the Florida Keys along the Atlantic Coastal Plain (Iverson 1992). Historically, the Lower Florida Keys population was considered a separate subspecies (*K. baurii baurii*; Steineger 1925); however, recent DNA analysis did not find significant genetic differences between Upper Keys or mainland Florida populations and the Lower Keys population (Karl and Wilson 2001). The Lower Keys population of the Striped Mud Turtle is, however, isolated from the rest of Florida by a seven-mile expanse of open sea water. The FWC currently lists the Lower Keys population as endangered due to isolation and habitat loss (Lazell 1989). Though several populations occur on federal lands within national wildlife refuges, some of the largest occur on private lands threatened by development (FNAI 2001).

Perceived Threats: Habitat loss due to development in the Florida Keys is listed as a primary threat to this population. Its isolation also makes it especially vulnerable to local extirpation and severe weather events (Lazell 1989; Dunson 1992).

Notes: Although striped mud turtles also occur throughout the Florida peninsula and Upper and Middle Keys, only those populations occurring in the Lower Keys, from west of the Seven Mile Bridge to Key West, are listed (FNAI 2001).

Prioritization information:

PLCP PVA proportion of pops modeled to persist on public lands = **.32**

PLCP PVA probability of a 50% decline on public lands = 0

Millsap updated biological score = 15

Millsap updated supplemental score = **18**

Legacy population trend = stable

Legacy population status = **low**

Summary: This species triggers 3 of the 6 parameters.

Life History: The Lower Keys population of the striped mud turtle is highly specialized for life in temporary ponds with salinities less than 15 ppt (Dunson 1992). If salinity is greater than 15 ppt, turtles will leave the ponds to find another or will find suitable terrestrial retreats, such as rock ledges or tree roots. The turtles exhibit a high degree of site fidelity and have been found to be faithful to ponds, returning repeatedly to the same pond throughout their life (FNAI 2001).

The turtle has been found utilizing a variety of habitats, including cypress swamps, sloughs, ponds, drainage canals, wet meadows, shallow marshes, and adjacent forested areas. It is often observed on roads and along canal banks (Carr 1952, Duellman and Schwartz 1958) and sometimes digs into decaying vegetation or the soil surface. In central Florida, the striped mud turtle sometimes estivates on land when water levels are low and returns to water after rains raise water levels (Wygoda 1979). It may be less aquatic in northern than in southern Florida, where habitats more often include deeper flowing waters and where estivation on land is rare or absent (Ernst et al. 1972, Iverson 1979). However, in the Lower Keys, habitats include shallow ponds and excavated mosquito-control ditches, and turtles may use terrestrial retreats if the ponds dry or become too saline. Suitable ponds are usually in or along the edge of elevated hardwood hammocks. Typical pond-side vegetation is dominated by buttonwood, and red and black mangroves sometimes occur, as does cattail in disturbed sites. The striped mud turtle is active year round as long as salinity stays below 15 ppt (Dunson 1992).

Eggs are laid in nests dug in sand or decaying vegetation (Ernst and Barbour 1972, Iverson 1979), including alligator nests occasionally. Nesting areas for northern populations in Florida include turkey oak-longleaf pine sandhills adjacent to swamps. The species may travel 50-100 meters to nest. A study on a population near Tampa found that after ovipositing, females often burrow underground a few meters from the nest and then move back to wetland habitat after the next rain (Mushinsky and Wilson 1992).

Diet includes mosquito larvae, cabbage palm seeds, juniper leaves, algae, small snails, insects, crayfish, and likely carrion (Einem 1956, Dunson 1992). The striped mud turtle forages in principally in water, but occasionally and on land, where it may seek insects in cattle dung or garbage piles (Carr 1952, Ernst and Barbour 1972). It has been reported as a carnivorous scavenger or insectivore in the Florida Keys (Lazell 1989).

Preferred Habitat Parameters:

Temporary ponds with salinities less than 15 ppt (Dunson 1992).

