

CONSERVATION PLAN FOR THE WOOD TURTLE IN THE NORTHEASTERN UNITED STATES

Population Assessment Protocol



Wood Turtle Population Assessment Protocol

Northeast Wood Turtle Working Group

Supported in part by the USFWS Competitive State Wildlife Grant Program

Background and Overview: A regional effort to assess Wood Turtle (*Glyptemys insculpta*) populations in the northeastern United States has been underway since 2012. *Status and Conservation of the Wood Turtle* (2015) and *Conservation Plan for the Wood Turtle in the Northeastern United States* (2018) resulted from the coordinated field surveys of over 50 biologists in 14 States and Canadian Provinces over six years. These surveys followed a standardized protocol, which allowed for data collected throughout the region to be pooled for analysis and thus facilitated greater insight into regional trends. While the fundamental components of the protocol have remained unchanged, details have been continually refined to promote greater efficiency and effectiveness. This document outlines the Northeast Wood Turtle Working Group's latest revision of recommended guidelines for Wood Turtle population assessments in the northeastern United States. This document outlines the recommended methodology for (1) selecting and delineating sites, (2) conducting surveys, (3) processing turtles, and (4) recording and submitting data.

Guidelines:

Step 1. Identify Stream. Identify an appropriate reach of stream for targeted surveys. These sites may be either:

- a.) **priority conservation sites**, supporting high densities of Wood Turtles, large Wood Turtle populations, excellent landscape context, ongoing conservation efforts for Wood Turtles, or supportive landowners;
- b.) existing **long-term research sites**;
- c.) **data-deficient areas** as identified either by State wildlife agencies or the *Status Assessment*;
- d.) random stream segments, generated using CART during the 2012–2013 modeling.

Step 2. Identify One-Kilometer Segment(s). Select one kilometer of meandering stream (following the centerline) in Google Earth. To the extent possible, select a homogenous section of stream (e.g., mostly agricultural, mostly forested, or mostly urbanized, etc.; see **Fig. 1**). Record the **upper** and **lower bounds** of the chosen stream segment using a GPS or GIS (e.g., GoogleEarth), using decimal degrees (as follows):

Upper bound: 42.34567°N, -73.4567°W

Lower bound: 42.4567°N, -73.5678°W

Step 3. Conduct Reconnaissance Visit. If necessary, visit and scout the survey segment to identify access points, logistical problems, and to confirm access permission.

