# Spotted Turtle

*Clemmys guttata*

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|---|---|
| Federal Listing | N/A |
| State Listing | T |
| Global Rank | G5 |
| State Rank | S2 |
| Regional Status | Very High |

*Photo by Michael Marchand*

## Justification (Reason for Concern in NH)

The spotted turtle is declining throughout its range (Litzgus and Mousseau 2004) and is of conservation concern in the Northeast (NEPARC 2010, Therres 1999). In New England, spotted turtles are listed as endangered in Vermont, and threatened in Maine and New Hampshire. 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. Because their habitat overlaps with the highest human population densities in New Hampshire, spotted turtles are particularly vulnerable to rapid development, especially where road density and traffic volume is high. 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 can 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, Jones and Willey 2013).

## 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 1994) but no recent verified records include Pembroke, Cornish, Webster, and Manchester. The majority of known spotted turtle locations are concentrated in southeastern New Hampshire. However, NHFG has received reports far from the core area in the southeast, including Ossipee and Sandwich, Richmond and Winchester, Grafton, and on the Enfield/Canaan border.

## Habitat

Spotted turtles require large intact landscapes with a diversity of wetland types and sizes, 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, Jones and Willey 2013).

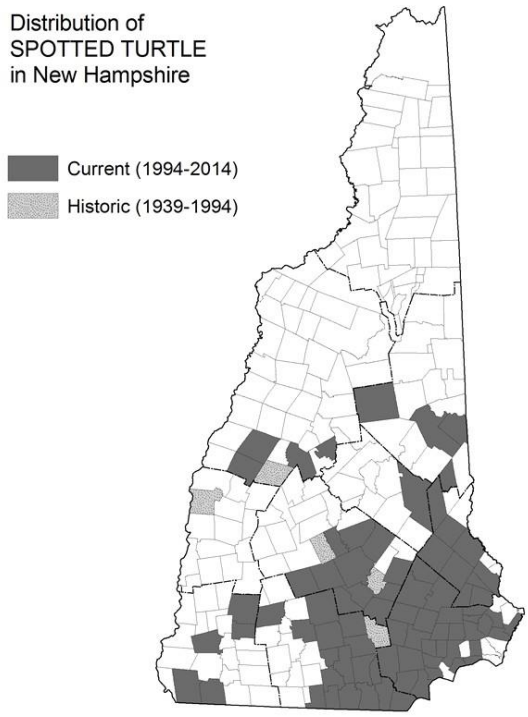
Habitat use shifts seasonally and varies geographically, and overland movements among wetlands may be greater than 500 m (Milam and Melvin 2001). In spring, spotted turtles are likely to use wetlands with abundant wood frog (*Lithobates sylvaticus*) egg masses, and in fall are likely to use wetlands with high sun exposure (Beaudry et al. 2009).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) are often used for nesting (Carroll 1991, Joyal 1999, Joyal et al. 2001), as are hummocks in emergent wetlands (Milam and Melvin 2001). When summer temperatures are high, spotted turtles may become relatively inactive, resting in the bottoms of wetlands (fens, swamps, marshes, ponds, and rivers) and seasonal pools (Fowle 2001, Milam and Melvin 2001, Hinderliter 2003).

## NH Wildlife Action Plan Habitats

- Marsh and Shrub Wetlands
- Vernal Pools
- Floodplain Habitats
- Peatlands
- Temperate Swamps




**Distribution Map**

## Current Species and Habitat Condition in New Hampshire

There is little information on the abundance and condition of spotted turtle populations in New Hampshire. There are only 141 records (Element Occurrences) in the Rare Species Database maintained by the NHNHB (as of 1 March 2015), fourteen of which are considered historic (before 1994). Most records consisted of 1 spotted turtle observation, and very few records in the database had greater than 10 observations. Many records were of individuals found only on roads.

Across the Northeast Region in 2012 and 2013, 148 wetland sites were surveyed for Blanding's and spotted turtles (Jones and Willey 2013). As a result of trapping in these wetlands, 102 spotted turtles were captured. In New Hampshire specifically, 45 spotted turtles were observed during this survey period (combined visual and trapping surveys).

