SPECIES PROFILE

Spotted Turtle

Clemmys guttata

Federal Listing: Not listed
State Listing: Special Concern
Affected Species: N/A
Global Rank: G5
State Rank: S3
Author: Michael, N. Marchand, NHFG

Element 1: Distribution and Habitat

1.1 Habitat Description

Spotted turtles (*Clemmys guttata*) require large habitats with a diversity of wetland types and hydroperiods, and they tolerate only limited development of uplands and disturbance by humans (Fowle 2001, Joyal et al. 2001, Hinderliter 2003). Spotted turtle aquatic and wetland habitats include marshes, wet meadows, ponds, forested and shrub swamps, fens, shallow slow-moving streams and rivers, and vernal pools (Ernst et al. 1994, Fowle 2001).

Habitat use may shift seasonally and vary geographically, and overland movements among wetlands may be greater than 500 m (Milam and Melvin 2001). Vernal pools often are used extensively in spring and early summer (Joyal et al. 2001, Milam and Melvin 2001. Female spotted turtles usually lay eggs in open canopied uplands, generally between late May and early July (Ernst et al. 1994). Human-altered sites (e.g., pastures, road edges, yards, and agricultural areas) may be used (Carroll 1991, Joyal 1999, Joyal et al. 2001), as may hummocks in emergent wetlands (Milam and Melvin 2001). When summer temperatures are high, spotted turtles may estivate in permanent wetlands (fens, swamps, marshes, ponds, and rivers) and seasonal pools (Fowle 2001, Milam and Melvin 2001, Hinderliter 2003).

1.2 Justification

Spotted turtles use a large matrix of wetland and upland habitats, and because of life history characteristics (e.g., late age of maturity, low fecundity, and high adult survival) are extremely sensitive to small increases in mortality. And because spotted turtles need large protected areas with relatively limited development, maintaining viable populations of spotted turtles should benefit many other rare and common organisms. For example, habitat use may overlap with that of Blanding's turtle (*Emydoidea blandingii*); both species were found in similar shallow-water habitats in southern New Hampshire (Jenkins and Babbitt 2003).

The spotted turtle is declining throughout its range (Litzgus and Mousseau 2004) and is of conservation concern in the Northeast (Therres 1999). Spotted turtles are listed as endangered in Vermont, threatened in Maine, and a Species of Special concern in Massachusetts and New Hampshire. Because their habitat overlaps with the highest human population densities in New Hampshire, spotted turtles are particularly vulnerable in this area and are threatened especially by encroachment of roads.

1.3 Protection and Regulatory Status

- See Marsh and Shrub Wetland profile for regulations regarding wetland impacts.
- NHFG Rule FIS 803.02. Importation. Spotted turtles shall not be imported to New Hampshire
- NHFG Rule FIS 804.02. Possession. Spotted turtles shall not be possessed in New Hampshire
- NHFG Rule FIS 811.01. Sale of Reptiles. No person shall sell spotted turtles in New Hampshire

1.4 Population and Habitat Distribution

Populations range from southern Maine, south along

the Atlantic coast, to Florida, as well as to southern Ontario, New York, Pennsylvania, Ohio, Indiana, Michigan, and Illinois (Ernst et al. 1994). In New Hampshire, Huse (1901) reported that spotted turtles were found 'everywhere'; however, Oliver and Bailey (1939) knew of only one documented occurrence. Towns with historic records (before 1985) but no recent verified records include Mount Vernon (Oliver and Bailey 1939), Goffstown (1982) and Pembroke (1983). The majority of known spotted turtle locations are concentrated in southeastern New Hampshire (See section 1.5). However, NHFG has received reports far from the core area in the southeast, including two reports in Ossipee, one report in Richmond, and two in Grafton and on the Enfield/Canaan border. An unverified report was received from Effingham, the town east of Ossipee. Though the record in Richmond is isolated from other reports in New Hampshire, reports in the adjacent Massachusetts town of Warwick (Massachusetts Natural Heritage Program) support the validity of this observation. Reports in the Grafton area need further investigation.

