

Blanding's Turtle

Emydoidea blandingii

Federal Listing	N/A
State Listing	E
Global Rank	G4
State Rank	S1
Regional Status	Very High



Photo by Loren Valliere

Justification (Reason for Concern in NH)

The Blanding's turtle is of conservation concern throughout its range (NEPARC 2010, Jones and Willey 2013). Most eastern populations appear to number under 50 adult turtles (Compton 2007), with very few exceeding 100 adults. Blanding's turtles are listed as threatened in Massachusetts and New York, and endangered in Maine and New Hampshire. In 2012, Blanding's turtles were included in a multi-species petition to the USFWS for Federal listing under the ESA (Center for Biological Diversity 2012). In 2013 the IUCN upgraded the species from "Near Threatened" to "Endangered" (Willey and Jones 2014). Within New Hampshire, Blanding's turtle habitat overlaps with the highest human population densities. Therefore, turtles are extremely vulnerable to rapid development, especially where road density and traffic volume is high. Like most turtles, Blanding's turtles are long-lived (up to 77 years in the wild; Brecke and Moriarty 1989) and are characterized by a late age of sexual maturity (14-20 years for female Blanding's turtles; Congdon and van Loben Sels 1993), relatively low fecundity (average 13 eggs per year, DePari et al. 1987, Congdon et al. 1983), and high rates of adult survival. Small increases in annual adult mortality (as little as 2-3%, Congdon et al. 1993, Gibbs and Shriver 2002), especially among females, can have catastrophic effects on populations. Because Blanding's turtles require large mosaics of wetland and upland habitats with relatively limited development, they are an important umbrella species for wetland habitat and species protection in the Northeast (Willey and Jones 2014). Associated SGCN and more common wetland species will benefit from conservation actions for Blanding's turtles. **Distribution**

Populations of Blanding's turtle exist outside of the northeast, from southern Ontario, south through Wisconsin, to Michigan, Minnesota, Ohio, Indiana, Illinois, Iowa, and Nebraska. Peripheral populations exist in Missouri and Pennsylvania and isolated populations of Blanding's turtles occur in Nova Scotia, New York, and New England (Ernst et al. 1994). In New England, Blanding's turtles are restricted to eastern Massachusetts, southeast and south-central New Hampshire, and south-coastal Maine. The core of the northeast Blanding's turtle population (approximately 40%) is southeastern and south-central New Hampshire, where most towns have multiple records.

NH populations are scattered in areas of suitable, connected wetland habitats. Populations in the southeast part of the state are commonly fragmented by roadways. Surveys conducted in 2011-2014 detected Blanding's populations from Kingston and Exeter north to Barrington and Strafford; west to Dunbarton and New Boston; and south to areas of Londonderry, Litchfield, Hollis and Brookline. Most towns within Rockingham, Stafford, Merrimack, and Hillsborough counties have at least one verified report of Blanding's turtle. More information is needed to assess the occurrence of Blanding's turtle populations in Cheshire, Belknap, and Carroll counties.

Occasional reports are received from periphery towns, such as areas of the Lakes Region, but recent surveys did not detect any individuals. Two reports came from the town of Sandwich in 2014, representing the furthest verified northern report of Blanding's turtle to date. Reports from the towns

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of Fitzwilliam and Jaffrey represent the farthest westerly-reaching reports to date. Historic reports (before 1993) without any recent documentation include the towns of Moultonborough, Boscawen, and Seabrook.

Habitat

Blanding's turtles require large intact landscapes consisting of a diversity of wetland types and sizes, sandy open areas for nesting, and limited human disturbance (such as roads and associated threats) (Joyal 1996, Jenkins and Babbitt 2003). Preferred aquatic habitats include marshes, vegetated ponds, forested and shrub swamps, fens, oxbows, and vernal pools (Ernst et al. 1994, Fowle 2001). Blanding's turtles are often associated with buttonbush swamps, highbush blueberry-winterberry shrub thickets, and deep marshes with emergent vegetation, particularly duckweed (*Lemna*) (Sperduto 2004, Jenkins and Babbitt 2003, Ross and Lovich 1992). Slow moving streams and rivers may be important for dispersal and travel between wetlands (Southwell 2002). Adults prefer clean water with a soft organic bottom and abundant aquatic vegetation (Ross and Anderson 1990, Ernst et al. 1994).