## 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, and 13 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.

A regional project supported by the Competitive State Wildlife Grant Program titled 'Conservation of Blanding's Turtle and Associated Wetland SGCN in the Northeast' was initiated in 2011 and consisted of a standardized and coordinated monitoring strategy for Blanding's turtle populations in the northeast region, which is ongoing (Jones and Willey 2013). Spotted turtles are one of the associated wetland SGCN that were assessed through this project, and are included in management plans written for Blanding's turtles and their habitats in NH.

**Regulatory Protection (for explanations, see Appendix I)**

- CITES - Convention on International Trade of Endangered Species of Wild Fauna and Flora
- NHFG Rule FIS 803.02. Importation.
- NHFG Rule FIS 804.02. Possession.
- NHFG Rule FIS 811.01 Sale of Reptiles.
- Endangered Species Conservation Act (RSA 212-A)
- NHFG FIS 1400 Nongame special rules
- Fill and Dredge in Wetlands - NHDES
- Comprehensive Shoreland Protection Act - NHDES
- Alteration of Terrain Permitting - NHDES

**Quality of Habitat**

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).
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 study sites where roads were near wetlands (Hinderliter 2003). NHFG receives reports of vehicle collisions with spotted turtles every year through RAARP and Wildlife Sightings.

**Habitat Protection Status**

One hundred thirty seven (137) occupied habitat areas were mapped, ranging from 86 to 1,202 ha (mean 189 ha ± 170 SD), and a 500 m buffer around known spotted turtle records restricted possible sizes of occupied areas. The percentage of conservation land in spotted turtle habitat was 19 % ± 23 SD (range 0-94%); mean fee ownership was 13% ± 21 SD (range 0-94 %) and mean conservation easement was 6 % ± 12 SD (range 0-54 %). Ninety-four occupied areas had less than 20% of land protected, 123 areas had less than 50% protected, and only 7 occupied areas had more than 70% protection.

Of these 7 areas, all had road densities greater than 1.0 km/km2 and 2 were bisected by a major state route. The total area protected in occupied lands ranged from 0 to 412 ha (mean = 38 ha ± 62). Seven

mapped occupied areas were greater than 50% protected, had road densities less than 2 km/km2, and lacked major routes.

**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.

## Threats to this Species or Habitat in NH

*Threat rankings were calculated by groups of taxonomic or habitat experts using a multistep process (details in Chapter 4). Each threat was ranked for these factors: Spatial Extent, Severity, Immediacy, Certainty, and Reversibility (ability to address the threat). These combined scores produced one overall threat score. Only threats that received a "medium" or "high" score have accompanying text in this profile. Threats that have a low spatial extent, are unlikely to occur in the next ten years, or there is uncertainty in the data will be ranked lower due to these factors.*

**Habitat impacts from development of surrounding uplands (Threat Rank: High)**

Reduction in habitat quality or availability may harm populations by causing indirect mortality due to increased dispersal across inhospitable habitat, increased predation, and increased desiccation. In late May to early July, female turtles leave wetlands in search of an area with an open canopy and bare ground to lay eggs. If nesting habitat is not connected to occupied wetland habitat, adult mortality may occur. Humans and their pets can disturb nesting females and their eggs. Also, succession over time of open areas to brushy or shaded areas can reduce the quality of nesting habitat and may result in reduced recruitment to local populations.

Spotted turtles may use human-modified areas such as gravel pits, residential lawns, and agricultural areas, for nesting. Thus, adults in these areas are vulnerable to predation, road mortality, disturbance, and mowing equipment (Marchand and Litvaitis 2004a). Nests near some ecological edges, such as those nearby to development, may also be more vulnerable to predation (Temple 1987).

Regional population declines have been exacerbated by upland habitat fragmentation and degradation by development. Large blocks of connected habitat are needed to adequately protect spotted turtles. Because spotted turtles often use vernal pools and uplands, protection only of large wetlands is not adequate to protect populations. New Hampshire is the fastest growing state in the northeast, and development in the southern part of the state is consuming open space at a rapid rate (SPNHF 2014). New Hampshire state regulations are currently ineffective at protecting species that use large wetland complexes, and building and disturbance setbacks from freshwater wetlands are not required under New Hampshire state wetland regulations (except for septic setbacks).

