# A Guide to Habitat Management for Wood Turtles

(*Glyptemys insculpta*)

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*Prepared by:*
Northeast Wood Turtle Working Group

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## Northeast Wood Turtle Working Group:

# The Wood Turtle (*Glyptemys insculpta*)

Figure 1. Juvenile Wood Turtle from New Hampshire, showing characteristic orange legs, black head, and sculpted shell. Photo © Mike Jones / MassWildlife

## Species Description

*Body Size*

- Wood Turtles are a medium-sized turtle. Females typically average about 6.7–7.9 inches in shell length, and males are generally up to 11% larger.

*Carapace (top of shell)*

- Typically brown, sometimes possessing radiating or reticulated yellow marks.
- Growth rings can create a "sculpted" appearance in juveniles and young adults
- Posterior margin (rear edge) is serrated in younger adult turtles.

*Plastron (bottom of shell)*

- Typically a yellowish-cream color
- Prominent black pigmentation on each scute (segment of shell)

*Body*

- Solid (not striped or patterned) red, orange, or yellow coloration on neck, forelimbs, and hind feet
- Black head, outer surfaces of forelimbs, and tail

**Note:** Over time all turtles endure varying degrees of wear, thus older turtles generally have a smoother carapace and plastron.

Figure 2. Carapace (top) and plastron (bottom) variability in Wood Turtles from New England. Large image shows typical carapace appearance. Photos © Mike Jones / MassWildlife

Figure 3. Top: comparison of male (left) and female (right) Wood Turtles, showing the larger size, tail width, and plastron concavity of males. Middle: adult male from Maine. Bottom: Adult female from Massachusetts. Photos © Mike Jones / MassWildlife

## Habitat

Wood Turtles (Fig. 1–3) require both aquatic and terrestrial habitats in order to maintain healthy and viable populations. Populations are almost always associated with slow-moving sections of clear, cold, woodland streams (Fig. 4, 5), especially those with a sand, gravel, or rock substrate. While Wood Turtles overwinter and mate in streams, they spend much of their time, from late spring to fall, in floodplain and upland habitats, including both forested and non-forested areas. Preferences for these habitats can vary by geographic region and season, but Wood Turtles will generally occupy a mosaic of habitats including mature forest and early-successional (Fig. 6) cover types. So-called **edge habitat**s play an important role for Wood Turtles by providing opportunities to balance both thermoregulation and food requirements.

*Stream Size.*—Wood Turtles can be found in a wide range of streamflow conditions, but are most often associated with mid-sized streams 10–65 ft wide.

*Stream Substrate.*—Wood Turtles appear to be most associated with stream sections dominated by sand or sand and gravel, and/or large rocks; however, Wood Turtles can also be observed in areas dominated by organics and muck, clay, silt, cobble, boulders, and bedrock.

*Instream Habitat Features.*—Within-stream structure is important for providing cover, basking sites, overwintering areas, and stability during high-flow periods. Common structural features within streams include large root masses of adjacent mature trees, logjams, and accumulated woody debris (Fig. 7). Deep pools also appear to be important areas for Wood Turtles.

Figure 4. Typical riparian and stream habitat of Wood Turtles in the Northern Forest. Photo © Mike Jones / MassWildlife

Figure 5. Suitable Wood Turtle stream habitat from throughout the species' range in the northeastern USA. Photos © Mike Jones / MassWildlife

Figure 6. Early-successional riparian habitats in New England. Photos © Mike Jones / MassWildlife

Figure 7. Instream, coarse woody debris (CWD) and woody structure are important components of Wood Turtle habitat throughout their range. Photos © Mike Jones / MassWildlife

*Nesting Habitat Requirements.*—Generally, Wood Turtles require well-drained, elevated, and exposed areas of sand and/or gravel for nesting (Fig. 8), but the ideal nesting conditions varying somewhat by geographic region. Throughout much of their range, Wood Turtles select nesting sites in coarse alluvium, poorly graded sand, or fine to medium gravel, and sandy loam associated with a wide range of natural and anthropogenic sites.

Natural nesting features include:

- Sandy point bars on the inside of river bends
- Cutbanks on the outside of river bends
- Sand and gravel bar deposits in the stream channel associated with stream obstructions, constrictions, or directional changes in flow, and areas of overwashed sand in open floodplains
- Dry stream beds

A variety of anthropogenic features can serve as nesting habitats as well (Fig. 9). Examples include:

- Sand and gravel pits
- Gravel boat ramps
- Powerlines
- Roadsides
- Unpaved farm roads near streams
- Railroad beds
- Gravel piles
- Golf course sand traps

Wood Turtles will also make use of anthropogenic nesting areas created specifically for turtles (Fig. 10).

*Other Habitats.*—Springs, vernal pools, seeps, and temporary wetlands appear to serve as complementary habitat during the active period and may be valuable features of the landscape, but do not support overwintering populations. Although uncommon, Wood Turtles have also been reported in freshwater tidal wetlands and estuarine creeks.

## Survivorship and Reproduction

*Lifespan.*— Wood Turtles are capable of surviving at least 70 years in the wild, but can almost undoubtedly survive even longer. Closely related Blanding's Turtles continue to reproduce into their 80s, and Spotted Turtles (another close family member) may reach ages over 100.