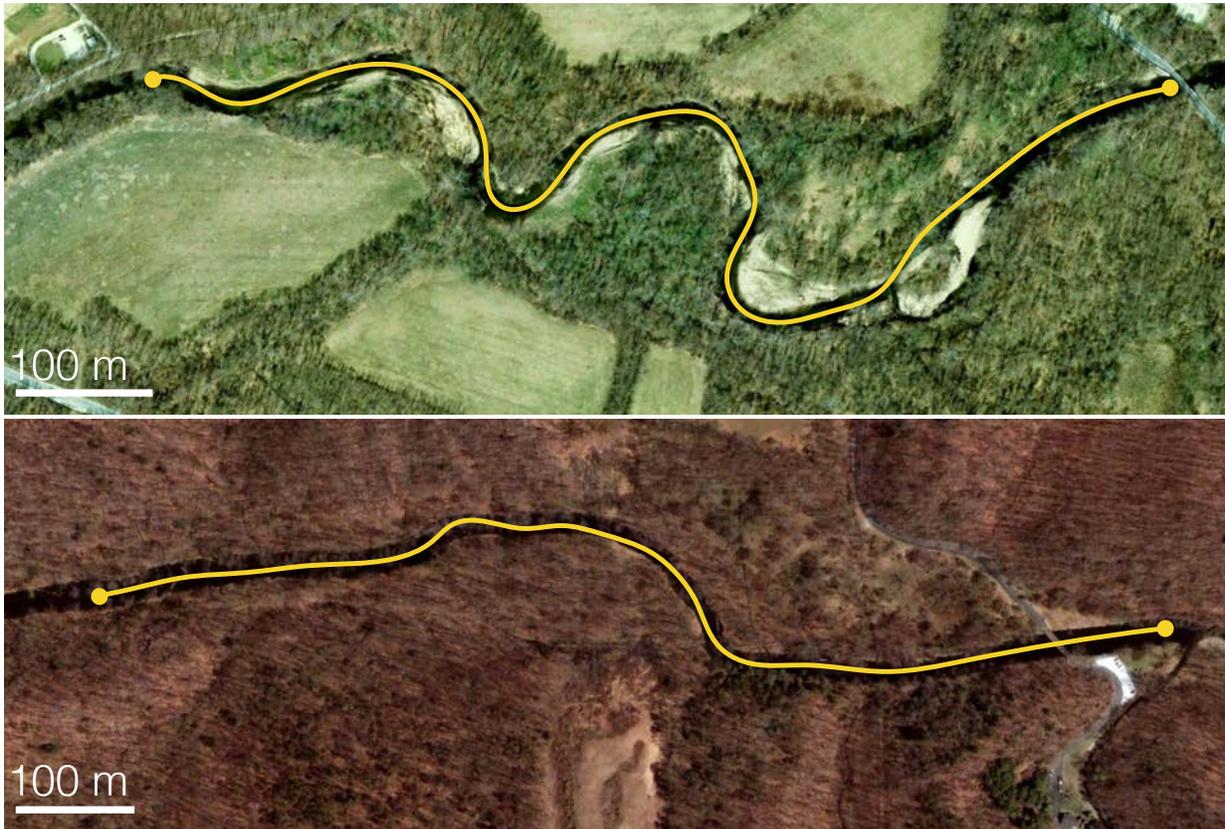


Figure 1. Standardized site selection in Google Earth, illustrating the delineation of two, 1-kilometer segments. Note that both images depict “leaf-off” conditions in April. Leaf-off early spring images may be found for most regions in the Northeast using the “time machine” function in Google Earth. Note that the upper segment flows through an agri-forested landscape and that the lower segment flows through relatively uniform deciduous forest. When possible, avoid major habitat shifts within a segment, such as from intensive agriculture to mature forest, except as part of a mosaic landscape. Both sites depicted are believed to represent extirpated populations. Aerial images were obtained from **Google Earth**.

Step 4. Schedule Surveys During Optimal Seasonal Windows. Schedule and conduct three surveys within a single biological season (see Fig. 2). The pre-nesting season (emergence to May 28) is the optimal season throughout most of the Northeast. Fall surveys are about half as productive, but provide useful independent recapture information for population estimates at long-term reference sites. Avoid surveying the same site on back-to-back days—but if a site is very difficult or costly to access, it is better to survey it three days in a row than only one time. If you are sampling two or more sites, stagger your visits (randomly visit all sites before returning to the first site).

Step 5. Identify and Number the Surveyors. For each survey, select one or more survey partners. Ideally, all surveys are conducted by two observers, but any number between 1–4 is acceptable. **IMPORTANT:** Each observer is numbered sequentially 1, 2, 3, or 4. Observer #1 is the **Lead Observer**. Surveys by a single observer are OK, but the lone observer is still identified as “Observer #1” to be comparable to other surveys with multiple people.

Step 6. Conduct Surveys Following the Protocol. Surveys should adhere to the following guidelines:

- a.) *Season.* Surveys should be undertaken in a clearly defined season, as described in Step 5;
- b.) *Form.* Use a standardized field form to record survey results (p. 8);
- c.) *Pace.* Observers should maintain an approximate pace of **1 km per hr**;
- d.) *Tracking minutes.* During each survey, record the start time and end time. Record the number of minutes within this window that you spend *not surveying*;

Emergence to May 28th	May 29th to July 8th	July 19th to Sept. 1 or Oct. 1	Oct. 1 until dormancy
Emergence/Pre-Nesting Ideal survey window region-wide. The season begins after ice-out and the first several days above 10°C. Watch for signs of activity (basking turtles, tracks).	Nesting Ideal window only in streams that have in stream nesting areas such as beaches and point bars.	Summer Not an ideal survey window, although turtles may be detectable at high density sites.	Fall Region-wide, half as productive as spring surveys, but may be locally ideal for surveys.