Habitat use may shift seasonally and vary geographically. Vernal pools are used extensively in spring and summer (Joyal 1996), and when summer temperatures are high, Blanding's turtles may become relatively inactive. During this time, turtles may be resting in the bottoms of vernal pools, shrub swamps, marshes, and ponds (Joyal 1996, Graham 1999, Fowle 2001).

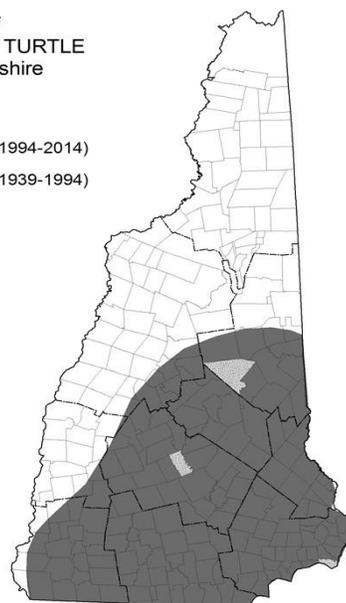
Female turtles lay eggs in upland habitats, usually between late May and early July. Suitable nest sites include an open canopy with sand, loam, or gravelly substrate (Graham 1999). Human-altered sites (e.g. pastures, road edges, yards, gardens, gravel pits, and power line right of ways) are often used (Linck et al. 1989, Joyal 1996, Jenkins and Babbitt 2003, Beaudry et al. 2010). Hatchlings may rest in moss, leaf litter, and grass tussocks prior to migrating from nesting areas to aquatic habitats (Butler and Graham 1995). Juveniles may use shallower habitats, utilizing marsh edges and shrubby wetlands that provide refugia from predators (Pappas and Brecke 1992, Congdon and Kenaith 2006).

NH Wildlife Action Plan Habitats

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

Distribution of
BLANDING'S TURTLE
in New Hampshire

■ Current (1994-2014)
■ Historic (1939-1994)



Distribution Map

Current Species and Habitat Condition in New Hampshire

Generally, larger populations of Blanding's turtles are found in the more extensive wetland complexes
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than in smaller, more fragmented wetland areas. Turtles captured during surveys were marked with a unique identification code, so that individual turtles can be tracked, and populations can be evaluated in subsequent years. In-hand assessments of individual Blanding's turtle health occasionally revealed healed-over shell cracks from being hit by vehicles, and missing limbs presumably from escaping a predator. Vehicle injuries were observed even at sites that appeared less fragmented. The majority of Blanding's turtles captured were adults (greater than 14 years old), but small turtles may have been able to escape traps easier than larger adult turtles, or may use different areas than adult turtles (Congdon and Kenaith 2006).

NHFG also received many reports through the Reptile and Amphibian Reporting Program (RAARP) that helped fill in population information. Among 828 records (Element Occurrences) in the NHHNB Rare Species Database (as of 12 March 2015), 63 are considered historic (before 1995). Many of these are reports of Blanding's turtles on roadways. See 'Quality of Habitat' section for additional information.

Population Management Status

Possession of Blanding's turtles, including manipulation of individuals for research, requires a permit from NHFG. Previous population studies have occurred in New Hampshire: D. Carroll conducted a field investigation for rare turtles (i.e., Blanding's, spotted, *Clemmys guttata*, and wood, *Glyptemys insculpta*) in the Great Bay and Lamprey River areas; and an extensive multi-year Blanding's turtle research project was conducted in two areas of New Hampshire: central New Hampshire (Dunbarton, Weare, Hopkinton) and southeastern New Hampshire (Lee, Durham, Newmarket; Jenkins and Babbitt 2003). The New Boston Air Force Station has investigated habitat use and movement of Blanding's turtles on their property (Najjar and Drake 2014).