Figure 8. Example instream nesting features and substrates. Note the elevated nature and variability in substrate. Arrows show nesting Wood Turtles. Photos © Mike Jones / ATO & MassWildlife

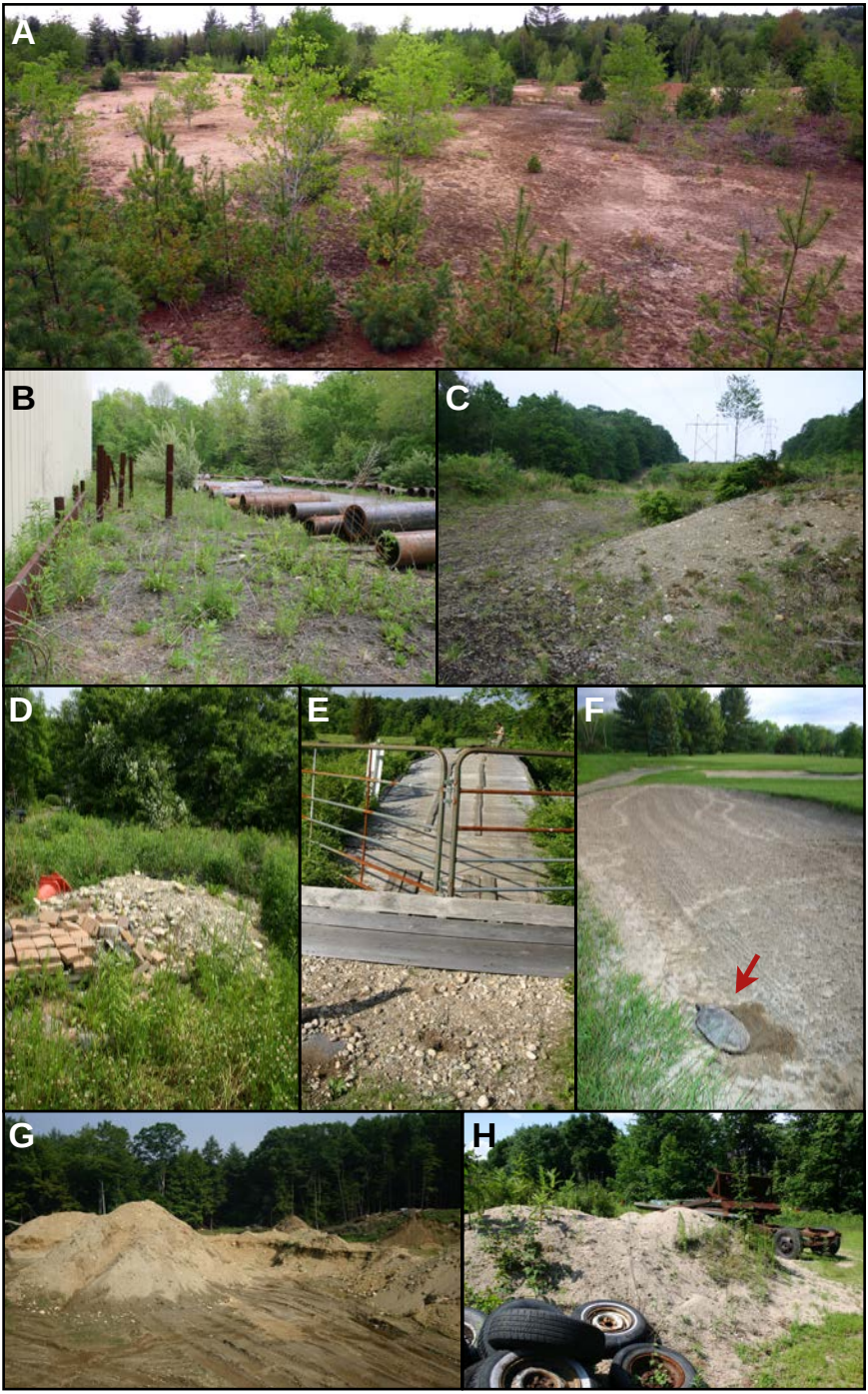



Figure 9. Anthropogenic nesting areas ranging from disturbed soil (A, B, E), to powerline corridors (C), piles of soil (D, G, H), and golf course sand traps (F). Arrow indicates nesting Wood Turtle. Photos © Mike Jones / MassWildlife

Figure 10. Anthropogenic nesting areas created for Wood Turtles in New Jersey. Photos © Colin Osborn / USFWS

*Survivorship.*—Wood Turtle survivorship appears to have a positive relationship with age. Adults have been shown to have annual survivorship rates >0.85, while studies examining hatchling survival suggest extremely low survivorship.

*Maturity.*—Age of sexual maturity varies from 12 to 20 years depending upon sex and geographic area.

*Generations.*—Generation time, which is the average age of parents of the current cohort of hatchling turtles, varies dramatically depending upon the threats and population pressures present at individual populations. Populations with high adult mortality rates (>0.2) can have generation times of 20 years, while populations without substantial anthropogenic pressures may possess generation times >45 years.

## Seasonal Movement Patterns

Wood Turtles are a highly mobile species, often traveling considerable distances both in water and on land.

*Home Range Size.*—Home ranges are highly variable and are likely influenced by local landscape features. The average home range size of male Wood Turtles has been reported as 44.9 ac (0.7–79.6 ac), with females from the same studies averaging 28.7 ac (1.2–72.6 ac).

*Distances Traveled Along Streams.*—Males generally spend more time in streams than females during the active season and therefore have greater stream ranges. Male Wood Turtles in Massachusetts and New Hampshire have been documented having stream ranges up to 3.9 mi.

*Distance Traveled Away from the River.*—While turtles have been documented traveling >0.5 mi from streams, the vast majority of movements occur within 100 ft, with a high-activity zone of 300 ft from streams. Females tend to move greater distances into the landscape than males.

*Nesting Movements.*—Most Wood Turtles utilize instream features for nesting or travel relatively short distances to deposit eggs. Wood Turtles studied in Massachusetts and New Hampshire traveled a median distance of 84 ft from

streams in order to nest. However, if appropriate nesting habitats are not available, females can travel several hundreds meters in search of a suitable nesting substrate (see Nesting Requirements section). Female Wood Turtles near the northern and southern range limits will travel several kilometers to locate suitable nesting sites.