1.5 Town Distribution Map

Not completed for this species.

1.6 Habitat Map

Known spotted turtle habitats (element occurrences) were buffered conservatively by 500 m (Inferred Extent, NatureServe Element Occurrence specifications, 2002), and overlapping buffers were merged. These areas were considered occupied. For each occupied area, a number of variables was measured, including size (ha), area of potentially suitable wetland habitat (ha), conservation land (ha, percent), road density, and amount of development (ha, percent).

1.7 Sources of Information

Distribution information came largely from RAARP. High quality records were submitted to NHNHB and incorporated in the New Hampshire Rare Species Database (NHRSD). New Hampshire studies included an assessment by D. Carroll along the Lamprey River and a graduate research study by M. Hinderliter in 2003.

1.8 Extent and Quality of Data

Location records incorporated into the NHRSD consisted of high quality observations (photographs, specimens, or expert observer). Because spotted turtles are secretive and difficult to detect, focused efforts will likely result in new town records.

1.9 Distribution Research

- Ask RAARP volunteers to gather more information on towns with limited species distribution information and towns distant from the core New Hampshire population (e.g, Richmond, Ossippee, and Grafton/Enfield/Canaan).
- Conduct visual and trapping surveys at locations where the species has not been reported but is most likely to occur because of available habitat.
- NHFG should coordinate this effort and involve other state and federal agencies, universities, non-government organizations, and expert observers.

Element 2: Species/Habitat Condition

2.1 Scale

Habitat quality was assessed based on known occupied sites (500 m buffer around locations; see element 1.6).

2.2 Relative Health of Populations

There is little information on the abundance and condition of spotted turtle populations in New Hampshire. There are only 64 records (Element Occurrences) in the Rare Species Database maintained by the NHNHB (as of 8 April 2005), seven of which are considered historic (before 1985). Thirty-eight records consisted of 1 spotted turtle observation, and only 2 records in the database had greater than 10 observations. Eleven records were of individuals found only on roads.

2.3 Population Management Status

There is little management of spotted turtles in New Hampshire. Possession of spotted turtles, including manipulation of individuals for research, requires a permit from NHFG. Several individuals have been

permitted to conduct mark-recapture studies, and D. Carroll, who has extensive knowledge of turtle biology, has conducted long-term monitoring of a local New Hampshire population. A search for rare turtles (e.g., Blanding's, spotted, and wood, *Glyptemys insculpta*) was conducted in the Great Bay and Lamprey River areas, and13 blocks of relatively extensive and contiguous suitable habitat were identified (Carroll 1999). In addition, 14 spotted turtles were monitored at sites in the coastal watershed as part of M. Hinderliter's graduate research.

2.4 Relative Quality of Habitat Patches

Sixty-five occupied habitat areas were mapped, ranging from 95 to 2,702 ha (mean 227 ha ± 357 SD), and a 500 m buffer around known spotted turtle records restricted the possible sizes of occupied areas.

Roads are a major threat to spotted turtles. In southern New Hampshire, spotted turtles crossed roads in every month from April to August at all 3 sites where roads were near wetlands (Hinderliter 2003). Average road density in mapped occupied areas was 3 km/km^2 ± 3 SD (range 0-16 km/km^2). Thirty-one occupied areas lacked any state routes and interstates, and in these areas, the percent of residential development was 11 % ± 18 SD (range 0-68 %). Only 2 sites had road densities less than 1 km/km^2, one of which was 0.9 km/km^2. The mean residential development within occupied areas was 13% ± 20 SD (range 0-91%).

Large, unfragmented habitats with a diversity of wetland types will be necessary to maintain viable populations of spotted turtles (Milam and Melvin 2001, Hinderliter 2003). In general, an undisturbed buffer of more than 400 m around wetland edges may be necessary to protect nesting, estivation, foraging, and travel sites of local spotted turtles (Milam and Melvin 2001), and 430 ha of wetlands and uplands may be needed for a population of 600 adult spotted turtles (Fowle 2001).