The Competitive State Wildlife Grant-funded regional project launched in 2011 provided NH and cooperating states with present-day baseline information on Blanding's turtle's distribution and abundance in the Northeast. This project allowed NH to rank and prioritize Blanding's turtle sites for conservation actions and site-specific plans, and evaluated the influence of habitat and landscape characteristics on population size and structure (Willey and Jones 2014). Priority sites were determined based on the habitat quality and the number of Blanding's turtles observed at the site. For high-priority sites, management plans were created that detail the baseline data collected, include population management goals, and suggest best management practices for conserving Blanding's turtles and their habitat on-site. Management plans include ongoing intervals of population assessment, habitat assessment, and threat assessment. The Northeast Blanding's Turtle Working Group is facilitating implementation of management plans.

Protective screening has been placed over Blanding's turtle nests to prevent predation in some areas, but this effort has not been practiced at a large scale. NHFG and partners have created sandy nesting openings in certain areas near suitable wetlands to reduce the need for adult turtles to cross roads and dangerous terrain to access nesting areas.

NHFG purchased 'turtle crossing' signs to place at areas where roads cross or are adjacent to suitable wetlands. A pilot project was launched in the town of Newmarket in 2014, where signs were strategically placed in these areas. The effectiveness of the signs to alert motorists and reduce vehicle speed still needs to be assessed.

Regulatory Protection (for explanations, see Appendix I)

- CITES - Convention on International Trade of Endangered Species of Wild Fauna and Flora

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- 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
- Clean Water Act-Section 404
- Alteration of Terrain Permitting - NHDES

Quality of Habitat

Known Blanding's turtle sites were ranked using factors such as site area, within-site habitat fragmentation, within-site habitat abundance and quality, surrounding landscape context, percent of the site that is protected and other conservation measures already underway (Willey and Jones 2014). Within-site habitat fragmentation was calculated by looking at the percent of site area that had at least low intensity development, the percent of impervious surface cover, and road density within the site. The presence and intensity of roads is a major threat and influences the quality of an area for Blanding's turtles. These sites were then fit into one of four categories: high priority, mid-priority, supporting landscape (those sites offering connectivity between high priority sites), and non-priority sites – consisting of unknown (single observation) sites and fragmented sites. Genetically distinct sites were also included as high priority sites, as well as those that are geographically isolated. Thirty-two percent of New Hampshire's Blanding's turtle habitat is considered high priority. Forty percent of the state's habitat area falls into the mid-priority category, and 18% of the state's habitat area falls into the 'supporting landscape' category.

Approximately 38% of the known Blanding's turtle habitat in the Northeast region falls within the 36 high priority sites and 31% falls within the 85 mid-category sites. All sites are important to the long-term conservation of Blanding's turtles in the region (Willey and Jones 2014) but actions will need to be prioritized among sites.

Habitat Protection Status

Within High Priority Blanding's turtle habitats, 37% of this habitat is currently protected. 14% of Mid-tier sites are currently protected, and 9% of Supporting Landscape habitats are protected (Willey and Jones 2014). Statewide, out of 143,586 hectares of known Blanding's turtle habitat, 20% of this is conserved.

Habitat Management Status

Habitat management specifically for Blanding's turtles has increased in recent years, as their distribution and needs have become better understood. The species has been targeted for management on some lands protected by groups such as the Great Bay Partnership and Southeast Land Trust.

Artificial nesting areas have been created in some areas as part of mitigation during NHFG review of wetland impacts. Nesting areas were created at two NH Blanding's turtle sites in 2012, and monitoring of suitable nesting areas has occurred at mid- and high-priority sites. Nesting areas have been created on other lands, including some owned by the Army Corps of Engineers and the Natural Resource Conservation Service, but use of these nesting areas is unknown. A nesting study in Maine found that Blanding's turtles were more likely to use anthropogenic nest sites where they were available, and some turtles will use new nesting areas as they become available (Beaudry et al. 2010). A set of best management practices for Blanding's turtles was created for land managers. Nest Site Management and Creation Guidelines, Forestry Guidelines, and Recreation Guidelines are available at

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www.blandingsturtle.org. A Blanding's-specific brochure developed in coordination with UNH Cooperative Extension highlights these practices and is available for landowners at <http://extension.unh.edu/WildlifeBrochures>.