**Mortality of individuals from vehicles on roadways (Threat Rank: High)**

Human population density and development is rapidly increasing in southern New Hampshire (SPNHF 2014). Increases in road densities and traffic volume pose direct threats to turtles, which are slow to cross wide roads. Small annual losses of only a few adult spotted turtles may result in population extirpation.

Roads that intersect a turtle's home range will increase the chance of individuals being killed on roads. Many spotted turtle records (Element Occurrences) known from New Hampshire consist entirely of

individuals observed on roads. Additionally, low population densities and skewed age and sex ratios have raised concerns over the effect of road mortality on some turtle populations in the region (e.g., Joyal et al. 2000, Marchand and Litvaitis 2004a, Gibbs and Steen 2005).

Computer modeling suggests that road densities as low as 1 km/ km2 with fewer than 100 vehicles per lane per day will cause excessive loss of semiterrestrial turtles (Gibbs and Shriver 2002). Although density may be a good initial surrogate for investigating habitat quality, factors such as road width, traffic speed and volume, and position in the landscape should also be considered. Road shoulders, because of the availability of bare soil and open canopies, may attract nesting turtles, increasing the opportunity for road crossings of adult and hatchling turtles. Also, steep-sloping granite curbing can trap turtles on roadways and can decrease the chance of individuals successfully crossing roadways (Najjar, New Boston Air Force Base, personal communication).

**Habitat conversion from the direct filling of wetlands for development (Threat Rank: Medium)**

Filling of wetlands to produce flat, developable land directly removes spotted turtle habitat. Reduction in habitat quality or availability may harm populations by causing direct mortality of individuals or indirect mortality due to increased dispersal across inhospitable habitat, increased predation, and increased desiccation.

It's estimated that around 20,000 acres of wetlands have been historically lost from New Hampshire (Environmental Law Institute 2008). Under the Fill and Dredge in Wetlands Act, NHDES requires a permit for dredge, fill, or construction in any size wetland. NH DES receives around 2,600 permit applications each year for dredge, fill, or construction in wetlands, and approximately 95% are approved (Environmental Law Institute 2008). For projects that impact over 10,000 square feet of wetland, some mitigation is typically required.

As southern New Hampshire develops, wetlands will be threatened by myriad stressors (see Marsh and Shrub Wetland Profile). Although extensive marshes are not likely to be filled, small vernal pools can easily be overlooked during environmental reviews of dredge and fill permit applications (M.N. Marchand, personal observation).

New Hampshire state regulations are currently ineffective at protecting species that use large wetland complexes, and building and disturbance setbacks from freshwater wetlands are not required under New Hampshire state wetland regulations (except for septic setbacks).

**Mortality from the commercial collection of individuals from the wild (Threat Rank: Medium)**

Commercial collection of spotted turtles includes any capture of spotted turtles with intent to sell the animal. Individual turtles are removed from local populations, and because populations depend on high adult survival, removal can lead to local extinction. This can range in severity from one spotted turtle being sold within the state, to larger-scale collections that sell turtles elsewhere in the country or even overseas.

Large-scale commercial collection of spotted turtles appears to be low, but NHFG has evidence of commercial collection of spotted turtles in New Hampshire as recently as 2013. In the past, reptile dealers have advertised rare native turtles for sale in New Hampshire (Levell 2000). Adult spotted turtles are the most commonly collected, since they are easily captured particularly when on land. The loss of adult turtles from natural populations can have devastating effects for all species of turtles. Therefore, commercial collection in New Hampshire is worth further investigation and enforcement. Casual collection and relocation of individual spotted turtles is probably more common, and NHFG receives several reports of this every year.

**Habitat conversion and mortality from the removal of beaver and human-made dams (Threat Rank: Medium)**

The removal of beaver dams or human-made dams can result in reduced wetland habitat quality or availability. Often, beavers build dams in small streams or rivers that flood an area, creating a suitable shrub-wetland type of habitat that can be occupied by spotted and other turtles. When beaver dams are removed, flooded wetland area is typically reduced which reduces habitat suitability for spotted turtles. Removal of human dams may reduce or improve habitat quality depending on the availability of suitable wetland habitat before and after dam removal. When these or other human-made dams are removed, typically water flow is restored to an area and the habitat soon becomes unsuitable for spotted turtles. This reduction in habitat quality or availability may harm spotted turtle populations by causing indirect mortality due to increased dispersal across inhospitable habitat, increased predation, and increased desiccation. Removal of dams can also lead to direct mortality of individual turtles, especially if done during winter months when turtles are hibernating. If a wetland draw-down occurs during this time, turtles can be left without protection from the elements and may not survive through hibernation.