2.5 Habitat Patch Protection Status

The percentage of conservation land in spotted turtle habitat was 15 % ± 23 SD (range 0-99%); mean fee ownership was 13% ± 22 SD (range 0-99 %) and mean conservation easement was 2 % ± 6 SD (range 0-40 %). Fifty occupied areas had less than 20% of land protected, 60 areas had less than 50% protected, and only 3 occupied areas had more than 70% protection.

Of these 3 areas, all had road densities greater than 1.0 km/km^2 and 2 were bisected by a major state route. The total area protected in occupied lands ranged from 0 to 730 ha (mean = 39 ha ± 103). No mapped occupied areas were greater than 50% protected, had road densities less than 2 km/km^2, and lacked major routes.

2.6 Habitat Management Status

There is little management of spotted turtles in New Hampshire. Artificial nesting areas have been created in some areas as part of mitigation during NHFG review of wetland impacts and on other lands, but use of these nesting areas is unknown. Thirty-one wetland impoundments are managed, primarily for waterfowl, by NHFG, and spotted turtles occur in some of these areas.

2.7 Sources of Information

Available information on the condition of spotted turtle populations largely was a result of reports received from the RAARP and several localized research and inventory efforts (Carroll 1999, Hinderliter 2003). Using available data layers from various sources (e.g., University of New Hampshire Complex Systems), GIS were used to assess quantity and quality of known spotted turtle.

2.8 Extent and Quality of Data

Most records consist of only 1 or a few observations, and many were encounters on roads (see element 2.2). Wetland occupation and habitat use at a fine scale (e.g., wetland polygons) is poorly understood for most of the New Hampshire range of spotted turtles, though a few populations in southeastern New Hampshire have been studied in more detail (e.g., Hinderliter 2003).

2.9 Condition Assessment Research

- Continue to add and update spotted turtle records in the NHRSD in accordance with

Element Occurrence standards accepted by the NHFG and the NHNHB
- Prioritize and continue existing research with other New England states
- Identify viable populations and assess population sizes and structures
- Assess population viability and habitat use on Conservation Land, especially in State Parks and Wildlife Management Areas. Short visual (e.g., basking and nesting) or trapping surveys should be used to assess the relative condition of populations. Because multiple uses of protected habitat might threaten spotted turtles, longer surveys should be conducted at a sample of conservation lands to assess effects of land use. Studying populations in these areas would lead to better management of areas not in conservation land and could provide benchmarks for comparison with populations in disturbed and fragmented areas

Element 3: Species Threat Assessment

Threats to spotted turtles are similar to those of Blanding's turtles (see Threat Ranking Form) and are not discussed in detail here. The greatest threats include loss and fragmentation of large wetland complexes due to development and road construction and mortality of adults from vehicles and, possibly, agricultural machinery. Commercial collection may be a larger threat to spotted turtles than to Blanding's turtles because of the spotted turtles' smaller size and value in the international pet trade. For a discussion of threats, see Blanding's turtle profile (element 3) and habitat profiles (especially Marsh and Shrub Wetlands, Vernal Pools).

3.2 Sources of Information

Information on threats came from literature reviews, summary reports, expert reviews, and available GIS data layers from various sources.

3.3 Extent and Quality of Data

Habitat fragmentation and loss, as well as road mortality of spotted turtles, are known threats. Potential threats such as disease, invasive plants, genetic isolation, and effects of agriculture and forestry in New Hampshire are less understood.

3.4 Threat Assessment Research

- Evaluate the effects of land management (e.g., water level manipulation, agriculture, and recreation) on spotted turtles.
- Identify populations that are isolated by an anthropogenic barrier (e.g., high traffic road) and identify options for increasing connectivity for spotted turtles.
- Monitor spotted turtle populations (e.g., with radio telemetry) in areas where underpass systems have been installed or are proposed.

