Wood Turtle Monitoring and Stewardship, Annapolis River Watershed, Nova Scotia

Final Report (Public Version)

Produced for the Clean Annapolis River Project
Written by Carolyn Hann, Biologist
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Clean Annapolis River Project

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Executive Summary

The Wood Turtle Monitoring and Stewardship Project was initiated by the Clean Annapolis River Project (CARP) in collaboration with Acadia University and the Mersey Tobeatic Research Institute (MTRI) to assess the wood turtle *(Glyptemys insculpta)* population in the Annapolis River watershed. The wood turtle is a medium sized semi-aquatic turtle with a range restricted to northeastern North America. The wood turtle is listed as vulnerable under the Nova Scotia Endangered Species Act and threatened under the federal Species at Risk Act. The wood turtle has been cited in 31 watersheds throughout Nova Scotia but little is known about their abundance in many of these areas. Most research is being conducted in the St. Mary's River watershed, a 400 km distance from the Annapolis River watershed.

Historical field surveys were conducted in the Annapolis River watershed between 2005 and 2008 by Nova Scotia Department of Natural Resources (DNR) and 75 wood turtles were recorded. CARP initiated a series of systematic and repeatable land and water based visual surveys in the watershed based on this historical data and then continued with surveys where wood turtles were cited by members of the public. Wood turtle field surveys commenced June 14, 2012 and continued until November 2012.

One male turtle was located on July 10, 2012. This was a previously notched turtle from Nova Scotia DNR surveys. This turtle was outfitted with a radio tracking device to gather data on habitat preferences, movement range and overwintering behavior. The turtle was tracked once a week throughout the summer to determine range and twice a week into the fall to establish an overwintering site.

Overwintering surveys were initiated and have been ongoing since the tagged turtle was tracked to his overwintering location. Temperature loggers were deployed at the overwintering site (OWS) and a control site (CS). Both sites are visited bi-monthly (1st and 3rd Tuesday of the month) and will continue to be monitored until emergence during spring. Data collection during these visits will focus on water quality, site characteristics and turtle behavior. This information will provide insight on conditions favoured by wood turtles when selecting overwintering sites as well as allow insight into overwintering and movement patterns and strategies.

Community outreach and stewardship activities were a major component of this project. Different media were used to target a wide variety of individuals within the communities of the Annapolis River watershed. Media included:

- 11 wood turtle presentations given to a total of 178 individuals
- 3 CARP booths providing opportunities to talk about turtles and reaching 120 individuals directly
- The use of social media (Facebook) to provide updates and pictures related to field work
- Traditional Media (press release and radio interview)
- Posters distributed throughout watershed
- Website updates

Presentations were instrumental in providing information about wood turtles, what CARP is doing and opportunities to get involved and become a steward. Other forms of media used were helpful in allowing us to provide general messages about the wood turtle to a wider audience. It is the hope that these activities will create awareness for the species and provide more sightings in the spring as well as create stewards for the species within the watershed.

This season was helpful in providing preliminary information on important wood turtle habitat. Information was collected on wood turtle activities through the use of radio tracking. In order for this project to continue to be successful the following recommendations are necessary:

- Start future field season at the beginning of April (or early March) to allow for better success in finding wood turtles.
- Visual surveys need to continue for several more seasons to gain a better idea of wood turtle populations within the watershed.
- Utilize track mode on the GPS to provide more accurate mapping of sites surveyed that can be directly uploaded into ArcGIS.
- Due to the fact that we cannot predict when and where we will find wood turtles, sites should be surveyed several times throughout the field season.
- Radio transmitters should be attached to a number of male and female wood turtles particularly from different river systems in order to gain a better understanding of both sexes and separate populations within the watershed when possible.
- It would be ideal to track a female and male on the same watercourse so as to provide information about ranges and sexes in a same location.
- Continue weekly tracking of all tagged turtles and increase tracking during nesting season and before overwintering to establish both these sites at multiple locations.
- Schedule evening nest surveys at known nesting areas to learn more about wood turtle nesting.
- Continue overwintering surveys for all turtles tracked through the season to continue to understand overwintering strategies and habitat use and compare between seasons.
- Continue outreach activities in schools as well as try to hold more community wide presentations including presentations open to the public, booths, community organizations, groups and clubs to spread the plight of the wood turtle to a wider audience base.
- Develop a pamphlet as a hand out on the wood turtle to provide to people who are interested in more information following a presentation.
- Develop a wood turtle business card that people can put in their wallet providing a picture of the wood turtle and information on how to report a sighting.
- Develop a wood turtle website providing reliable information about the wood turtle to the online community.
- Develop a relationship with the farming community to obtain information that will help to create a stewardship plan that the farming community would be interested in following to help mitigate the number one threat to wood turtles, mower blade height as well as other threats such as plowing equipment and livestock.
- Develop a community based social marketing program to address threats such as raising mower blades.

By adopting some or all of these recommendations we have the opportunity to better understand the wood turtle species within the Annapolis River watershed and this will help in the creation of a conservation management plan for the species.

Note: The exact names and locations where wood turtles were located were deliberately left out of this document to protect wood turtle populations. All sightings have been shared with the regulatory authorities for conservation efforts.