Spotted turtles move to overwintering sites in bogs, fens, marshes or ponds in late fall. Spotted turtles may use vernal pools, beaver ponds, or other wetlands for overwintering sites in NH. During hibernation, turtles are vulnerable to metabolic and respiratory failure, freezing, and predation (Edge et al. 2009). They remain mostly inactive in the substrate of these slow-moving, low oxygen environments until April or May, depending on the weather.

In New Hampshire, landowners may remove beaver dams to protect their property, often with minimal approval or review process. Wetland drawdowns, especially those conducted in fall, may expose turtles to predation, winterkill, and road mortality (Hall and Cuthbert 2000), especially where dispersing individuals are surrounded by dense development (Marchand and Litvaitis 2004a).

**List of Lower Ranking Threats:**

Mortality and species impacts (reduced fitness) from impervious surface run-off

Mortality and species impacts (decreased fitness) from various diseases (ranavirus)

Mortality from subsidized or introduced predators (egg and hatchling mortality)

Habitat degradation from introduced or invasive plants (nesting areas and wetlands)

Mortality from subsidized or introduced predators

Habitat conversion from succession and associated loss of nesting areas

Habitat degradation and mortality from lake and river drawdowns during winter

Habitat degradation due to wetlands manipulation

Mortality and degradation from legal and illegal OHRV activity

Mortality of individuals from forestry equipment

Mortality from casual collection of individuals from the wild or moving animals to a different location

Habitat degradation and conversion from forestry practices

Mortality from mowing and agricultural machinery and vehicles

Disturbance from increased cold temperatures that reduce embryonic development

Habitat and species impacts from fragmentation

## Actions to benefit this Species or Habitat in NH

**Design roads and other transportation networks (e.g., railways, bike trails, sidewalks) to reduce threats to spotted turtles and other rare wildlife.**

**Primary Threat Addressed:** Mortality of individuals from vehicles on roadways

**Specific Threat (IUCN Threat Levels):** Transportation & service corridors

**Objective:**
Roads and associated structures may impede passage of aquatic organisms and change the natural flow and structure of streams or rivers. Upgrading or replacing ineffective structures (e.g., culverts and bridges) can benefit wetland species.

**General Strategy:**
Well-designed culverts, bridges, and other forms of stream or wetland crossing will enhance connectivity of wildlife populations and will increase population viability. NHFG will work with NHDOT, NHDES, towns, and other partners to minimize road mortality of spotted turtles on roadways. Specific targeted actions will include: avoid placement of new roads in high-quality spotted turtle landscapes, avoid upgrading unpaved roads to paved surfaces in spotted turtle landscapes, designing roadways to minimize mortality such as avoiding use of steep curbing, upgrading culverts/underpasses to increase opportunities for safe passage of turtles, place turtle crossing signs to educate motorists in spotted turtle areas, and manage vehicle speed by reducing speed limits or installing speed bumps. Trails should be directed away from wetlands and potential nesting areas to reduce disturbance (see recreation guidelines for Blanding's turtles at blandingsturtle.org, which apply to spotted turtles as well). Priority landscapes for implementation will need to be assessed using a combination of habitat modelling, turtle road crossing data, and local knowledge.

**Political Location:**
Belknap County, Carroll County, Cheshire County, Grafton County, Hillsborough County, Merrimack County, Rockingham County, Strafford County

**Watershed Location:**
Androscoggin-Saco Watershed, Lower CT Watershed, Pemi-Winni Watershed, Merrimack Watershed, Coastal Watershed

**Reduce anthropogenic food sources for predators.**

**Primary Threat Addressed:** Mortality from subsidized or introduced predators

**Specific Threat (IUCN Threat Levels):** Invasive & other problematic species, genes & diseases

**Objective:**
Reduce availability of anthropogenic food sources for predators of turtles & their eggs.

**General Strategy:**
Educate the public about sources of anthropogenic food and the influence it has on the presence of subsidized predators, and the impacts these predators can have on turtle recruitment into a population through predation on eggs.