Figure 2. Active biological seasons of the wood turtle. Surveys may occur in any season, although summer surveys are not recommended and negative surveys should not be construed to indicate absence. The **preferred survey window** region-wide is Emergence/Pre-Nesting (**from the onset of spring activity until May 28th**). Nesting season surveys are effective within rivers where the primary nesting habitat occurs on beaches, point bars, islands, and other features in or adjacent to the stream. Fall surveys may begin *around* September 1 in the North, and October 1 in the south. Fall surveys are about 1/2 as productive as spring surveys (detection rates are half those in spring), but should be used to increase the independence of capture-recapture data at long-term reference sites. Each segment should be surveyed a minimum of 3 times in one season. Long-term reference sites should be surveyed three times per season in each of multiple seasons over two years (3 or 4 recommended).

e.) *Recording weather.* At the beginning and end of each survey, record the air and water temperature using the provided survey field form. Air temperature should be measured in the shade. Water temperature should be measured at the surface in the swiftest current accessible. Weather should be recorded categorically: clear, overcast, mostly cloudy, partly cloudy, light rain, heavy rain, thunderstorm. Surveys will ideally be completed during daylight hours at air temperatures between 9° and 24°C and water temperatures of 7° and 20°C, but any temperatures are acceptable.

f.) *Lead Observer has right of way.* The **lead observer** has the right of way and must survey in front, so that the other observers cannot scare turtles into the water.

g.) *Search area.* Observers may search in the water or on land, including bank and floodplain areas. All observers should remain within the floodplain or within 10 m, whichever is a greater distance from the riverbank. Observers may search riparian features such as oxbows, sidestreams, flood channels, and pools.

h.) For all Wood Turtles detected, record the number in the river, on the bank, and in the floodplain. Record the number observed by each observer. Record the identity of Wood Turtles observed. Follow the turtle processing guidelines outlined in Step 7.

Step 7. Complete an Individual Turtle Field Form. For every Wood Turtle captured, complete an individual turtle form (p. 9).

a.) *Mass.* Record the mass of the animal using a digital or spring-loaded scale (e.g., 2 kg Pesola).

b.) *Morphometrics.* Record the straight carapace length (CL), carapace width (CW), plastron length (PL), plastron width (PW) at the seam between the humeral and pectoral scutes, and the shell height (Fig. 3) using 300 mm dial caliper.

c.) *Deformities and injuries.* Note any deformities or injuries to the limbs, tail, face, or shell.

d.) *Marking turtles.* Assign a unique ID to the turtle and notch the marginal scutes accordingly with a triangular file, following the local numbering system or Ernst et al. (1974) (Fig. 3). It is helpful to number the turtles as sequential integers (1, 2, 3, 4) rather than combinations of numbers (1-1, etc.).

e.) *Photography.* Photograph the carapace and plastron of the captured turtle straight on, not from an oblique angle. Photograph the turtle in full sun or full shade, if possible—not in dappled light. If possible, photograph the head and face. Record the photo ID and camera ID on the individual turtle form, or include a card with the turtle information in the photograph. In either case, organize your photos soon to avoid confusion. For ideal photographs, see Fig 4. and 5.

f.) *Blood draws or tissue collection.* If you are trained or qualified, collect blood from the caudal vein of ≤ 20 turtles per site (see “Tissue Collection Protocol”; www.northeastwoodturtle.org). Other options are available such as collecting shell filings, toenails, and other tissues. Store the sample in a sterile tube with Queen’s lysis buffer or ethanol, as appropriate. Send the tubes to UMass (address at the end of this document).