## Annual Activity Period

The Wood Turtle "active period" refers to the portion of the year that Wood Turtles are active and can be found both in streams and on the surrounding upland landscape. The length of this period varies with latitude (it is longer in warmer regions), but generally spans from early April to late October. The Wood Turtle active period can be broken down into five distinct sub-periods:

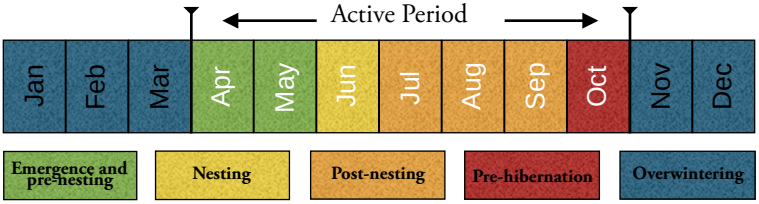
*Emergence and pre-nesting.*—Wood Turtles start to become active during March and April. In the northern region of the species range, spring activity may be determined by ice-out. During this period, Wood Turtles are typically found 0–35 ft from streams.

*Nesting.*—Nesting primarily occurs during the month of June, but can start as early as mid-May and end as late mid-July. During this period females can be found traveling considerable distances from streams if appropriate nesting habitats are not present nearby.

*Post-nesting.*—Beginning when nesting has concluded, the post-nesting period spans from July until late September. During these warm months, Wood Turtles spend much of their time on the surrounding landscape and can typically be found 0–1000 ft from streams.

*Pre-hibernation.*—Pre-hibernation typically begins in early October when temperatures start to drop. At this point, Wood Turtles retreat to streams from the landscape and eventually settle in the areas where they will spend the winter.

*Overwintering.*—Wood Turtles spend the cold months of the year from November or December to March or April hibernating in streams.




## Major Threats

Wood Turtles are hearty creatures with remarkably long lifespans (>70 years) and the ability to survive the range of threats that existed before humans were present on the landscape. However, due to delayed sexual maturity (12–20 years of age) and

naturally high nest predation and juvenile mortality rates, Wood Turtle populations grow very slowly even without humans present. As a result, any additional pressures, small or large, that have the potential to negatively influence Wood Turtle survival or reproduction, can have detrimental impacts and even cause local populations to go extinct.

Wood Turtles face many threats, nearly all of which are directly or indirectly caused by humans. Major threats posed to the species include:

- Machinery (e.g. agricultural and logging equipment)
- Roads (road mortality of adults)
- Habitat loss and fragmentation by development
- Poaching (commercial and incidental)
- Predation by human-adapted mammals (e.g. raccoons)
- Dams
- Severe floods
- Streambank stabilization
- Pollution
- Disease
- Invasive plant species
- Plant succession and loss of nesting sites

## Why is Wood Turtle Habitat Management Necessary?

Humans have altered Wood Turtle habitats throughout nearly the entire species range. These alterations vary in degree of severity, but in most cases the negative impacts of humans on Wood Turtle populations are unlikely to subside. Without direct intervention, many populations that exist today may disappear in the coming years or decades or decline to the point that they are unable to rebound. Apart from the **protection of Wood Turtle habitat at the landscape scale**, the habitat management efforts highlighted in this booklet are perhaps the most effective way to positively impact Wood Turtle populations and conserve the species as a whole.

## Conservation Priorities

All Wood Turtle streams are important for the conservation of the species, however, some streams—which are referred to as "**regionally significant**" throughout this document—contain populations in the northeastern United States that are critical to the persistence of the species as a whole. These regionally significant stream sections were identified in a 2017 region-wide conservation planning process. Due to their importance, greater protections are recommended for these populations. If you are uncertain about the status of a stream, please contact your state wildlife agency.