**Political Location:**
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**Watershed Location:**
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**Educate the public about rules and regulations pertaining to spotted turtles and other reptiles and amphibians (e.g., sale and possession).**

**Primary Threat Addressed:** Mortality from casual collection of individuals from the wild or moving animals to a different location

**Specific Threat (IUCN Threat Levels):** Biological resource use

**Objective:**
Use media, such as updated NHFG website and other sources, to educate the public about rules and regulations that prohibit possessing native reptiles.

**General Strategy:**
NHFG will increase landowner knowledge of the species' status and threats by developing materials and messages on various media including Facebook, NHFG webpage, and press releases to other media outlets (newspaper, radio, television). Goals should include educating the public about the importance of beaver impoundments for wildlife and the risk of flooding if structures are built in areas with potential to become impounded. This helps landowners, managers, and others become aware of the importance of natural beaver colonization and abandonment to the persistence of shrub wetlands for spotted turtles and other species that use this habitat. The public should become aware that it is illegal to possess spotted turtles or any listed species, and that there are timing restrictions & possession limits for common turtles as well.

**Political Location:**
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**Watershed Location:**
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**Minimize disturbance to spotted turtles from recreational activities.**

**Primary Threat Addressed:** Mortality and degradation from legal and illegal OHRV activity

**Specific Threat (IUCN Threat Levels):** Human intrusions & disturbance

**Objective:**
Minimize impacts of recreation on spotted turtle populations by using recreation guidelines and incorporating species' needs into property management plans.

**General Strategy:**
The potential negative influence of recreational trails on spotted turtle populations may be reduced through a combination of management techniques. Although specific guidelines have not been developed for spotted turtles, the best management practices outlined in Guidelines for Recreational Areas within High Priority Blanding's Turtle Sites in the Northeastern United

States (available at blandingsturtle.org) are applicable for this species. Objectives and guidelines for recreational trails in high priority spotted turtle sites include: Prevent direct adult mortality caused by ATVs, OHRVs, trucks, bikes, etc.; minimize disturbance of adults, particularly nesting females; minimize mortality of nests, hatchlings, and juvenile turtles; and maintain the integrity of confirmed and potential nesting habitat. Specific actions could include: 1) Seasonal closures of ATV/OHRV trails bisecting sensitive wetland areas and turtle movement corridors; 2) seasonal (24 May to 4 July) or afternoon/evening (>16:00 h) closures to protect nesting females where trails bisect nesting habitat or nesting corridors;
3) Permanent closures of ATV/OHRV trails in known and potential nesting areas; 4) Increased, targeted law enforcement presence during sensitive time periods when turtle movements are frequent and relatively predictable (e.g., June); 5) Trail relocation to avoid bisecting sensitive wetland complexes and to avoid separating suitable wetland habitats from suitable nesting habitats; and 6) Avoid placing hiking trails or sports fields in or adjacent to nesting areas.

**Political Location:**
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**Watershed Location:**
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**Additional research and monitoring of spotted turtle populations, with a focus on a conducting a thorough threat assessment for the species.**

**Objective:**
Collect and analyze data that will better inform how threats act on spotted turtle populations, and use this to mitigate impacts of threats where possible.

**General Strategy:**
Develop and implement long-term and rapid assessment monitoring using standardized protocol (see regional protocol for Blanding's turtle monitoring, Willey and Jones 2014). Long-term monitoring should be implemented at all high priority sites and repeated every 5 years. Additional monitoring could target nesting areas or habitat quality of particular wetlands. NHFG will participate in any regional conservation initiatives focused on spotted turtles and their wetland habitat. Further research should 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. Any mitigation actions implemented should be monitored for effectiveness (e.g., by radio-telemetry).