As part of the Blanding's turtle project, site-specific management plans were created for high-priority sites in southern New Hampshire. NHFG will continue to coordinate with site managers to implement habitat management including increasing connectivity of wetlands, promoting attention to the timing of wetland drawdowns (avoiding winter months), reducing road mortality by upgrading road culverts and bridges, and creating nesting 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)

Blanding's turtles use a mosaic of wetland, aquatic, and upland habitats, often traveling a mile or more among them. Thus, a large amount of land is required to protect a population. 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, and although turtle populations are less sensitive to egg survival than to adult survival, high nest mortality or lack of nesting habitat may harm populations.

Blanding's 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 (Compton 2007). An estimated 21,000 ha (51,000 acres) were required to maintain viable populations of Blanding's turtles in Maine (McCollough 1999). Although smaller areas may protect species where populations are denser (Fowle 2001), large blocks of connected habitat are needed to protect Blanding's turtles.

Because Blanding's turtles often use vernal pools and uplands, protection only of large wetlands is not adequate to protect Blanding's turtles (Southwell 2002). New Hampshire has been the fastest growing state in the northeast in recent decades, 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). Where setbacks or buffers do occur at the town level, they are not sufficient to protect wide ranging species such as Blanding's turtles without a larger scale planning effort.

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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 Blanding's turtles may result in population extirpation.

Blanding's turtles are capable of dispersing long distances through upland habitats (Joyal et al. 2001, Jenkins and Babbitt 2003), and roads that intersect turtle home ranges will increase the chance of individuals being killed on roads. Many Blanding's 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 (e.g., *Emydoidea*, 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 Blanding's 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.

An estimated 21,000 ha (51,000 acres) were required to maintain viable populations of Blanding's turtles in Maine (McCollough 1999). Although smaller areas may protect species where populations are denser (Fowle 2001), large blocks of connected habitat are needed to protect Blanding's turtles. 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).

Mortality from casual collection of individuals from the wild or moving animals to a different location (Threat Rank: Medium)

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 individuals picking up a Blanding's turtle to take home as a pet, or picking up a Blanding's turtle and unknowingly moving it to

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unsuitable habitat in a different area.

NHFG has evidence of casual collection of Blanding's turtles in New Hampshire. Casual collection and relocation of individual Blanding's turtles is probably more common than is documented, and NHFG receives several reports of this every year. People may move turtles to distant wetlands, ponds, or lakes, and may occasionally keep Blanding's turtles as pets. Lakes, rivers, and open water ponds are unsuitable for Blanding's turtles, and moving turtles to these habitats likely causes dispersal in search of a suitable wetland, leaving the turtle vulnerable to other threats like road mortality and predation.

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

Commercial collection of Blanding's turtles includes any capture of Blanding's 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 Blanding's 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 Blanding's turtles appears to be low, but NHFG has evidence of commercial collection of Blanding's turtles in New Hampshire as recently as 2013. In the past, reptile dealers have advertised Blanding's turtles for sale in New Hampshire (Levell 2000). Adult Blanding's turtles are probably the most commonly collected, since they are easily captured particularly when on land. Commercial collection in New Hampshire is worth further investigation and enforcement.

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

The removal of beaver dams or some 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 Blanding's and other turtles. When beaver dams are removed, flooded wetland area is typically reduced which reduces habitat suitability for Blanding's turtles. Removal of human dams may reduce or improve habitat quality depending on the availability of suitable wetland habitat before and after dam removal. This reduction in habitat quality or availability may harm Blanding's 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.