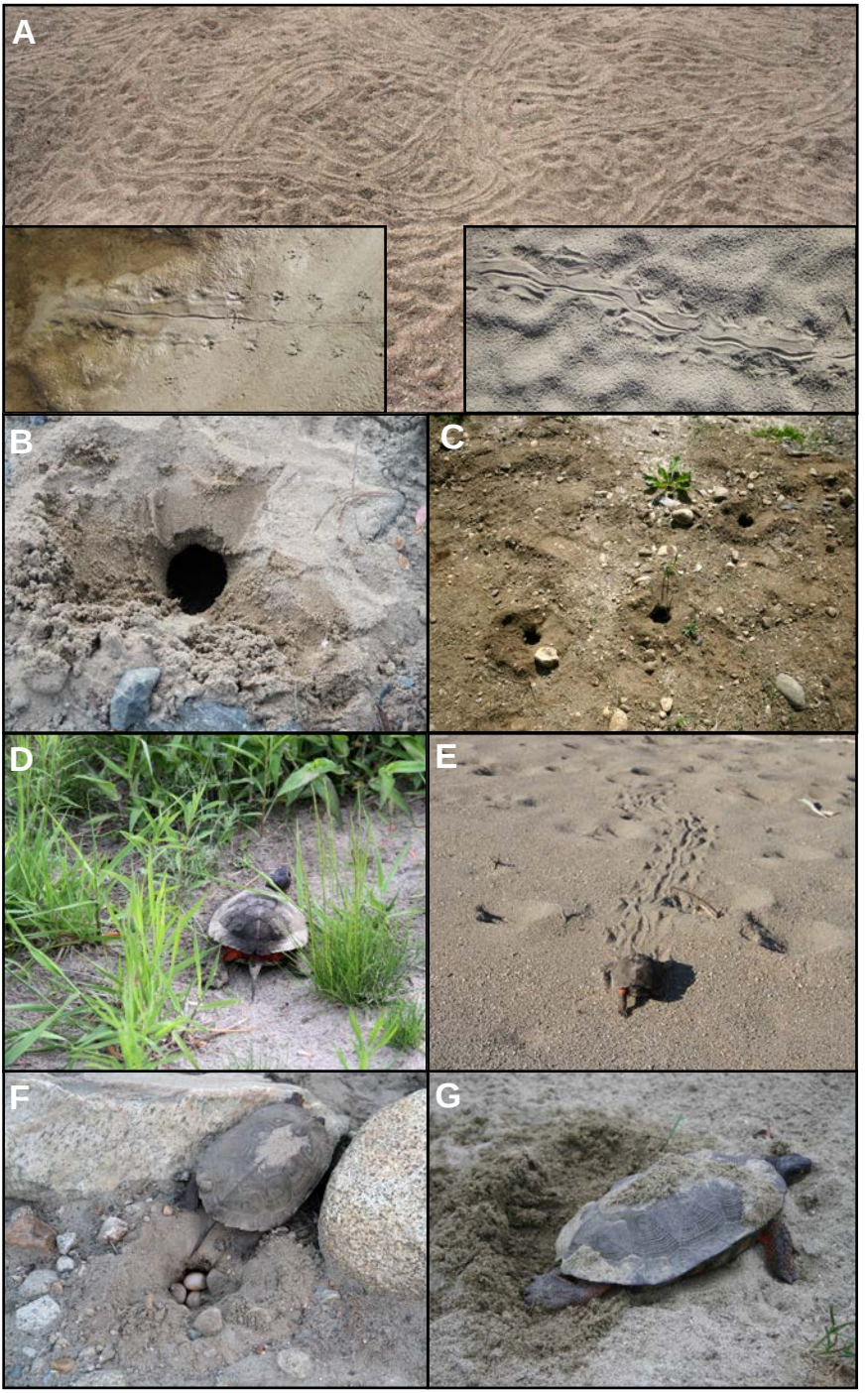



Figure 11. Signs of nesting activity including Wood Turtle tracks (A), excavated nest holes (B, C), nest-searching females (D, E), and nesting females (F, G).

## Nesting Habitat Management

When managing the habitat needs of Wood Turtles, it is essential to consider the abundance and availability of nesting areas. Seemingly healthy populations of Wood Turtles can exist for decades in streams, but without suitable and abundant areas to nest, new generations of turtles will not be born and the overall population will gradually decline. Actions necessary for effective nesting habitat management are described below.

*Surveying and Mapping Nesting Habitat.*—If nesting habitat is already abundant and of good quality, the creation of nesting habitat may not be an appropriate use of resources. In addition, the use of machinery to create nesting habitat has the potential to degrade existing habitats. Thus, Wood Turtle streams and the surrounding terrestrial habitat should first be surveyed in order to assess the need for nesting areas. This process should involve ground surveys where all existing nesting habitat as well as potential nesting areas are identified and mapped using aerial imagery.

**General Note:** All nesting habitat enhancement and creation efforts should occur between November 1 and March 31 when Wood Turtles are overwintering and generally inactive (see Active Period section).

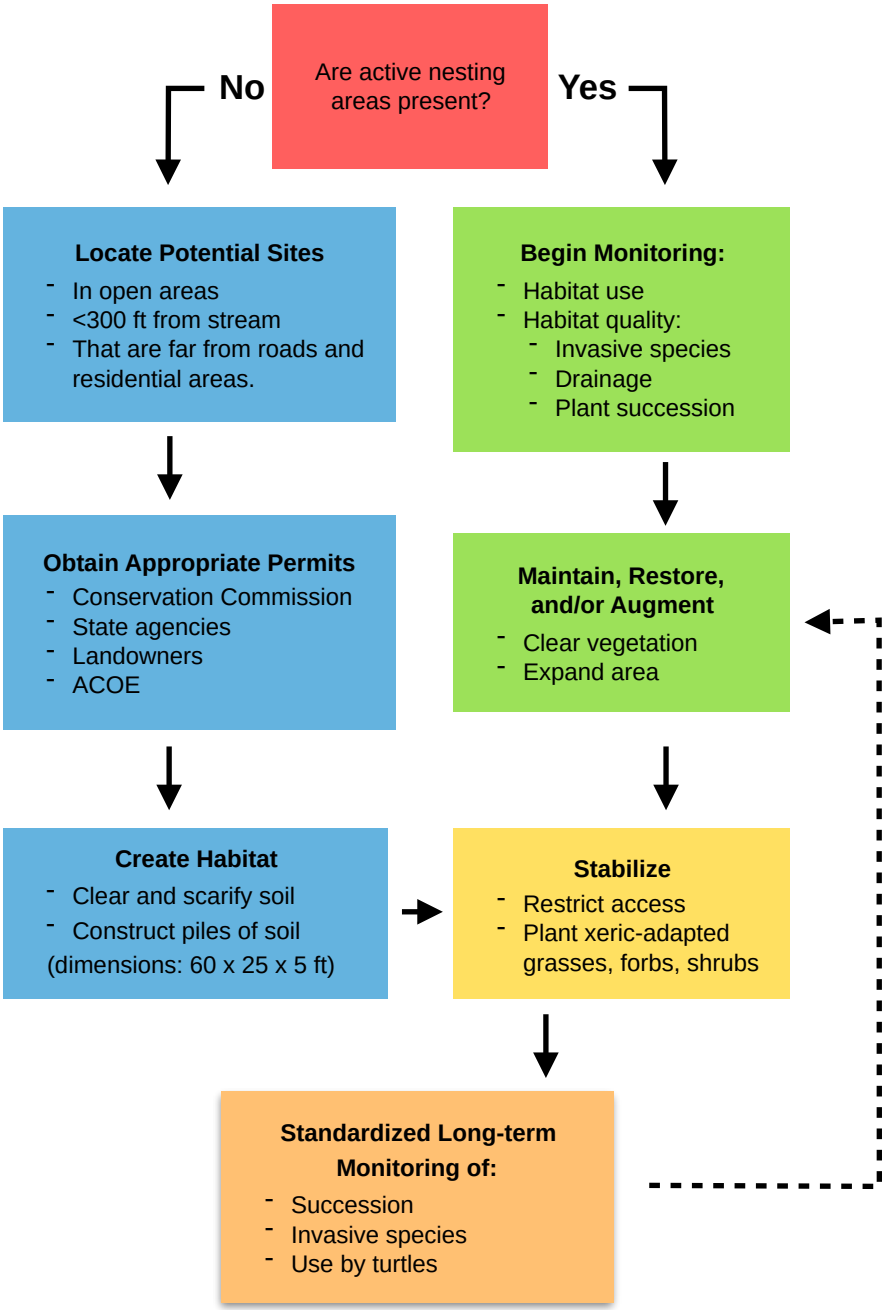
*Managing Instream Nesting Features.*—When considering nesting area management, managers should first prioritize the enhancement (but not creation of) instream features such as point bars, sand and gravel bars, beaches, and cutbanks (Fig. 8). This can be done by clearing the majority of native vegetation and eradicating invasive species from the feature. In most cases where available, these features are preferable to nest sites away from the stream because females that must travel to find a nesting area are more vulnerable to threats such as roads and predators. However, instream nesting areas generally appear to be more abundant in eastern Canada, Maine, and New Hampshire and may not be as readily available at the southern portion of the species range.