1.0 Introduction

The wood turtle *(Glyptemys insculpta)* is a medium-sized, semi-aquatic, long-lived species with adults ranging in size between 16 and 25 cm in length (COSEWIC 2007; MacGregor and Elderkin 2003). The carapace is grayish brown in colour with a sculptured woody look caused by pyramidal circular rings or growth lines (COSEWIC 2007; MacGregor and Elderkin 2003) and the plastron is yellow with a pattern of black or dark coloured blotches and has no hinge (COSEWIC 2007; MacGregor and Elderkin 2003). The skin on the head and upper body of the wood turtle is often dark brown, while the skin on the throat, tail and undersides of the legs is often yellow, orange or red in colour (MacGregor and Elderkin 2003).

The wood turtle can be found distributed throughout northeastern North America (MacGregor and Elderkin 2003). In Canada, the wood turtle can be found in Nova Scotia, New Brunswick, Quebec and Ontario while in the United States (US) the wood turtle can be found in Virginia, New York, Wisconsin, Minnesota and Iowa (MacGregor and Elderkin 2003; Ernst and Lovich 2009). In Nova Scotia, wood turtles have been reported in 31 watersheds throughout the province, although little is known about their abundance in many of these areas (MacGregor and Elderkin 2003).

The wood turtle is the most terrestrial out of all freshwater turtle species but it still requires water for many of its daily and seasonal activities (COSEWIC 2007; MacGregor and Elderkin 2003) such as hydration (Kaufmann 1992), thermoregulation (Dubois et al. 2009), mating (Ernst and Lovich 2009) and hibernation (Greaves and Litzgus 2007). In Nova Scotia, the wood turtle requires a stream or river that is clear, meandering and moderately flowing (COSEWIC 2007; MacGregor and Elderkin 2003). A sandy or sand-gravel area is required for nesting although wood turtles will also make use of artificial nesting sites such as gravel pits, road shoulders and residential sites (COSEWIC 2007; MacGregor and Elderkin 2003). Forested habitat and riparian areas (COSEWIC 2007; MacGregor and Elderkin 2003) are preferred wood turtle habitat; however they are also found in habitats such as flood plains, meadows, hay and agricultural fields, oxbows and beaver ponds (COSEWIC 2007).

There are many threats, both natural and anthropogenic that the wood turtle faces. In Nova Scotia, one of the primary threats facing the wood turtle is agricultural machinery blades, while plowing and livestock also present issues (MacGregor and Elderkin 2003). Mower blades set lower than 10 cm are a major cause of mortality for the wood turtle (Saumure et al. 2007; Tingley et al. 2009). Other anthropogenic threats include loss and degradation of habitat, human disturbances such as recreational activities, collection of wood turtles as pets by local residents or for the commercial pet trade and road mortality (COSEWIC 2007; MacGregor and Elderkin 2003). Natural threats include predators such as raccoons and crows that predate on eggs, juveniles and adult wood turtles (COSEWIC 2007; MacGregor and Elderkin 2003).

In Canada, the wood turtle is considered a species at risk and is listed as threatened under the Species at Risk Act (SARA). Provincially it is listed under the Nova Scotia Endangered Species Act (NS ESA) (2000) as vulnerable. These designations are largely imparted because of the wood turtle's sensitivity to human activities and land use practices.

The largest researched population of wood turtles in Nova Scotia can be found within the St. Mary's River watershed (MacGregor and Elderkin 2003). Between 2005 and 2008 Nova Scotia DNR completed wood turtle surveys within the Annapolis River watershed and 75 wood turtles were recorded. CARP initiated surveys in 2012 to re-assess the population. Scientific research in watersheds throughout the province is required to gain a better understanding of the species and its requirements. By understanding what the species requirements are will allow for better protection and the creation of a conservation management plan that can be implemented to aid in their recovery. Note: Exact names and locations of wood turtles herein were left out deliberately to protect turtle populations. Sightings have been shared with regulatory authorities for conservation efforts.

2.0 Objectives

The overall research goal for this project is to learn more about the ecology and threats that face the wood turtle in the Annapolis River watershed specifically in Annapolis and Kings Counties (Nova Scotia). This project sets out to:

1. Determine the estimated population size, age and sex ratios of wood turtles in the Annapolis River watershed.
2. Assess current activities of the wood turtle in the Annapolis River watershed (e.g. year round use, copulating, nesting, overwintering, etc.).
3. Identify habitat types used by the wood turtle in the Annapolis River watershed (e.g. riparian, grass lands, wetlands, forest, sand outcrops, etc.).
4. Monitor the movement patterns and distribution of wood turtle populations in the Annapolis River watershed through the use of radio telemetry (e.g. travel routes between habitat types, distance traveled, etc.).
5. Implement an outreach program to create awareness and promote education about the wood turtle. Through outreach activities create stewards to gain momentum on a stewardship program for species sightings, habitat identification, nest protection, monitoring of turtle emergence, and management of land in ways that are not threatening to the wood turtle.

3.0 Methods

The objectives for this project will be carried out using the following methods to help build a better understanding of the species as well as to build an outreach strategy and stewardship plan to help address known threats within the Annapolis River watershed.

3.1 Population

The population studied can be found within the Annapolis River watershed. The Annapolis River watershed is approximately 2000 km^2 and is the third largest watershed in Nova Scotia. It runs from Caribou Bog just outside of Aylesford westward to Digby (Figure 1). A map was generated using historical wood turtle records from Nova Scotia DNR and field surveys were determined based on this data, as well as through public sightings reported through the species at risk hotline and in person during presentations or when in the field.