Minimum Habitat Requirement:

From PVA: Populations with at least 34 females (~6 ha)

From Literature: N/A

Best Management Practices:

- Protection of hardwood hammocks and all associated freshwater wetlands in the Lower Keys is critical.
- Although filling of mosquito-control ditches has been proposed in conjunction with management of the Key deer, this would destroy some of the mud turtle's most important habitat (USFWS 2003).
- Monitor controlled burning if conducted during the dry season, when turtles may be buried on land and might be affected (FNAI 2001).

Survey Methods and Monitoring Protocols: While little information is available specifically regarding the Lower Keys population, a 20-year study of the closely related Eastern Mud Turtle (*Kinosternon subrubrum*) provides monitoring and survey protocol. See: Frazer *et al.* (1991).

PVA Summary: The Wildlife Habitat Conservation Needs in Florida project's PVA for the Striped Mud Turtle was based on a habitat map provided by Florida Fish & Wildlife Conservation Commission showing approximately 2,539 ha of potential habitat, with about 64% on managed (public) lands. Extensive population information for this species was not available; therefore researchers used data from the closely related Eastern Mud Turtle for the PVA. The Keys Mud Turtle was estimated to breed at 5-6 years of age, so researchers used a three stage demographic model (0-1, 1-5, and 6+ years), and estimated survival (0.65 for the intermediate stage) from Eastern Mud Turtle data, although experts note this and subsequent figures may not be relevant to the lower keys population. There was no reliable data for fecundity, so researchers ran multiple models to accommodate the variability in data: a baseline model with 0.62 fecundity, an optimistic model with 1.06 fecundity, and a pessimistic model with a fecundity value of 0.36. Dispersal ability of approximately 500 meters was used to delineate populations. Forty-nine distinct populations were identified in the model with all potential habitat, with 54 populations existing in managed habitat only. Initial abundance was set at 0.37 females per 30-m cell.

After running all 3 models, researchers deemed the baseline model to be the most realistic. The baseline growth rate was 1.0043, with zero probability of extinction in the next 100 years for both populations on all potential and only managed habitat. In only managed habitat, there was a 6-7% probability of a 20% decline in abundance. Sensitivity analyses indicated that survival of the 5+ and the 1-5 year stages had the most influence on population growth, increasing the probability of a large decline (98.5% probability of a 90% decline in abundance with a 5% reduction in the 5+ stage). Populations that had at least 34 females (i.e., ~6 ha) were likely to remain occupied for most of the 100 years of the simulation, which suggested that the smaller populations were not likely to persist long term without occasional dispersal from these source populations. Only 18 of 49 populations on all potential habitat and 22 of 54 populations on managed habitat remained occupied for at least 80 years. Many of the populations were very small and did not remain occupied for very long in the simulation.

2003 Landcover used for model:

Pinelands	Freshwater Marsh and Wet
Tropical Hardwood Hammock	Prairie

FNAI Natural Communities Utilized:

Pine Rockland	Wet Prairie
Rockland Hammock	Basin Marsh
Hydric Hammock	

FNAI field guide description of habitat: Small, usually temporary, freshwater to slightly brackish ponds and ditches with salinity below 15 parts per thousand, roughly circumneutral in acidity. Most natural ponds are at edges of hardwood hammocks and have buttonwood (*Conocarpus*) fringes, but sometimes large populations occupy man-made mosquito-control ditches. Uses terrestrial retreats (rock ledges, tree roots) when ponds dry or become too saline due to evaporation.

Important Links:

FNAI. 2001. Field Guide: Striped Mud Turtle (Lower Keys)
http://www.fnai.org/FieldGuide/pdf/Kinosternon_baurii_-_lower_Keys_population.PDF

Documents/Literature:

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- Wygoda, M. L. 1979. Terrestrial activity of striped mud turtles, *Kinosternon baurii* (Reptilia, Testudines, Kinosternidae) in west-central Florida. *J. Herpetol.* 13: 469-480.