**Note:** Instream nesting area **creation** is not recommended because mass sand deposition and other associated disturbances may affect overwintering turtles. Also, moving fill within most wetlands is regulated by the U.S. Army Corps of Engineers under the Clean Water Act, in addition to regulatory oversight by local authorities.

*Managing Out-of-Stream Nesting Areas.*—When instream nesting features are not available for enhancement, management should focus on (1) maintaining existing nest sites, (2) expanding and augmenting existing nest sites, and/or (3) creating new nesting areas, as appropriate.

*Restoring and Maintaining Known Nesting Sites.*—While some dispersed vegetation in nesting areas might be desired for providing cover for nesting females (Fig. 9), too much vegetative cover can deter females and degrade the area's value as nesting habitat. If nesting sites are becoming overgrown and are unlikely to be rejuvenated naturally, restoration and maintenance in the form

## Major considerations and actions for managing Wood Turtle nesting habitats:



of vegetation clearing may be necessary. Managers should exercise caution when managing known nesting areas and disturb sections of habitat on a multi-year rotational basis. Clearing should occur only outside of the nesting window, i.e., October to April.

*Augmenting and Creating Nesting Areas.*—Nesting areas can be augmented or created by clearing land to expose mixed poorly-graded sand and gravel or by depositing piles of soil. Ideal artificial nesting mound dimensions are not known, however, a successful nesting mound created in New Jersey was 60 ft long, 25 ft wide, and 5 ft tall. Artificial nesting areas should be placed in open areas with ample sun exposure (e.g. a field or scrub/shrub mosaic) and a direct, unfragmented path (no roads, structure or difficult terrain) to suitable stream habitat. Nesting mounds should be placed as close as possible to streams and ideally within 200 ft. Replication of nesting features at a site is recommended in order to provide turtles with a range of environmental conditions to choose from and because depredation rates have been shown to be higher when nests are spatially concentrated.

*Avoiding Ecological Traps.*—New, anthropogenic nesting areas should avoid creating landscape configurations that result in attractive nuisances or ecological traps in which females are attracted to nesting areas that either result in decreased adult survival rates, decreased nest success, or decreased hatchling survivorship. For example, it is not ideal to have suitable or attractive nesting habitat located across a road from an overwintering stream, even if the road is infrequently traveled. Further, it is not ideal for nesting to be heavily concentrated at a single location because this may result in elevated nest depredation rates.

*Monitoring artificial nest sites.*—Nest sites should be monitored in order to assess habitat quality and determine the effectiveness of the nest site creation in attracting nesting females. Artificial nest sites are susceptible to erosion, drainage, and colonization by invasive species and therefore should be revisited monthly for the first year after creation and every five years thereafter. Relative use of nesting sites can be determined using two methods: visual foot surveys and remote-sensing time-lapse (not motion-sensing) cameras.

*Visual foot surveys*.—Surveys can be conducted by one or more observers and should take place during the typical nesting period between May 29 and July 8. The total survey area should be clearly defined and the entire area searched for signs of nesting activity (Fig. 11).

*Camera surveys.*—Time lapse cameras (e.g., Plotwatcher Pro, Day 6 Outdoors, Columbus, GA) may be used to evaluate the success of nesting areas. One or more cameras may be installed (with landowner permission) on trees (or other vertical structures) facing north into the nesting area. The frame capture rate should be set to 1 or 5 minutes depending on access to the camera and card capacity. The cameras may be programmed to turn on at 18:00 hr and turn off at 20:00 hr. At the end of the season, the SD cards should be downloaded and the results tabulated.