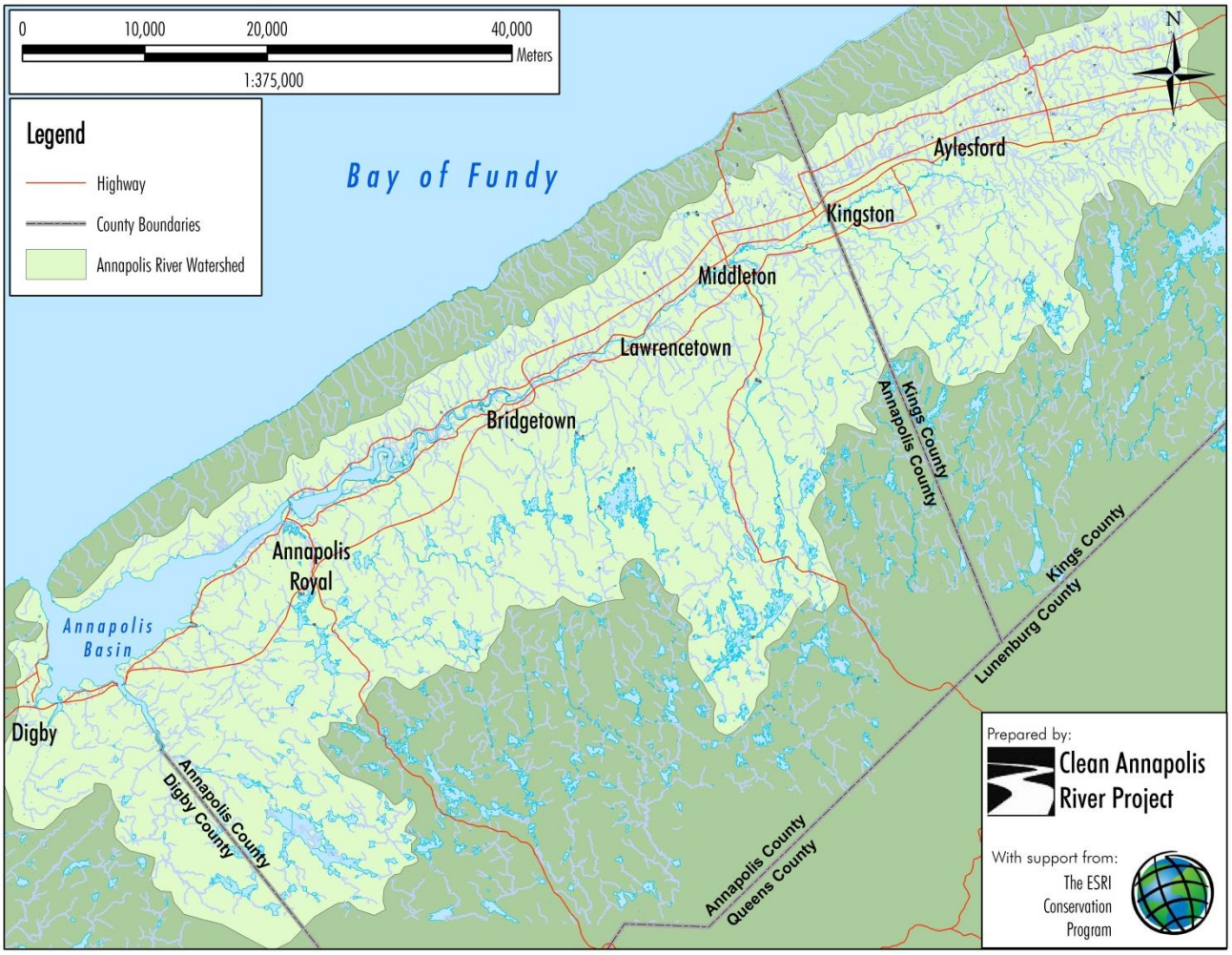

Figure 1. The Annapolis River watershed.

3.2 Field Surveys

Systematic and repeatable land and water based visual surveys were conducted on rivers and tributaries within the Annapolis River watershed from June to November 2012. Field researchers and volunteers walked along rivers and tributaries searching the bank side and riparian vegetation, fields and meadows for wood turtles. Nova Scotia Turtle Daily Effort cards (Appendix A) were filled out for each survey location and entered into the provincial database found at www.speciesatrisk.ca/resource/.

If individual turtles were found, a Nova Scotia Turtle Observation card (Appendix B) was filled out and entered into the provincial database noted above. Protocols, data collection and handling were similar to those developed by the Blanding's Turtle Recovery Team (2007). Measurements (Appendix C) were taken with Mantax Blue 40 cm classic precision calipers (Haglöf Sweden AB) and turtles were weighed in grams using a Pesola Medio-Line Spring Scale, metric, 2500 g (Pesola AG, Baar Switzerland) and a mesh bag. An estimated age was given to the turtle by counting annular rings on the carapace or plastron. A thorough examination of the turtle from head to toe was performed noting any and all abnormalities.

If turtles were not previously notched they were assigned a notching code (Appendix D) provided by Jeffie McNeil (Mersey Tobeatic Research Institute).

CARP was assigned codes 451-500. Using a ½" triangular file a unique code was filed into the marginal scutes of the turtle. This serves as a method of identification for subsequent years.

3.3 Radio Telemetry

Three refurbished radio transmitters (Holohil Systems Ltd., Carp, ON, CAN) provided the opportunity to radio track up to 3 wood turtles in the 2012 field season. Radios last approximately 18 months and date attached was recorded. Radio transmitters were attached to the carapace using standard methods (Blanding's Turtle Recovery Team 2007). Radios were glued to the rear marginal scutes of the carapace using PC•7 Epoxy (PC Products , PA USA) ensuring the weight of the radio did not weigh more than 5% of the total body weight of the turtle.