Blanding's turtles move to overwintering sites in bogs, fens, marshes or ponds in September and October (Edge et al 2009). Blanding's turtles have been observed using vernal pools and beaver ponds 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 Blanding's turtles to predation, winterkill, and road mortality (Hall and Cuthbert 2000), especially where dispersing individuals are surrounded by dense development (Marchand and Litvaitis 2004a).

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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
Habitat degradation from introduced or invasive plants
Mortality from subsidized or introduced predators
Habitat degradation due to wetlands manipulation
Habitat conversion and mortality from the removal of beaver and human-made dams
Habitat conversion and mortality from drawdowns of lakes and ponds
Mortality and degradation from legal and illegal OHRV activity
Mortality of individuals from forestry equipment
Habitat degradation and conversion from forestry practices
Mortality from mowing and agricultural machinery and vehicles
Species impacts from increased temperatures that reduce suitability for temperature-intolerant species
Disturbance from increased cold temperatures that reduce embryonic development
Habitat and species impacts from fragmentation

Actions to benefit this Species or Habitat in NH

Enforce wildlife regulations

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

Specific Threat (IUCN Threat Levels): Biological resource use

Objective:

Enforce wildlife regulations pertaining to the illegal collection, possession, or sale of Blanding's turtles in New Hampshire.

General Strategy:

In NH, it is illegal to kill, harm, possess, collect, or sell a Blanding's 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 Blanding's 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.

Political Location:

Statewide

Watershed Location:

Statewide

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Location Description:

Species is illegal to possess statewide even though it may not occur in wild statewide.

Outreach to landowners

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:

Provide information on the status and risks of species via various media outlets to educate public on importance of not collecting or moving turtles.

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).

Political Location:

Hillsborough County, Merrimack County, Rockingham County, Strafford County

Watershed Location:

Merrimack Watershed, Coastal Watershed

Location Description:

Species range in NH.

Minimize road mortality to Blanding's turtles

Primary Threat Addressed: Mortality of individuals from vehicles on roadways

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

Objective:

Minimize mortality of Blanding's turtles on roadways.

General Strategy:

NHFG will work with NHDOT, NHDES, towns, and other partners to minimize road mortality of Blanding's turtles on roadways. Specific targeted actions will include: avoid placement of new roads in priority Blanding's turtle landscapes, avoid upgrading unpaved roads to paved surfaces in priority Blanding's 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 priority Blanding's turtle areas, and manage vehicle speed by reducing speed limits or installing speed bumps. Priority landscapes for implementation will need to be assessed using a combination of habitat modelling, turtle road crossing data, and local knowledge.

Political Location:

Hillsborough County, Merrimack County,

Watershed Location:

Merrimack Watershed, Coastal Watershed

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Rockingham County, Strafford County

Location Description:

Blanding's turtle range within NH

Encourage alternatives to dewatering wetlands potentially occupied by Blanding's turtles.

Primary Threat Addressed: Habitat conversion and mortality from the removal of beaver and human-made dams

Specific Threat (IUCN Threat Levels): Natural system modifications

Objective:

Encourage alternatives to dewatering wetlands potentially occupied by Blanding's turtles.

General Strategy:

Blanding's turtles use a variety of wetland types, many of which are influenced by beaver or human constructed dams. Dewatering wetlands occupied by Blanding's 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.

Political Location:

Grafton County, Hillsborough County, Merrimack County, Rockingham County, Strafford County

Watershed Location:

Merrimack Watershed, Coastal Watershed

Location Description:

Blanding's range in NH

Identify priority habitat at Blanding's turtle sites.

Objective:

Identify priority Blanding's turtle areas.

General Strategy:

Use a combination of habitat modelling, radiotelemetry, and site assessments to evaluate site conditions and importance for Blanding's turtle populations. At priority sites where nesting areas not known, mature females should be tracked via radiotelemetry.

Political Location:

Hillsborough County, Merrimack County, Rockingham County, Strafford County

Watershed Location:

Merrimack Watershed, Coastal Watershed

Conserve priority Blanding's turtle parcels

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Primary Threat Addressed: Habitat and species impacts from fragmentation

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

Objective:

Conserve priority Blanding's turtle parcels.