*Monitoring vegetation*.—Nesting areas should be assessed **at least every five years** to ensure that vegetation is not too dense or shading large portions of the exposed soil. Early signs of colonization by invasive plant species such as spotted knapweed (*Centaurea stoebe*), Japanese knotweed (*Polygonum cuspidatum*), multiflora rose (*Rosa multiflora*), autumn and Russian olive (*Eleagnus umbellata* and *E. angustifolia*), glossy buckthorn (*Rhamnus frangula*), and tree of heaven (*Ailanthus altissima*) and others should be addressed immediately following established guidelines.

## Agricultural and Open Land Management

Intensive agriculture places adult Wood Turtles at higher risk of mortality and injuries from mowers, combines, tractors, plows, harrows, and other farm machinery. Under certain landscape configurations and times of years, repeated mortalities and even **mass mortality events** can occur in the same field. Below are methods that can be implemented to help prevent Wood Turtle mortalities.

*Timing.*—The most effective way to avoid causing Wood Turtle mortalities is through timing of land management/machine use. If possible, any land management should be conducted during the colder months of the year when Wood Turtles are inactive and primarily restricted to streams.

*Land Buffers.*—Riparian buffers are an effective method for reducing agricultural mortality if management must be conducted during the active season. Wood Turtles have been shown to congregate along the edges of fields in shrub habitats with good solar exposure (facing south). These areas are often close to ditches, damp areas, or the river itself. If turtle densities are otherwise high in the river, the absence of sightings in fields should not be construed as low use of those areas by Wood Turtles. Wood Turtles are well-documented to frequently use both forb and graminoid-dominated meadows and hay fields, so their **presence should be assumed wherever hay fields, pastures, or abandoned farmland are in close proximity to a high-density overwintering stream**.

Any amount of land buffering streams is likely beneficial for Wood Turtles to some degree, however, to effectively conserve populations, buffers ≥300 ft are recommended for all Wood Turtle streams and buffers ≥1000 ft are recommended for populations that are regionally significant.

*Machinery.*—Although less efficient than disc and rotary mowers, sickle-bar mowers have been shown to significantly lower mortality rates. Thus, it is recommended that sickle-bar mowers be used whenever possible.

*Blade Height.*—Raising mower blades ≥6 inches is often recommended when managing for Wood Turtles. While this method likely helps save some turtles and is certainly worth the effort **where no other option exists**, it is important to note that raising blades does not significantly lower Wood Turtle mortalities. Even with blades set high, both blades and tires can still kill Wood Turtles at high rates. More effective alternatives to raising mower heads should be considered whenever possible.

Figure 12. Examples of agricultural habitats attractive to Wood Turtles and corresponding practices that can kill turtles of all ages. Photos © Mike Jones

*Grazing.*—Grazing can be used as an alternative method for for clearing land. Animals typically used for grazing (cows or goats) are capable of clearing large areas of land and do not pose a threat to Wood Turtles.

*Late-Season Crop Varieties.*—Late-season crop varieties that require harvest in October rather than August or September are ideal in areas where the primary risk to turtles comes from row-crop agriculture such as corn.

*Best Management Practices for agricultural and open land management:*

1. Establish unfragmented riparian buffers of ≥300 ft along Wood Turtle streams.
2. Establish unfragmented riparian and upland buffers ≥1000 ft near **regionally significant** (see page 12) streams. There should be no warm-season mowing within this buffer if early-successional habitats are already available.
3. Mow or clear existing fields during the cold months of the year (roughly November 15 to March 15) in the southern part of the species range and October 15 to April 15 in the northern range. If warm season management is necessary, leave a buffer at the streamside edge of fields and only maintain during winter.
4. Use late-season crop varieties that require harvest in October rather than August or September.
5. Use sickle bar mowers and raise blades >6 in.
6. Implement off-season burning or year-round grazing if areas must be kept open for other competing interests.
7. Use radiotelemetry on a large sample of adults, or systematic surveys, to identify heavily used areas within the fields and avoid these areas.

## Forest Management

Forest management and logging have the potential to negatively affect Wood Turtle populations if adults are crushed by tractors, skidders, or other heavy equipment. Broad-scale, intensive forestry such as clearcutting likely degrades habitat quality by facilitating numerous long-term management concerns such as the introduction of invasive species and soil erosion. In addition, the extensive removal of large wood from riparian systems can decrease the availability of logjams and other critical overwintering structures in streams.

While certain management strategies can be detrimental, there are several types of forestry such as as shelterwood cuts, group selection, patch cuts, and salvage (and likely others) that may provide an opportunity to enhance Wood Turtle habitat **if conducted when turtles are overwintering**. For instance, most northern studies indicate that open patch cuts (Fig. 13) within 300 ft (in an otherwise forested landscape) may be beneficial.