The turtle was held in a 40L plastic bin with a small amount of river water covering the bottom and brought to the CARP office location for attachment of the radio transmitter. The radio transmitter was checked prior to attachment to ensure that it was properly functioning. The Turtle was minimally handled and kept safe in an environment as free from stress as possible. The turtle was released within 24 hours of capture at the same location where it was found. Once released, the turtle was tracked at minimum weekly with the goal of tracking any nesting females daily during the nesting season and tracking more frequently in the fall to establish overwintering site identification.

3.4 Nesting Surveys

In the event that nesting areas were established through visual surveys or public identification nesting surveys were conducted as per methods established by the Blanding's Turtle Recovery Team (2007). Data was recoded for each site and care was taken to limit trampling of nesting areas. In the event that a turtle is located during the nest searching and/or digging phase's field researcher and volunteers are trained to take extreme caution not to disturb the turtle. The turtle can be approached closely when egg laying has begun at which point data can be collected using the NS Turtle Nesting and Observation Card (Appendix E). Once the turtle leaves the nest it can be handled and identified and a nest enclosure can be placed over the nest. Nest enclosures are held in place with large rocks and are used to help protect nests from predators. Nest enclosures were also put in place if a nest was established by a landowner.

All possible nest sites are monitored daily starting mid-August for signs of emergence. If hatchlings are confirmed at time of emergence they are notched according to the hatchling notch code (Appendix F) and information will be gathered according to the Blanding's Turtle Emergence Card (Appendix G) (Blanding's Recovery Team 2007). Once all information has been collected hatchlings are released at the nest site.

Any confirmed or possible nests are excavated in the fall after emergence is complete or if emergence was not successful, protocols used are similar to those of the Blanding's Turtle Recovery Team (2007). Care is taken to dig out the nest looking for unhatched eggs or live hatchlings. Live hatchlings are processed as per above. Eggs that are not viable are measured, weighed, opened, documented and discarded using the Blanding's Turtle Emergence Card (Appendix G).

3.5 Overwintering Surveys

If any turtles were tracked throughout the summer they continued to be tracked into the fall to their overwintering site. Overwintering surveys methods are similar to those used by Newton and Herman (2009). OWS sites were selected based on where the turtle overwintered and accessibility to the site. The CS site location was chosen according to the following characteristics: within 150 m of the known range of the turtle, accessibility to

site, lack of known records for wintering wood turtles in previous years and similar site characteristics (water depth, structure, etc.) to OWS site. If multiple suitable sites arose the CS site would have been selected at random. At the location where the overwintering survey was being conducted there was only one suitable CS site that met all the above characteristics thus this site was chosen as the CS site for the surveys.

CS and OWS sites were visited bi-monthly on the 1st and 3rd Tuesday of each month until time of emergence in spring. A temperature logger (Figure 2) was deployed at each site to create a thermal profile. The logger was positioned 8 cm from the base of a brick to mimic the height of a wood turtle. Water quality, site characteristics and turtle behaviour data was collected at each site using the Wood Turtle Overwintering Data Sheet (Appendix H).

Figure 2. Temperature logger dropped at CS and OWS sites.

3.6 Stewardship

Development of outreach activities was a major component of this project. Outreach is important to educate and engage citizens within the community to become involved and aid in the protection of the species.

Outreach activities included:

- Circulation of "Have you seen a wood turtle" poster (Appendix I)
- Development of a wood turtle presentation to give to local schools and community groups
- CARP booths providing information on the wood turtle project
- Creation of a poster for CARP information board (front office)
- Creating awareness through the use of social media
- Creating awareness through the use of press releases

4.0 Results

4.1 Field Surveys

Field surveys started on June 14, 2012 and were conducted throughout the Annapolis River watershed (Table 1).

Table 1. Wood turtle survey locations within the Annapolis River watershed.

Site ID	Date	Notes
WB1	14-Jun-2012	
SR1	14-Jun-2012	
SR2	15-Jun-2012	
FR1	20-Jun-2012	
FR2	21-Jun-2012	Survey ended at UTMs noted.
SR3	22-Jun-2012	
AR1	28-Jun-2012	
PG1	3-Jul-2012	Wood turtles noted on site by staff and clientele. A member of staff provided us with best area to look.
AR2	4-Jul-2012	
SR4	5-Jul-2012	North side of river surveyed.
SR4	9-Jul-2012	South side of river surveyed.
SR2	10-Jul-2012	Jeffie McNeil and K9 on survey, one turtle found and survey ended at UTMs noted.
SR2	11-Jul-2012	Release of turtle
SR5	17-Jul-2012	
FR2	18-Jul-2012	
AR3	24-Jul-2012	Severe lightning and thunder, survey canceled.
AR3	25-Jul-2012	
SR6	30-Jul-2012	
NR1	31-Jul-2012	
FR2	22-Aug-2012	Simon Gadbois, team and trained K9's.
ZB1	23-Aug-2012	Simon Gadbois, team and trained K9's.
ZB2	24-Aug-2012	
NR2	7-Sep-2012	David Adams and trained K9's.
BR1	20-Sep-2012	
AR4	13-Oct-2012	Bank survey by canoe.
AR5	17-Oct-2012	
FR3	18-Oct-2012	
FR2	22-Nov-2012	Used historical data to look for overwintering turtles.