Element 4: Conservation Actions

- Protect spotted turtle habitat through acquisition, easement, and regulation (see Land Protection Strategies):
  - Protect large blocks of unfragmented habitat with a diversity of wetland complexes.
  - Use spotted turtle habitat to prioritize conservation of land.
  - Work with towns to protect critical habitat through land acquisition, prime wetland designation, and wetland buffer regulation.
  - Develop guidelines for landowners, managers, and towns to enhance and protect resources important to spotted turtles.
  - Maintain beaver flowages.
  - Minimize threats to wetlands such as vernal pools used by spotted turtles.
  - Maintain natural vegetation along wetland edges
- Promote wetland restoration, enhancement, and creation projects in areas that will benefit spotted turtles (e.g., restore shallow, wet meadow in agricultural areas) (see Marsh & Shrub Wetland strategies)
- Evaluate current protection status for spotted turtles and consider protection under New Hampshire Endangered Species Conservation Act (RSA 212-A). Develop guidelines for spotted turtles for use during environmental project reviews.
- Design roads and other transportation networks (e.g., railways, bike trails, sidewalks) to reduce threats to spotted turtles and other rare wildlife

(see Roads strategies)
- Educate public about rules and regulations pertaining to spotted turtles and other reptiles and amphibians (e.g., sale and possession) through updated NHFG website and other media (see Wildlife Collection strategy)
- Reduce anthropogenic food sources for predators (see Predator control strategy)

Element 5: References

5.1 Literature

Carroll, D.M. 1991. The year of the turtle. A natural history. Camden House Publishing, Incorporated, Charlotte, Vermont, USA.

Caroll, D.M. 1999. Lamprey River and Great Bay area turtle habitat investigations. Preliminary map report. Unpublished data.

Ernst, C.H., J.E. Lovich, and R.W. Barbour. 1994. Turtles of the United States and Canada. Smithsonian Instituted Press, Washington and London, USA.

Fowle, S.C. 2001. Priority sites and proposed reserve boundaries for protection of rare herpetofauna in Massachusetts. Natural Heritage and Endangered Species Program. Massachusetts Division of Fisheries and Wildlife, Westborough, Massachusetts, USA.

Hinderliter, M.G. 2003. Seasonal movements, habitat usage, home range, and conservation of spotted turtles (*Clemmys guttata*) in southern New Hampshire. Master's Thesis. University of New Hampshire, Durham, New Hampshire, USA.

Huse, W.H. 1901. The Testudinata of New Hampshire. Proceedings of the Manchester Institute of Arts and Sciences 2:47-51.

Jenkins, R., and K.J. Babbitt. 2003. Developing a conservation strategy to protect land habitat functions for New Hampshire's reptiles and amphibians using the Blanding's turtle (*Emydoidea blandingii*) as a flagship species. Final report submitted to the New Hampshire Fish & Game Department.

Joyal, L.A. 1999. *In* Maine Amphibians and Reptiles, Hunter, M.L., Jr., A.J.K. Calhoun, and M. McCollough, editors. The University of Maine Press, Orono, Maine, USA.

Joyal, L.A., M. McCollough, and M.L. Hunter, Jr. 2001. Landscape ecology approaches to wetland species conservation: a case study of two turtle species in southern Maine. Conservation Biology 15: 1755-1762.

Litzgus, J.D., and T.A. Mousseau. 2004. Demography of a southern population of the spotted turtle (Clemmys guttata). Southeastern Naturalist. 3: 391-400.

Milam, J.C., and S.M. Melvin. 2001. Density, habitat use, movements, and conservation of spotted turtles (Clemmys guttuta) in Massachusetts). Journal of Herpetology 35:418-427.

NatureServe. 2004. NatureServe Explorer: An online encyclopedia of life [web application]. Version 4.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: 4 January 2005).

Oliver, J.A. and J.R. Bailey. 1939. Amphibians and reptiles of New Hampshire exclusive of marine forms: Pages 195-217 *in* Biological Survey of the Connecticut watershed, H.E. Warfel, editor. New Hampshire Fish and Game Department Survey Report 4.

Therres, G.D. 1999. Wildlife species of regional conservation concern in the northeastern United States. Northeast Wildlife 54:93-100.