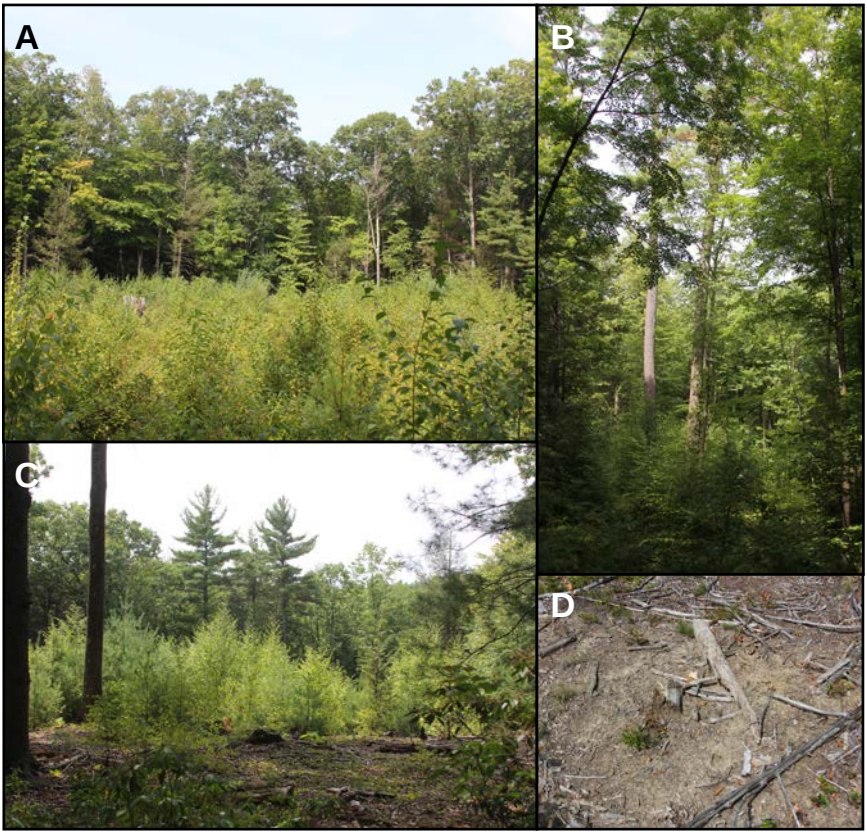



Figure 13. Forest openings created through group selection harvests (A, B, C) and associated soil disturbance (D). Pictured openings are 1.5 (A), 0.12 (B), and 0.42 (C) ac in size. Photos © Patrick Roberts / UMass

Harvesting within 1000 ft of high-quality riparian areas known to be occupied by Wood Turtles should occur only in the cold season when Wood Turtles are inactive (late October to late February).

*Best Management Practices for forestry:*

1. Restrict forestry activities during the active season within 300 ft of Wood Turtle streams.
2. Minimize forest manipulations within 300 ft of all Wood Turtle streams and 1000 ft of regionally significant (see page 12) Wood Turtle streams.
3. *If early-successional habitats or nesting habitats near the stream are lacking*, small group selection cuts (Fig. 13) may enhance riparian habitat quality when conducted during the inactive season.
4. Discontinue logging roads after operations are complete in order to discourage access points and motor vehicle use near streams.

## New Road Construction

Roads (Fig. 14) and associated roadkill are a **major** threat to Wood Turtles throughout the entire species range. In almost all cases, simply the presence of roads near occupied rivers will dramatically increase the probability of extinction of local Wood Turtle populations. Roads that parallel Wood Turtle streams, especially within 300 ft, are particularly detrimental. Perpendicular road crossings will also exert negative effects at stream crossing points, especially if there are attractive early-successional habitats or nesting features nearby. In addition, if culverts at road crossings are undersized or perched (Fig. 15), turtles may be forced to cross road surfaces and risk collision with cars. Below are actions related to road construction and management that can be implemented to support Wood Turtle conservation.

*Avoid New Road Construction.*—To date, no cost-effective measures to reduce Wood Turtle roadkill rates have been successfully developed. Thus, to effectively conserve Wood Turtles and prevent increased rates of decline, it is important that new roads be prohibited near Wood Turtle streams. All road construction should be:

1. Prohibited within 300 ft of all Wood Turtle streams.
2. Prohibited where feasible within 1000 ft of regionally significant (see page 12) streams.

State officials or site managers should also capitalize on opportunities to close or seasonally gate existing roads within 1000 ft of regionally significant Wood Turtle streams. Numerous roads on federal properties that serve hunters during the cold season could potentially be closed to protect Wood Turtles at all other times.

*Culverts and Crossings.*—New stream crossings should be **avoided in all possible cases** near regionally significant streams. However, when it is necessary for roads to cross Wood Turtle streams, it is critical that:

A) Culverts or bridges allow turtles to pass underneath (i.e., they are not perched [Fig. 15 A,B]).

B) The road surface and side slopes do not attract nesting females (see previous nesting habitat section).

*Broad-scale Restrictions.*—Roads are not only a potential threat to population viability in and of themselves, but also facilitate additional risks such as new development, recreational use of streams, introduction of invasive species, and mowing along roadsides.

To minimize the necessity of extensive and costly management as well as increase the long-term probability of population persistence, roads should be minimized up to 3.5 miles from regionally significant streams.

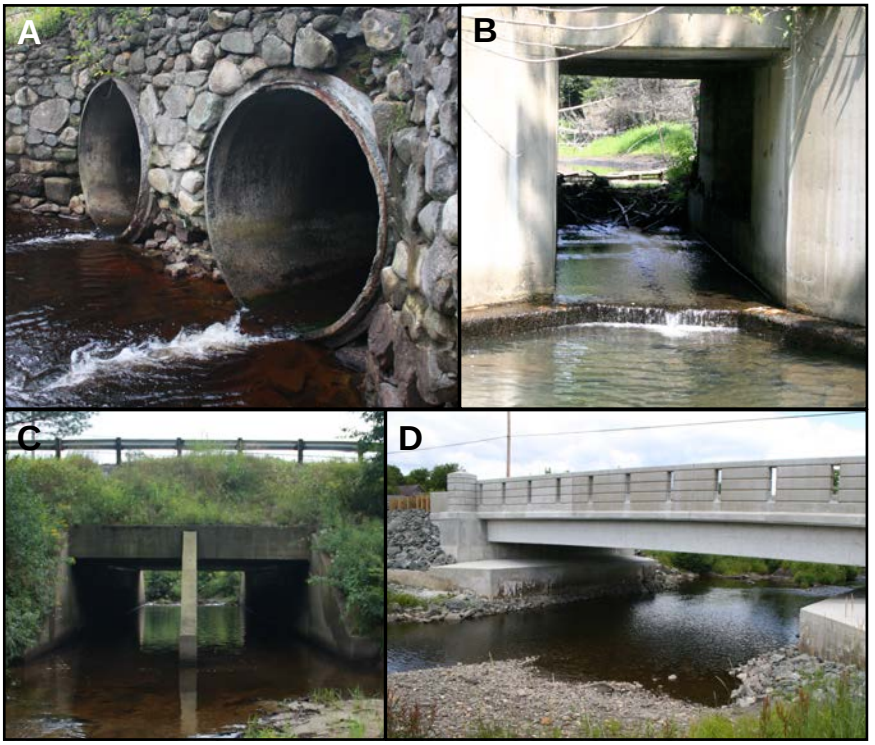



Figure 15. Examples of perched culverts (A, B), which restrict Wood Turtle movement within the stream channel as well as culverts (C) and bridges (D) that allow turtles to pass underneath. Photos © Mike Jones