4.1.1 Wood Turtle

One male wood turtle (Figure 3) was seen on site SR2 on July 10, 2012 (Table 2). This turtle was previously notched from Nova Scotia DNR surveys.

Figure 3. Earl the wood turtle, notch code 9,11-2,3,11 (523).

Table 2. Information for turtle 9,11-2,3,11 (523).

Notch Code	Age	Sex	Weight (g)	Deformities
9,11-2,3,11	>30	Male	1280 without transmitter	11 marginal scutes left side, 12 marginal scutes right side, nub tail, old damage to scutes L10 and L11

4.2 Radio Telemetry

On July 10, 2012 a wood turtle was brought back to CARP and outfitted with a radio tracking device (Figure 4) to help gather data on habitat preferences, movement range and overwintering behavior. Turtle 9,11-2,3,11 (523) was tracked (Table 3) once a week throughout the summer months and twice a week into the fall to establish his overwintering site. No mating activity was observed during this time.

Figure 4. Radio tracking device being attached to wood turtle 9,11-2,3,11 (523).

Table 3. Radio tracking activities for turtle 9,11-2,3,11 (523).

Site Name	Date	Habitat type at time of capture
RT1	19-Jul-2012	Terrestrial
RT2	26-Jul-2012	Aquatic
RT3	2-Aug-2012	Terrestrial
RT4	7-Aug-2012	Terrestrial
RT5	16-Aug-2012	Terrestrial
RT6	29-Aug-2012	Aquatic
RT7	6-Sep-2012	Unknown
RT8	10-Sep-2012	Terrestrial
RT9	12-Sep-2012	Terrestrial
RT10	18-Sep-2012	Aquatic
RT11	22-Sep-2012	Terrestrial
RT12	25-Sep-2012	Unknown
RT13	26-Sep-2012	Aquatic
RT14	1-Oct-2012	Terrestrial
RT15	4-Oct-2012	Unknown
RT16	5-Oct-2012	Aquatic
RT17	9-Oct-2012	Aquatic
RT18	12-Oct-2012	Terrestrial
RT19	17-Oct-2012	Terrestrial
RT20	23-Oct-12	Unknown
RT21	26-Oct-2912	Terrestrial
RT22	30-Oct-2012	Aquatic
RT23	2-Nov-2012	Aquatic
RT24	7-Nov-2012	Aquatic
RT25	9-Nov-2012	Aquatic
RT26	15-Nov-2012	Unknown
RT27	16-Nov-2012	Unknown
RT28	21-Nov-2012	Unknown
RT29	26-Nov-2012	Unknown
RT30	4-Dec-2012	Aquatic
RT31	12-Dec-2012	Aquatic

4.3 Nesting Surveys

One public sighting led to the possibility of a nest in the Lawrencetown area (Table 4). A landowner who lived close to one of the wood turtle volunteers mentioned to him that several weeks prior he had seen a female wood turtle starting to dig a nest on his property. The following morning the turtle was gone but he marked the location where he saw the turtle with a yellow flag. The nest location was visited and a nest enclosure was put over the marked area (Figure 5). The landowner who reported this sighting confirmed the location and species by showing us pictures he had taken. He reported wood turtles on his property for the past several years and noted that he had tried to notify DNR in the past. Although it was quite late in the season, the landowner allowed us to complete 2 evening nest surveys to look for nesting females (Table 4). No nesting females were seen during these surveys.

Starting mid-August the nest enclosure was checked daily by a volunteer until the first week of October for signs of emergence. There was no activity during this period so the nest was excavated resulting in no eggs being found (Table 4). This could have possibly been a test pit a female wood turtle had dug.

Table 4. Nesting activities and surveys in the Lawrencetown area.

Site ID	Date	Notes
NS1	27-Jun-2012	Identifying a possible nest
NS2	28-Jun-2012	Nest Survey
NS3	6-Jul-2012	Nest Survey
NS4	9-Oct-2012	Nest excavation

Figure 5. Possible wood turtle nest with nest enclosure added for protection against predators.

4.4 Overwintering Surveys

Temperature loggers were deployed November 26, 2012 and will be removed at time of emergence. At that time we will be able to create a thermal profile of the water temperature at the CS1 and OWS1 sites. Between November 26, 2012 and December 4, 2012 the turtle moved from one side of the bank to the other. The turtle was not visualized on November 26, 2012 but through tracking it is suspected the turtle was underneath a submerged tree trunk. December 18, 2012 loggers were moved using the same methods noted above to more accurately represent the new overwintering location of the turtle. During surveys that are conducted the 1st and 3rd Tuesday's of each month (between end of November 2012 and March 2013) water quality (Table 5 and 6), site characteristics and turtle behaviour (Table 7) data are being collected. These surveys are on-going and all information collected to date can be found in the tables below.

Table 5. CS1 water quality data collected to date using YSI Professional Plus (Model: Pro 10102030).

Date	Station name	Time	Water Temp (°C)	DO (%)	pH
26-Nov-12	CS1	15:29	2.7	93.1	6.15
04-Dec-12	CS1	13:45	3.4	98.4	6.13
18-Dec-12	CS1	13:53	1.6	95.8	6.12
08-Jan-13	CS1	11:07	-0.1	75	6.55
05-Feb-13	CS1	Ice unsafe	Ice unsafe	Ice unsafe	Ice unsafe
19-Feb-13	CS1	10:34	-0.1	90.4	6.53

Table 6. OWS1 water quality data collected to date using YSI Professional Plus (Model: Pro 10102030).