General Strategy:

A conservation plan has been developed (Willey and Jones 2014) that identified priority Blanding's turtle sites and parcels. These sites will be updated over time as new information becomes available. 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 Blanding's turtle conservation.

Political Location:

Grafton County, Hillsborough County, Merrimack County, Rockingham County, Strafford County

Watershed Location:

Merrimack Watershed, Coastal Watershed

Northeast Blanding's turtle working group

Objective:

NHFG should continue participation in Northeast Blanding's turtle working group and other national or internal initiatives to conserve the species.

General Strategy:

A Northeast Blanding's turtle working group has been active since 2003. As a result, the group has completed a status assessment for the Northeast region, a Blanding's turtle conservation plan, a standardized monitoring protocol, a genetics assessment, and initiated implementation of actions across the northeast region. This group will continue to facilitate and track the implementation of the Northeast conservation plan. The Northeast Blanding's turtle working group intends to increase communication to the mid-west United States and Canada in order to develop a global communication network for the species.

Political Location:

Northeast

Watershed Location:

Statewide

Monitor Blanding's turtle populations

Objective:

Implement long-term and rapid assessment monitoring using standardized regional protocol.

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General Strategy:

Implement long-term and rapid assessment monitoring using standardized regional protocol (Willey and Jones 2014). Long-term monitoring should be implemented at all high priority sites and repeated every 5 years. Additional targeted monitoring could target nesting areas or habitat quality of particular wetlands.

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

Location Description:

Blanding's turtle range in NH.

Minimize disturbance to Blanding's 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 Blanding's turtle populations by using recreation guidelines and incorporating species' needs into property management plans

General Strategy:

The potential negative influence of recreational trails on Blanding's turtle populations may be reduced through a combination of management techniques outlined in Guidelines for Recreational Areas within High Priority Blanding's Turtle Sites in the Northeastern United States available at blandingsturtle.org. Objectives and Guidelines for Recreational Trails in High Priority Blanding's Turtle Sites include: 1) Prevent direct adult mortality caused by ATVs, OHRVs, trucks, bikes, etc.; 2) Minimize disturbance of adults, particularly nesting females; 3) Minimize mortality of nests, hatchlings, and juvenile turtles; and 4) 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:

Grafton County, Hillsborough County, Merrimack County, Rockingham County, Strafford County

Watershed Location:

Merrimack Watershed, Coastal Watershed

Location Description:

Blanding's turtle range in NH

Implement and promote the use of forestry guidelines in areas where Blanding’s turtles occur

Primary Threat Addressed: Habitat degradation and conversion from forestry practices

Specific Threat (IUCN Threat Levels): Biological resource use

Objective:

Encourage use of Blanding's turtle forestry guidelines to minimize impacts to Blanding's turtle populations.

General Strategy:

‘Guidelines for Forestry Activities within High Priority Blanding’s Turtle Sites in the Northeastern United States’ have been developed by the Northeast Blanding’s turtle working group and are available at blandingsturtle.org. Objectives and guidelines for forestry activities in high priority Blanding’s turtle sites include: 1) Prevent direct adult mortality caused by machinery, skidders, trucks, etc.; 2) Minimize mortality of nests, hatchlings, and juvenile turtles; 3) Improve, expand, or create new nesting habitat; 4) Avoid changes to wetland hydrology during overwintering season (October to April); 5) Avoid disturbance to vernal pool habitats year-round; and 6) Avoid introducing aquatic or terrestrial invasive plant species. The Blanding’s turtle active season is 1 March to 15 September in most years, but may vary depending on weather. The Blanding’s turtle dormant season is typically 1 November to 28 February. These guidelines are targeted at high priority Blanding’s turtle sites in the northeast United States, but could be useful in conserving Blanding’s turtles at any occupied site where landowners are willing to implement. NHFG will target large landowners within high priority Blanding’s 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, etc.) 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, Merrimack County, Rockingham County, Strafford County

Watershed Location:

Androscoggin-Saco Watershed, Lower CT Watershed, Pemi-Winni Watershed, Merrimack Watershed, Coastal Watershed

Maintain & enhance nesting habitat

Primary Threat Addressed: Mortality from subsidized or introduced predators

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

Objective:

Create, enhance, and maintain multiple nesting areas at each priority Blanding's turtle site.