Figure 14. Even unpaved roads that are infrequently used can be harmful to nearby wood turtle populations. Arrow indicates a Wood Turtle found in the tracks of a logging road.

## Human Development

Development (Fig. 16) affects Wood Turtles in a variety of ways ranging from habitat and stream degradation to the facilitation of mortality due to roadkill, collection, increased predator abundance (especially raccoons), and other sources.

There are many options for individually addressing the myriad of threats that are posed by human development, however, the most effective means for conserving Wood Turtles is that of land protection. It is not a panacea for the problems associated with development, but providing as much land as possible for Wood Turtles that is relatively uninfluenced by humans helps to alleviate many of the threats they face.

Similarly to managing for agricultural land, buffers of unfragmented habitat should be set aside for Wood Turtles whenever development is proposed near Wood Turtle streams. It should also be noted that while recreational trails are often suggested as a component of mitigation by land developers, **this is counterproductive** and should be advocated against. Trails that penetrate Wood Turtle habitat almost certainly worsen the outcome for Wood Turtle populations because human are more likely to come in contact with turtles and thus are more likely to collect them from the wild.

*Recommended actions:*

1. Minimize and consolidate development activities within 300 ft of suitable streams.
2. Minimize all development within 1000 ft of streams that are designated as regionally significant for Wood Turtles. This can be accomplished through regulation, deed restriction, and fee acquisition.
3. Use strategic partnerships and landscape-scale planning to minimize future development within 3.5 miles of regionally significant Wood Turtle streams.

## Recreational Access

Wood Turtles co-occur with brook trout and are often found on high-quality coldwater trout streams that are frequently traveled by fishermen. Wood Turtles also occur on scenic waterways with high value to canoeists and boaters. Collections of Wood Turtles for pets, even at infrequent intervals, can cause considerable damage to a population and pose a long-term conservation challenge for the species. Because of this, it is critical to relocate recreational access points away from regionally significant Wood Turtle stream segments. This relocation should ideally occur downstream, so that canoeists do not incidentally access these important stream sections.

*Recommended actions for managing recreational access:*

Where possible, all recreational access points for fishing and boating should be installed >1000 ft downstream of the lower reach of a regionally significant occurrence and >1000 ft from key features such as nesting areas, logjams, and potential or documented overwintering areas.


Figure 16. Streams with characteristics of Wood Turtle habitat situated within undeveloped (top; Maine) and heavily developed landscapes (bottom; Massachusetts). Photo © Google Earth

## Dam Management

Dams (Fig. 17) influence Wood Turtles by (1) flooding upstream areas and turning low-gradient stream habitat into unsuitable reservoirs, and (2) altering the downstream flow regime, which degrades nesting habitat and/or floods nests near the river.

*Region-wide recommendations for dam management include:*

1. Minimize large water releases between late May and the estimated date of nest emergence (generally in August) on rivers with Wood Turtles and known or suspected low-lying nesting areas.
2. Allow high flows during early spring, before nesting, to encourage natural scouring of vegetation and redistribution of sand and gravel sediments.

During dam re-permitting near Wood Turtle streams, managers should map essential resource areas and key features and determine whether nest-site creation or management is necessary as a result of the dam-induced flow regime.

Figure 17. Examples of large (top: Conowingo Dam on the Susquehanna River in Maryland) and small (bottom: privately owned power dam on the White Mountain National Forest, New Hampshire) dams. Photos © Mike Jones / ATO

## Did you Find a Wood Turtle?

Turtles can regularly turn up in unusual places, such as backyards and gardens, but they're not lost! It is always best to leave turtles where you find them unless they are directly in harm's way (such as on a road or in a field being mowed), in which case the traveling turtle should be moved to a safe place in the direction that it was headed.

If you find a Wood Turtle in the wild, please:

1. Take pictures of the carapace and plastron (top and underside of shell).
2. Note the location as accurately as possible.
3. Alert your state wildlife agency to your discovery!

This is valuable information that will help efforts to conserve the species.

State agency websites:

**Maine:** www.maine.gov/ifw/

**New Hampshire:** www.wildlife.state.nh.us/

**Vermont:** www.vtfishandwildlife.com/

**Massachusetts:** www.mass.gov/eea/agencies/dfg/dfw/natural-heritage/

**Rhode Island:** www.dem.ri.gov/programs/fish-wildlife/

**Connecticut:**
www.ct.gov/deep/cwp/view.asp?a=2723&q=325726&deepNav_GID=1655

**New York:** www.dec.ny.gov/

**Pennsylvania:**
www.fishandboat.com/Resource/AmphibiansandReptiles/Pages/default.aspx

**New Jersey:** www.njfishandwildlife.com/

**Maryland:** dnr.maryland.gov/wildlife/Pages/default.aspx

**Virginia:** www.dgif.virginia.gov/wildlife/

**West Virginia:** www.wvdnr.gov/

# Notes

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