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**Promote wetland restoration, enhancement, and creation projects in areas that will benefit spotted turtles**

**Primary Threat Addressed:** Habitat and species impacts from fragmentation

**Specific Threat (IUCN Threat Levels):** Residential & commercial development

**Objective:**
Enhance, create, and restore wetlands and connecting uplands (for example, restore shallow, wet meadow in agricultural areas) to maintain and provide habitat for spotted turtles.

**General Strategy:**
Prioritize restoration funding that will benefit spotted turtles and other imperiled wetland fauna. Where feasible, maintain natural establishment, occupancy, and abandonment of beaver flowages in the landscape. Work with Wildlife Control Officers, NHFG, NHDES, and landowners to ensure that maintenance of beaver impoundments is a preferred option over removal. Woods roads and trails should be relocated outside of wetland areas and areas potentially flooded by beavers, to extent possible.

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**Watershed Location:**
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**Participate in any national or international spotted turtle working groups.**

**Objective:**
NHFG should participate in any national or international spotted turtle working group or forums and any regional initiatives for the species.

**General Strategy:**
NHFG will participate in any spotted turtle working groups that are formed. Similar to the structure of the Northeast Blanding's turtle working group, spotted turtle working groups may aim to complete a status assessment for the Northeast region, a conservation plan for spotted turtles, develop a standardized monitoring protocol, conduct a genetics assessment, and/or initiate implementation of actions across the northeast region.

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**Encourage alternatives to dewatering wetlands potentially occupied by spotted turtles.**

**Primary Threat Addressed:** Habitat degradation due to wetlands manipulation

**Specific Threat (IUCN Threat Levels):** Natural system modifications

**Objective:**
Encourage alternatives to dewatering wetlands potentially occupied by spotted turtles.

**General Strategy:**
Spotted turtles use a variety of wetland types, many of which are influenced by beaver or human constructed dams. Dewatering wetlands occupied by spotted turtles can result in a reduction in habitat, reduced habitat quality, and mortality to individuals from desiccation, freezing, predation or road mortality associated with increased overland travel. Drawdowns or dam removal during hibernation months (October - April) could result in mortality to hibernating turtles. Therefore, alternatives that maintain suitable wetland habitat, especially during hibernation periods, are encouraged.

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**Watershed Location:**
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**Enforce wildlife regulations pertaining to the illegal collection, possession, or sale of spotted turtles in New Hampshire.**

**Primary Threat Addressed:** Mortality from the commercial collection of individuals from the wild

**Specific Threat (IUCN Threat Levels):** Biological resource use

**Objective:**
Enforce existing regulations on collection and possession of spotted turtles.

**General Strategy:**
In New Hampshire, it is illegal to kill, harm, possess, collect, or sell a spotted turtle without a permit from the NHFG. The species is also protected in every other state in the Northeast where it occurs, by the USFWS Lacey Act and internationally via CITES. Because the removal of one individual spotted turtle from the wild can impact local populations, enforcement of rules and laws pertaining to this species are particularly important. NHFG biologists will work with NHFG law enforcement staff to identify violations and enforcement actions. NHFG staff will also work with neighboring states to

identify origin of animals during confiscations.

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**Evaluate impacts and develop environmental review guidelines.**

**Primary Threat Addressed:** Habitat impacts from development of surrounding uplands

**Specific Threat (IUCN Threat Levels):** Residential & commercial development

**Objective:**
Evaluate all projects that have potential to cause harm to Blanding's turtle populations and provide guidance to minimize impacts to those populations.

**General Strategy:**
Spotted turtles are listed as threatened in New Hampshire. As such, NHFG will review any proposed activities (residential and commercial development, recreation, habitat management, etc.) that has the potential to harm spotted turtles. NHFG will work with applicants and permitting staff from other state and federal agencies, primarily Department of Environmental Services (Wetlands Bureau) and U.S. Army Corps of Engineers, to identify avoidance and minimization conditions for permit applicants. NHFG will develop guidelines for consistent and effective review of projects potentially impacting spotted turtles. Guidelines will consider scenarios where impacts should be avoided and scenarios where impact minimization of mitigation may be appropriate. Pre- and post- construction monitoring of spotted turtles and associated habitat (e.g., vernal pools, nesting areas) should be considered as a component of project review. Although all spotted turtle populations have some protection by state law (RSA 212-A), NHFG should prioritize protection at higher quality sites.