Date	Station Name	Time	Water Temp (°C)	DO (%)	pH
26-Nov-12	OWS1	14:44	2.7	92.6	5.93
04-Dec-12	OWS1	14:24	3.4	100.1	6.04
18-Dec-12	OWS1	13:07	1.4	93.5	6.9
08-Jan-13	OWS1	11:57	-0.1	85.6	6.26
05-Feb-13	OWS1	11:15	-0.1	47.4	6.72
19-Feb-13	OWS1	11:40	-0.1	94.5	6.37

Table 7. Overwintering turtle behaviour data collected to date.

Date	Behaviour	Direction/positioning	Water depth (m)	Distance to shore (m)	Substrate type	Presence and type of submerged structure
26-Nov-12	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
04-Dec-12	Head and limbs tucked into shell	Facing bank at a 45° angle	0.6	1	sandy	Partially covered by leaf litter and roots, stick across top of shell
18-Dec-12	Tucked into leaf litter, majority of shell covered with sand, leaves and sticks	Unable to tell which end of shell is which. Cannot see radio transmitter. Shell on a slight angle to bank. Possibly rear of turtle closer to bank and head facing towards current	0.68	0.75	sandy	leaf litter and sticks
08-Jan-13	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
05-Feb-13	Could not see but appears to have moved slightly	Unknown	Unknown	Unknown	Unknown	Unknown
19-Feb-13	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown

4.5 Stewardship

4.5.1 Posters

"Have you seen a wood turtle" posters (Appendix I) were put around the watershed in June 2012 (Table 8). They were also brought to all CARP booth locations and presentations. A poster was generated for the CARP bulletin board in the front office titled, Wood Turtle Monitoring and Stewardship.

Table 8. Wood turtle poster locations and dates posted.

Town	County	Store	Date posted
Greenwood	Kings	Greenwood Mall	8-Jun-2012
Greenwood	Kings	Canadian Tire	8-Jun-2012
Greenwood	Kings	Sobey's	8-Jun-2012
Greenwood	Kings	CFB Greenwood	8-Jun-2012
Wilmot	Kings	Wilmot Centre	8-Jun-2012
Middleton	Kings	Subway	14-Jun-2012
Kingston	Kings	Kingston Lyons Club	21-Jun-2012
Kingston	Kings	Paragon Golf Course	4-Jul-2012
Digby	Digby	Shoreline Restaurant	13-Jun-1012
Digby	Digby	Visitor's Information Centre	13-Jun-1012
Digby	Digby	Home Hardware	13-Jun-1012
Digby	Digby	Canadian Tire	13-Jun-1012
Digby	Digby	Digby Marina	13-Jun-1012
Lequille	Annapolis	Irving Gas Station	13-Jun-1012
Annapolis Royal	Annapolis	King's Theatre	13-Jun-1012
Annapolis Royal	Annapolis	NSLC	13-Jun-1012
Annapolis Royal	Annapolis	Post Office	13-Jun-1012
Annapolis Royal	Annapolis	Community board by Police Station	13-Jun-1012
Annapolis Royal	Annapolis	CARP	18-Jun-2012

4.5.2 Presentations and Booths

A wood turtle monitoring and stewardship PowerPoint presentations was created and presentations were set-up within the watershed (Table 9). Many schools within the Annapolis Valley Regional School Board (AVRSB) were interested in booking a wood turtle presentation. A wide range of grades from grade 3 to 11 attended the presentation. This presentation was also given to day care aged children and to interested citizens within the community of Annapolis Royal. This presentation was very well received and generated much interest.

Table 9. Wood turtle presentation locations within the Annapolis River watershed.

Presentation	Number in attendance	Date
Just Right Childcare	20	22-June-12
Bridgetown Regional High School – Science 10	17	16-Oct-12
Bridgetown Regional High School – Career Development 10	17	24-Oct-12
Bridgetown Regional High School – Science 701	20	6-Nov-12
Bridgetown Regional High School – Science 702	20	6-Nov-12
Lawrencetown Education Centre – Oceans 11	12	9-Nov-12
Annapolis West Education Centre –Social Studies 9	20	14-Nov-12
4H Club Lawrencetown	10	26-Nov-12
West Kings District High School – Science 10	24	7-Dec-12
Annapolis Royal Library	10	30-Jan-13
Annapolis Valley Home School Group	8	1-Feb-13
Total number attended	178	

Three booths were attended on behalf of CARP providing information about the organization as well as the projects being run in 2012 including the wood turtle project (Table 10). Many of the people who dropped by these booths were interested in learning more about wood turtles and took an interest in the wood turtle information provided.

Table 10. CARP booth locations within the Annapolis River watershed.

Booth	Number of people	Date
Kejimkujik Storytelling Festival	40	21-Jul-12
Lawrencetown Exhibition	5	13-Aug-12
	10	14-Aug-12
	15	15-Aug-12
Annapolis Royal Market	50	12-Oct-12
Total number attended	120	

4.5.3 Social Media, Media and Website

Social Media

- Project updates and pictures were uploaded on the CARP Facebook page (Clean Annapolis River Project) throughout the field season.

Media

- A press release titled, "Meet Earl" was published in the Annapolis County Spectator on August 11, 2012 (http://www.annapoliscountyspectator.ca/News/2012-08-11/article-3050729/Meet-Earl/1) (Appendix J).