General Strategy:

A complete overview of nest enhancement guidelines can be found in 'Guidelines for Nest Site Management and Creation within High Priority Blanding’s Turtle Sites in the Northeastern United States' available at blandingsturtle.org. Existing nesting areas should be identified, protected, and enhanced as necessary. Large disturbed areas, including active and abandoned excavation areas, are

Appendix A: Reptiles

often important nesting areas for turtles when they occur in proximity to suitable wetlands. Loaming and planting excavated areas often reduces their suitability for nesting turtles and many other wildlife species (e.g., black racers, eastern hognose snake, New England cottontail, bank swallow, kingfisher, shrubland and grassland birds). Managers should use extreme caution when augmenting or restoring known nesting habitat for Blanding's turtles and management should occur outside of the nesting and incubation period. In areas where nesting opportunities appear to be few, far from wetlands, or when turtles must cross roads to reach, new nesting areas may be created. Landowners and land managers are encouraged to work with NH Fish & Game to identify nest enhancement projects, especially in priority Blanding's turtle sites. Nesting area creation or management should be monitored using visual surveys or camera surveys to assess use and document threats to nesting turtles, eggs, or young (predation, disturbance, etc.). Nesting areas should be systematically surveyed every five years to ensure that tree species are not shading the area.

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

Location Description:

Focused at priority Blanding's turtle sites.

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:

Blanding's turtles are listed as endangered 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 Blanding's 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 Blanding's 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 Blanding's turtles and associated habitat (e.g., vernal pools, nesting areas) should be considered as a component of project review. Although all Blanding's turtle populations have some protection by state law (RSA 212-A), NHFG should prioritize protection at higher quality sites (See Actions in Willey and Jones 2014).

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Political Location:

Belknap County, Carroll County, Cheshire
Merrimack County, Grafton County,
Hillsborough County, Merrimack County,
Rockingham County, Strafford County

Watershed Location:

Watershed Location:

Coastal Watershed, Androscoggin-Saco
Watershed, Lower CT Watershed, Pemi-Winni
Watershed

Location Description:

Throughout range of Blanding's turtle in NH.

References, Data Sources and Authors

Data Sources

Initial information on the condition of Blanding's turtle populations largely was a result of reports received from RAARP and several localized research and inventory efforts focused along the Lamprey River, Great Bay, and the Concord area (Carroll 1999, Jenkins and Babbitt 2003). 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 (Willey and Jones 2014). Blanding's turtles were observed and captured as part of this study during 2011-2014, and this information has been incorporated into the New Hampshire Rare Species Database. Before this study, distribution information came largely from the New Hampshire Reptile and Amphibian Reporting Program (RAARP). High quality records were submitted to New Hampshire Natural Heritage Bureau (NHNHB) and were incorporated into the Rare Species Database. Although most towns where Blanding's turtles currently occur probably have been reported, several towns in the center and periphery of the New Hampshire Blanding's turtle distribution have not verified the species presence to date.

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

Data Quality

Information was collected from visual surveys, trapping in suitable wetlands, and radio-telemetry studies of Blanding's turtles in 32 NH towns. NH information came from 293 nights of trapping in suitable wetlands, and 60 springtime visual surveys for Blanding's turtles. These surveys resulted in 315 Blanding's turtles captured during trapping surveys, 137 observed during visual surveys, and 223 individual genetic samples collected for analysis. Genetic samples collected from individual Blanding's turtles helped delineate site boundaries and provided some insight into the connectivity of Blanding's turtle habitats in the state.

Most records consist of one or a few observations, many of which were encounters on roads. Wetland occupation and habitat use at a fine scale is poorly understood for most of the New Hampshire range of Blanding's turtles, though several sites near Concord and Great Bay have been studied in greater detail (Jenkins and Babbitt 2003).

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