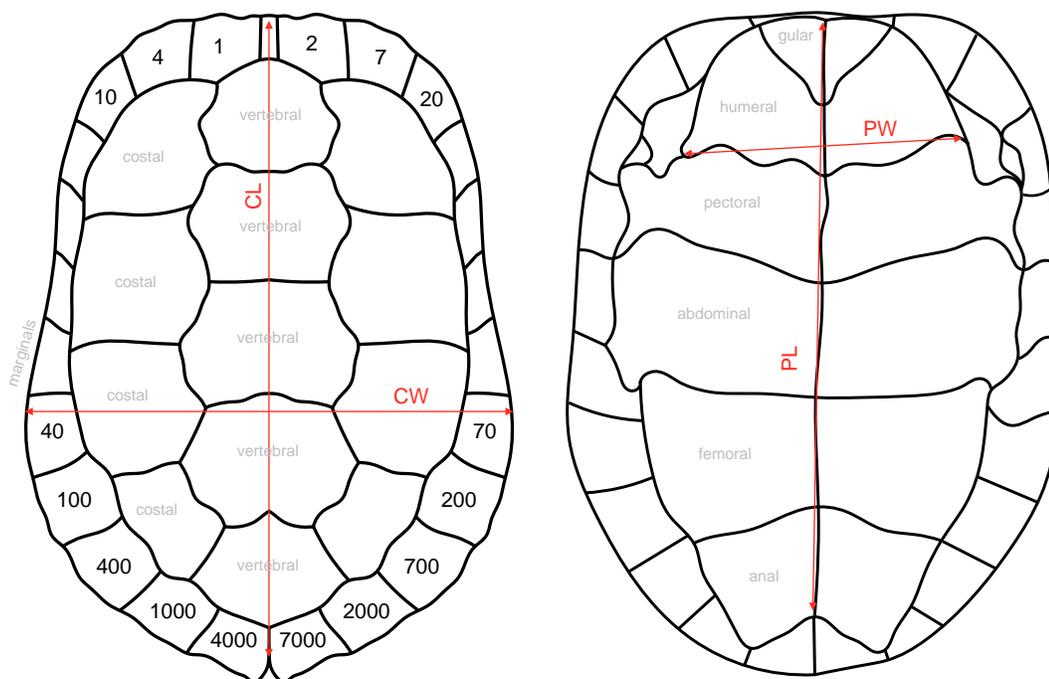


Figure 3. Four recommended shell measurements are illustrated on the diagram of a Wood Turtle carapace (left) and plastron (right), above. The recommended carapace notching scheme of Ernst et al. (1974) is illustrated on the carapace. Key shell morphology is also noted in gray text. The anterior portion (head) is at top.

Step 8. Record the location of each turtle observed in decimal degrees using a hand-held GPS. Note the exact location on the individual turtle form (p. 9).

Step 9. Report Data. Report your results using the data-entry portal on <http://northeastturtles.org>. Alternatively, enter your data into an Excel (.xls) or comma-separated values (.csv) file with all Wood Turtles detected during standardized surveys. Alternatively, submit the original forms. Remember to submit BOTH the survey results AND the individual turtle data. Also, remember to **list the turtle identification numbers on your survey form.**

Other considerations:

a.) *Boat surveys.* Boats (canoes, kayaks, or inflatable boats) may be used to facilitate access along the 1-km stream segment on larger rivers. However, the Lead Observer will (ideally) walk along bank and in stream habitats (as in the typical) form of the survey, and the support boat will follow behind at >100 m to avoid disturbing turtles before they are detected by the Lead Observer. Avoid the use of outboard motors *during the survey*. **In all cases**, spend as much time on the banks as possible, searching bank habitats and floodplain features. When the entire survey team spends part of the time in the boat, the Lead Observer should ride in the bow of the boat.

b.) *Small, Medium, and Large rivers.* The new survey form has a new field to record whether the river is crossable or not during your survey. If a river cannot safely be crossed during a given survey, it is considered “Uncrossable.” Note this on the survey form. In this case, both observers

may select different banks (if possible) or survey on the same side of the river (this should be noted). If both observers survey the same side of the river, the Lead Observer should be in the lead.

c.) *Visual aids.* **Polarized sunglasses** are highly recommended for universal use. Other visual aids may be used, including underwater bucket scopes and snorkel equipment. Note the use of either on the field form. If visual aids are used, they will ideally be used by the Lead Observer, so that the effects may be quantified.

d.) *Observer overlap.* Generally, data are more useful if a single observer surveys a large number of sites, and has sufficient overlap with other observers. To the extent possible, arrange for biologists to “switch” lead observer roles across nearby sites. Single surveys by single observers should be discouraged.

e.) *Equipment decontamination.* It is strongly recommended that all surveyors follow the most recent NEPARC or SEPARC decontamination guidelines.