- A CBC interview was conducted on CBC Information Morning Nova Scotia on August 15, 2012 titled, "The Elusive Wood Turtle" (http://www.cbc.ca/informationmorningns/2012/08/15/the-elusive-wood-turtle/).

Website

- The CARP website (http://www.annapolisriver.ca/) provides information about the wood turtle project and was updated at the beginning of October 2012.

5.0 Discussion

5.1 Field Surveys

Historical data showed wood turtle populations on 3 rivers and 2 brooks within the Annapolis river watershed. Visual surveys were conducted on these river systems first and only one wood turtle was identified. The lack in findings might suggest that wood turtle populations have declined in recent years. However, surveys started in June, at a time when temperatures are increasing and wood turtles start to spend the majority of their time on land (Kaufmann 1992a). At this time vegetation height and density are at its worst making it very difficult to find turtles thus contributing largely to our lack of success.

Two dogs trained to recognize the scent of wood turtles were brought in through partnership with Dalhousie University for 3 surveys on 3 different river systems in order to help locate wood turtles. The dogs were successful in finding our tagged turtle but no other turtles were discovered. The dog handler thought the vegetation height and density were a barrier to the dogs identifying turtles as in other locations the dogs had been quite successful.

In order to gain a better understanding of wood turtle populations in the Annapolis River watershed surveys must start in early April when temperatures are starting to change and wood turtle are emerging from their overwintering sites. Kaufmann (1992a) notes that wood turtles are normally dormant until late March or early April and that upon emergence turtles will spend most of their time in the water except for short periods spent basking or feeding on the bank. Also, during this time period vegetation will be at its lowest and will provide the best opportunity to successfully locate wood turtles.

5.2 Radio Telemetry

Radio telemetry proves to be a successful way to monitor the movement patterns and distribution of wood turtle populations. This method has been used to pinpoint and locate turtles and learn more about their habitat use/selection (Kaufmann 1992a, Quinn and Tate 1991, Compton et al. 2002, Dubois et al. 2009), home range and seasonal movements (Kaufmann 1995, Quinn and Tate 1991), nest site selection (Hughes et al. 2009, Walde

et al. 2007), movement and habitat use of hatchlings and juveniles (Castellano et al. 2008, Brewster and Brewster 1991), social behaviors (Kaufmann 1992b,) and overwintering ecology and behavior (Greaves and Litzgus 2007).

One male wood turtle was successfully radio tracked during the 2012 field season. This wood turtle was originally captured on July 10, 2012. A total of 31 tracking events occurred between July and December 2012 when the turtle selected a hibernaculum for overwintering. Radio tracking events allowed information to be collected to obtain an idea of habitat preferences, home range, movement patterns, behavior and overwintering locations. At this time an accurate calculation of home range for this turtle cannot be computed. In order to calculate this information a full seasons worth of data starting from time of emergence from overwintering hibernaculum until overwintering of the following winter season needs to be collected. Habitat use between April and July is unknown for the turtle tracked during 2012.

Tracking events revealed that the turtle remained within approximately 67 m (using the measure function in ArcGIS 9 v. 9.3.1, measuring from the edge of the river to the tracking location) from the edge of the river. When he was found in terrestrial habitats he was often within the riparian area in speckled alders *(Alnus sp.)* with a mix of ground vegetation such as jewel weed and grass species, in deciduous forest or in the cornfield on the North side of the river. When found in the water he was often close to the bank sitting on the sandy bottom usually close to tree roots or other structures. These habitats reflect those noted in work done by Quinn and Tate (1991), Kaufmann (1992a) and Dubois et al. (2009).

In order to develop a better understanding of the wood turtles through the use of radio-telemetry in the Annapolis River watershed it is imperative that wood turtles are tracked throughout the entire season from emergence of overwintering location to overwintering of the following season. This will provide a more well-rounded idea of habitat preferences, home ranges, movement patterns, behavior and overwintering locations. It would be ideal to radio-track a number of male and female wood turtles at different locations around the watershed to get a sense of the differences between the two sexes as well as the differences between populations within the watershed and to compare to other populations in other study areas.

5.3 Nesting Surveys

With the discovery of a wood turtle nesting area the opportunity arose to protect 1 possible nest this field season. The nest area was brought to the attention of a volunteer for the project who was neighbours with the landowner. Although the possible nest yielded no eggs and was most likely a test dig site this location provides the opportunity to learn more about nesting wood turtles in upcoming field seasons. The landowner allowed 2 evening nesting surveys on his property. These surveys were completed quite late in the nesting season the last week of June and the first week of July. Walde et al. (2007) notes the best time to conduct nesting surveys is from late May to the beginning of July.

It will be important to conduct nest surveys in the upcoming field season not only to learn more about this specific population of wood turtles but also to gain a better understanding of the nesting ecology of wood turtles in the watershed. The collection of data similar to Walde et al. (2007) such as time of year that wood turtle nesting occurs, movement pattern of nesting females, whether or not wood turtles show signs of nest site fidelity and insight into reproductive output could be interesting. The collection of this data would allow for comparisons between population differences within the Annapolis River watershed as well as to other researched populations. Also, by continuing to study nesting females there will be the potential for nest protection. This will provide an opportunity to learn more about nest success, emergence and hatchling behavior.