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**Protect spotted turtle habitat through acquisition, easement, and regulation.**

**Primary Threat Addressed:** Habitat conversion from the direct filling of wetlands for development

**Specific Threat (IUCN Threat Levels):** Residential & commercial development

**Objective:**
Protect large blocks of unfragmented habitat with a diversity of wetland complexes to provide and maintain areas for spotted turtles.

**General Strategy:**
Use spotted turtle habitat to prioritize conservation of land. This should include maintaining beaver flowages, minimizing threats to wetlands (such as vernal pools) used by spotted turtles, and maintaining vegetated buffers along the edges of wetlands and vernal pools. Many of the guidelines and land conservation priorities developed for Blanding's turtles are relevant to spotted turtles as well (available at blandingsturtle.org), but spotted turtle-specific guidelines should be developed for landowners, managers, and towns to enhance and protect resources important to the species. Priority sites will be incorporated into NH Wildlife Action Plan revision maps and incorporated into state land conservation funding consideration (e.g., Aquatic Resource Mitigation Fund, LCHIP). NHFG staff will provide technical assistance to land trusts and towns in identifying and conserving priority parcels. NHFG staff will also provide technical assistance in developing management objectives compatible with spotted turtle conservation.

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**Develop, implement and promote the use of forestry guidelines in areas where spotted turtles occur.**

**Primary Threat Addressed:** Habitat degradation and conversion from forestry practices

**Specific Threat (IUCN Threat Levels):** Biological resource use

**Objective:**
Implement forestry guidelines to minimize impacts to spotted turtles during forestry activities.

**General Strategy:**
Although there are not guidelines created specifically for spotted turtles, a set of forestry guidelines has been developed for Blanding's turtle (available at blandingsturtle.org), that is applicable to this species. Objectives and guidelines for forestry activities in high priority spotted turtle sites include: Prevent direct adult mortality caused by machinery, skidders, trucks, etc., Minimize mortality of nests, hatchlings, and juvenile turtles, Improve, expand, or create new nesting habitat, avoid changes to wetland hydrology during overwintering season (October to April), Avoid disturbance to vernal pool habitats year-round, and Avoid introducing aquatic or terrestrial invasive plant species. Spotted Turtle Active Season: 1 March to 15 September in most years, may vary depending on weather. Spotted Turtle Dormant Season: 1 November to 28 February in most years, may vary depending on weather. NHFG will target large landowners within high priority spotted turtle sites for dissemination of guidelines and provide technical assistance to these landowners as warranted. NHFG will also disseminate guidelines to groups (e.g., NRCS, UNH Cooperative Extension, foresters) that work with private landowners and encourage use when developing management plans for properties.

**Political Location:**
Belknap County, Carroll County, Cheshire County, Grafton County, Hillsborough County,

**Watershed Location:**
Androscoggin-Saco Watershed, Lower CT Watershed, Pemi-Winni Watershed, Merrimack

| | |
|---|---|
| Merrimack County, Rockingham County, Strafford County | Watershed, Coastal Watershed |

## References, Data Sources and Authors

**Data Sources**

Distribution information came largely from the Reptile and Amphibian Reporting Program (RAARP) and observations submitted to NH Wildlife Sightings Website (nhwildlifesightings.unh.edu). High quality records were submitted to New Hampshire Natural Heritage Bureau (NHNHB) and incorporated into the NH Rare Species Database. New Hampshire studies included an assessment by D. Carroll along the Lamprey River and a graduate research study by M. Hinderliter in 2003, and a Blanding's turtle assessment by NHFG that detected several spotted turtle occurrences during 2011-2014 (Willey and Jones 2014). These observations have also been incorporated into the NH Rare Species Database.

Threat assessments were conducted by a group of NHFG biologists (Michael Marchand, Brendan Clifford, Loren Valliere, Josh Megysey).

**Data Quality**

Most records consist of only 1 or a few observations, and many were encounters on roads. 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). Because spotted turtles are secretive and difficult to detect, focused efforts will likely result in new town records.

**2015 Authors:**

Michael Marchand, NHFG; Loren Valliere, NHFG

**2005 Authors:**

Michael Marchand, NHFG

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