Questions?

Contact Mike Jones (mtjones@bio.umass.edu); (978) 604-1330.

Send specimens, samples, and forms to:

Department of Environmental Conservation

University of Massachusetts

Amherst, MA 01003

Attn: Mike Jones



Figure 4. Standard-angle (not oblique or from the side), shaded photographs of the plastron of Male #103 from Massachusetts, photographed over ten years (2004 to 2014).



Figure 5. Standard-angle photographs of Male #37 from New Hampshire.

Wood Turtle (*Glyptemys insculpta*; GLIN) Population Assessment / Survey Form (2015)

Part I. Survey Details

Stream (Site) Name	Site Code	State	Survey Number	Date of Survey	Start Time	End Time	Minutes stopped	Name of Observer #1	Name of Observer #2	Name of Observer #3	Name of Observer #4
UPSTREAM End of Segment: Latitude	UPSTREAM End of Segment: Longitude	DOWNSTREAM End of Segment: Latitude	DOWNSTREAM End of Segment: Longitude	Survey Direction <input type="checkbox"/> Upstream <input type="checkbox"/> Downstream <input type="checkbox"/> Both Directions <input type="checkbox"/> N/A	Method of Survey (Check all that apply) <input type="checkbox"/> On Foot <input type="checkbox"/> Canoe / Kayak <input type="checkbox"/> Motorboat <input type="checkbox"/> Snorkel / Scope <input type="checkbox"/> Nesting Survey	Type of Survey Site (Check all that apply) <input type="checkbox"/> I am not sure yet <input type="checkbox"/> Random segment <input type="checkbox"/> Rapid assessment <input type="checkbox"/> Longterm / Reference	Comments on Pt 1				

Part II. Environmental Conditions During Survey

Weather (Clear, Partly Cloudy, Mostly Cloudy, Overcast, Rain) @ START	Weather (Clear, Partly Cloudy, Mostly Cloudy, Overcast, Rain) @ END	Air Temperature (°C) @ START	H2O Temperature (°C) @ START	Air Temperature (°C) @ END	H2O Temperature (°C) @ END	Water Visibility <input type="checkbox"/> Clear <input type="checkbox"/> Turbid <input type="checkbox"/> Tannic <input type="checkbox"/> Zero visibility	Streamflow Conditions <input type="checkbox"/> Low-flow <input type="checkbox"/> Elevated flows <input type="checkbox"/> Bankfull <input type="checkbox"/> Flood (in floodplain)
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Part III. Survey Results (Fill out Individual Turtle Forms for all Captured GLIN)

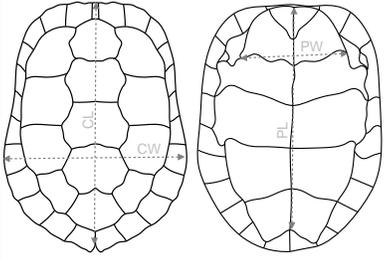
# GLIN on land	# GLIN in water	# GLIN Males	# GLIN Females	# GLIN Juveniles	# Unid GLIN	Obs. 1: # GLIN	Obs. 2: # GLIN	Obs. 3: # GLIN	Obs. 4: # GLIN	# other turtles (list species & numbers)	Sex & ID Number of Captured Wood Turtles (e.g., M1, M2, F4, F10, F98, J11):

Part IV. Habitat Conditions

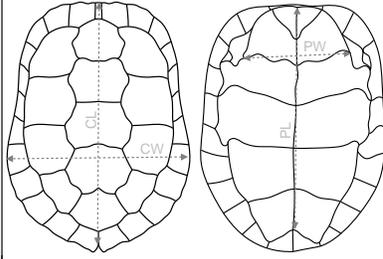
Stream Size <input type="checkbox"/> Large (>15 m wide) <input type="checkbox"/> Medium (7 to 15 m wide) <input type="checkbox"/> Small (<7 m wide) <input type="checkbox"/> Other (explain)	Dominant Stream Substrate(s) <input type="checkbox"/> Silt <input type="checkbox"/> Sand <input type="checkbox"/> Gravel <input type="checkbox"/> Cobble <input type="checkbox"/> Rock <input type="checkbox"/> Other:	Dominant Landuse Along Riverbanks (within 10 m of river) <input type="checkbox"/> Forest <input type="checkbox"/> Scrub or scrub mosaic <input type="checkbox"/> Agriculture: Hay <input type="checkbox"/> Agriculture: Pasture <input type="checkbox"/> Agriculture: Row Crop <input type="checkbox"/> Abandoned agriculture	Comments on Parts II, III, and IV Sand and gravel extraction Development: Residential Development: Commercial Development: Industrial Other (explain)
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* Fill out an Individual Turtle Form for ALL captured Wood Turtles.