5.2 Data Sources

NH Natural Heritage Bureau. 2005. Database of Rare Species and Exemplary Natural

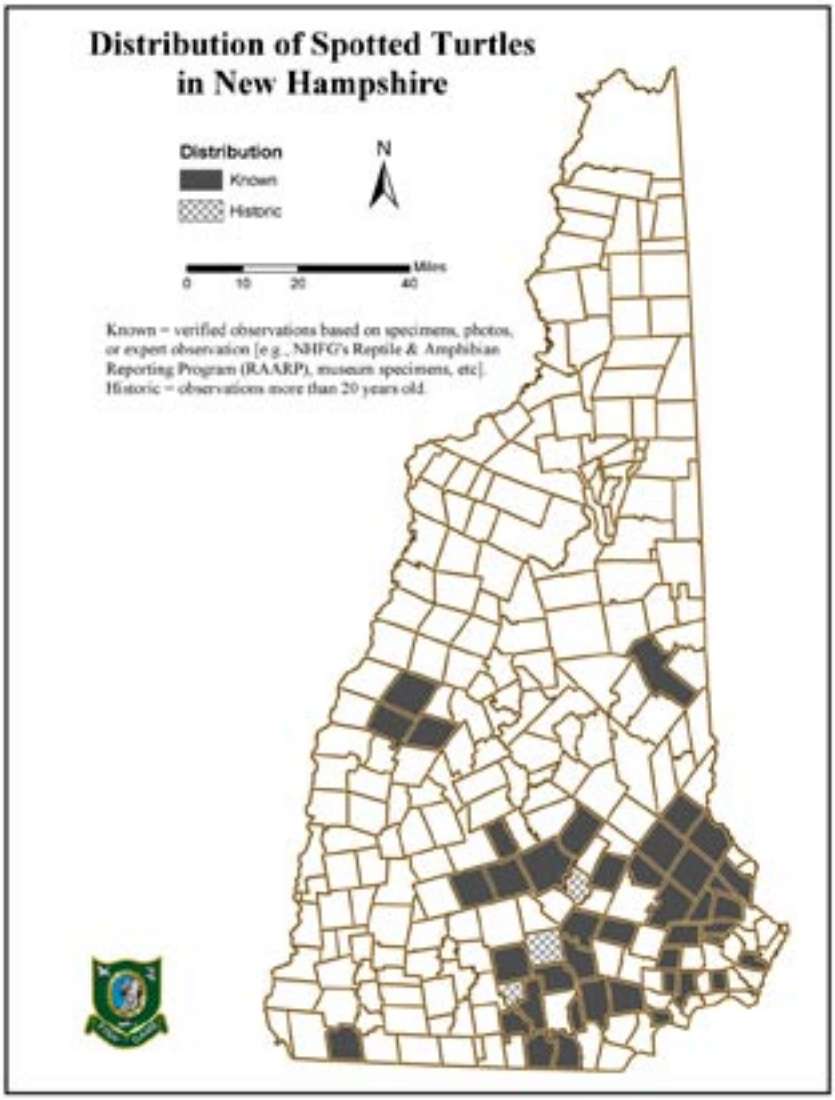
Community Occurrences in New Hampshire. Department of Resources and Economic Development, Division of Forests and Lands. Concord, New Hampshire, USA.

New Hampshire Reptile and Amphibian Reporting Program (RAARP). Coordinated by

New Hampshire Fish and Game Department's Nongame and Endangered Species Program.

Element 6: List of Figures

Figure 1. Town distribution map of known spotted turtle locations in New Hampshire, March 2005. Town records reported included a photograph, specimen, or were reported by an expert observer. Most reports were received through the New Hampshire Reptile and Amphibian Reporting Program (RAARP).


Distribution of Spotted Turtles
in New Hampshire
Distribution
Known
Historic
N
Miles
0
10
20
40
Known = verified observations based on specimens, photos, or expert observation [e.g., NHFG's Reptile & Amphibian Reporting Program (RAARP), museum specimens, etc].
Historic = observations more than 20 years old.