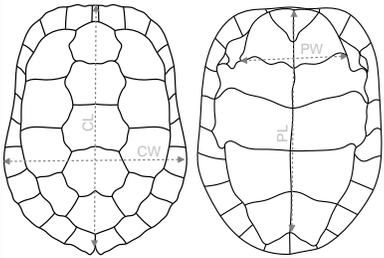
Wood Turtle Individual Form (2015)

Observer(s):		Site Name:		Segment #:	
		Site Code:			
Date:		Time:		Turtle Notch Code: <i>if captured and marked</i>	
				Turtle PIT #: <i>if applicable</i>	
Sex: <input type="checkbox"/> Male <input type="checkbox"/> Female <input type="checkbox"/> Juvenile <input type="checkbox"/> Unknown			# annuli on left ab.:		
<input type="checkbox"/> Bled <input type="checkbox"/> Tissue collected			% worn on left ab:		
CL (mm):		Camera ID & Photo #s: <small>Take carapace and plastron shots of each individual turtle upon its first capture.</small>			
CW (mm):		GPS ID and Point Number:			
PL (mm):		Coordinates (Latitude/Longitude): <small>Please set your GPS unit to DD.DDD (decimal degrees)</small>			
PW (mm):					
Shell height					
Mass (g):		<input type="checkbox"/> Initial capture <input type="checkbox"/> Marked before 2015 <input type="checkbox"/> 2015 Recap <input type="checkbox"/> Captured during a timed survey <input type="checkbox"/> "Off clock"			
Notch codes: Clearly note notches and injuries on the carapace diagram below.		<input type="checkbox"/> In the river <input type="checkbox"/> On bank (<2m to river) <input type="checkbox"/> Floodplain Dist. river:			
		Detection method: <input type="checkbox"/> Visual encounter survey (foot) <input type="checkbox"/> Boat survey <input type="checkbox"/> Snorkel survey <input type="checkbox"/> Nesting survey			
		Comments: <small>Note any signs of injury, respiratory distress, lesions, or lethargy. Note all strongly identifying features.</small>			

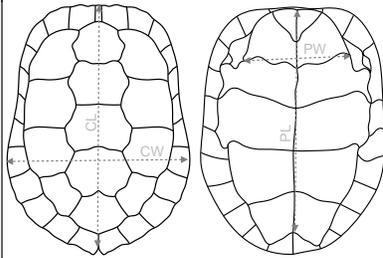
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		Site Code:			
Date:		Time:		Turtle Notch Code: <i>if captured and marked</i>	
				Turtle PIT #: <i>if applicable</i>	
Sex: <input type="checkbox"/> Male <input type="checkbox"/> Female <input type="checkbox"/> Juvenile <input type="checkbox"/> Unknown			# annuli on left ab.:		
<input type="checkbox"/> Bled <input type="checkbox"/> Tissue collected			% worn on left ab:		
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Shell height					
Mass (g):		<input type="checkbox"/> Initial capture <input type="checkbox"/> Marked before 2015 <input type="checkbox"/> 2015 Recap <input type="checkbox"/> Captured during a timed survey <input type="checkbox"/> "Off clock"			
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		Site Code:			
Date:		Time:		Turtle Notch Code: <i>if captured and marked</i>	
				Turtle PIT #: <i>if applicable</i>	
Sex: <input type="checkbox"/> Male <input type="checkbox"/> Female <input type="checkbox"/> Juvenile <input type="checkbox"/> Unknown			# annuli on left ab.:		
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