5.4 Overwintering Surveys

Since 1 turtle was radio-tracked to its overwintering location the opportunity arose to collect overwintering data. The data collected during these surveys will provide information such as conditions that are favoured by wood turtles when they are choosing their overwintering site and insight into

movement patterns and strategies. The data collected thus far has been fairly consistent except for on February 5, 2013. The percent Dissolved Oxygen (DO%) at the OWS1 site was recorded as 47.4% and the DO% at the CS1 site could not be recorded as the ice conditions were unsafe. The equipment used was calibrated one day prior to use and DO% was calibrated before use in the field while data was collected by the primary researcher. Overwintering data will continue to be collected until time of emergence at which time all data collected will be analyzed.

Similar to Greaves and Litzgus (2007) the data collected will help us learn more about hibernacula parameters and choice, turtle behaviour, and temperature. Water quality (temperature, dissolved oxygen and pH), site characteristics (substrate type, presence and type of submerged structure and ice thickness) and turtle behaviour (direction/positioning, movements) are also being collected similar to a project by Newton and Herman (2009) looking at habitat, movements and behaviours of overwintering Blanding's turtles *(Emydoidea blandingii)*.

5.5 Stewardship

Stewardship is a key component of a successful conservation effort. Using different media such as presentations, posters, social media, media etc. one is able to engage a wide variety of individuals, of varying age groups and backgrounds, in hopes to bestow knowledge and create stewards. Similar to Caverhill (2006) we took a multifaceted approach to reach as many individuals as possible.

A wood turtle monitoring and stewardship presentation was created and presented to many age groups. Primarily the presentation was given to public and high schools. There was one presentation to a daycare and a public presentation held to adults in Annapolis Royal. A total of 178 individuals participated in these presentations directly. Indirectly, information about the wood turtle was given at CARP booth set-ups. In total there were 3 different locations where booths on behalf of CARP were set-up (Kejimkujik Storytelling Festival, Lawrencetown Exhibition and the Annapolis Royal Market). A wood turtle handout, posters and stickers were available at these locations and a poster on the wood turtle created by CARP for educational purposes was a point of information. In total 120 people were spoken to directly about the wood turtle.

CARP's Facebook account was used for posting project updates and pictures from the field. In presentations this was highlighted so people could follow the success of the field season. The CARP website provided information on the project and was updated in October 2012. A press release in the Annapolis County Spectator and a radio interview on CBC Information Morning Nova Scotia provided more general information to a wider audience and left a point of contact for wood turtle sightings and ways to get involved and help.

Stewardship activities achieved through the use of public education and outreach activities were as simple as providing people information about the wood turtle, helping people to recognize a wood turtle and report a sighting to the species at risk hotline, getting involved and volunteering to help with visual, radio tracking or nesting surveys and/or managing privately owned land in ways that do not threaten the wood turtle especially land that is shared with wood turtle habitat. Providing people with the knowledge and the activities that they can get involved in is an important start to creating an effective monitoring program. However, offering people variety of opportunities to actively get involved and help in the conservation of the species is what will create stewards (Caverhill 2006).

Public education and outreach needs to continue to help educate and create wood turtle stewards. Specific groups need to be targeted such as people who live in nesting areas and people who have farm land in areas where wood turtles are found. By building relationships within the community and working with different groups and organizations the creation of innovative ways to help minimize impacts to wood turtles and wood turtle habitat can be developed that people are willing to try. Through this stewards will be created who will help with the future success of wood turtle populations within the watershed.

6.0 Recommendations

1. Start future field season at the beginning of April (or early March) to allow for better success in finding wood turtles.
2. Visual surveys need to continue for several more seasons to gain a better idea of wood turtle populations within the watershed.
3. Utilize track mode on the GPS to provide more accurate mapping of sites surveyed that can be directly uploaded into ArcGIS.
4. Due to the fact that we cannot predict when and where we will find wood turtles, sites should be surveyed several times throughout the field season.
5. Radio transmitters should be attached to a number of male and female wood turtles particularly from different river systems in order to gain a better understanding of both sexes and separate populations within the watershed when possible.
6. It would be ideal to track a female and male on the same watercourse so as to provide information about ranges and sexes in a same location.
7. Continue weekly tracking of all tagged turtles and increase tracking during nesting season and before overwintering to establish both these sites at multiple locations.
8. Schedule evening nest surveys at known nesting areas to learn more about wood turtle nesting.
9. Continue overwintering surveys for all turtles tracked through the season to continue to understand overwintering strategies and habitat use and compare between seasons.
10. Continue outreach activities in schools as well as try to hold more community wide presentations including presentations open to the public, booths, and community organizations, groups and clubs to spread the plight of the wood turtle to a wider audience base.
11. Develop a pamphlet as a hand out on the wood turtle to provide to people who are interested in more information following a presentation.
12. Develop a wood turtle business card that people can put in their wallet providing a picture of the wood turtle and information on how to report a sighting.
13. Develop a wood turtle website providing reliable information about the wood turtle to the online community.
14. Develop a relationship with the farming community to obtain information that will help to create a stewardship plan that the farming community would be interested in following to help mitigate the number one threat to wood turtles, mower blade height as well as other threats such as plowing equipment and livestock.
15. Develop a community based social marketing program to address threats such as raising mower blades.

7.0 Conclusion

The 2012 field season provided the opportunity to survey watercourses with historical sightings of wood turtles as well as look at some other water courses that showed good habitat qualities for the wood turtle. By successfully finding one male wood turtle, some insight was gained into wood turtle activities, home ranges and overwintering activities. Finding more turtles and radio tracking a balanced number of male and females would provide a better knowledge base about the elusive wood turtle within the Annapolis River watershed. A variety of outreach activities proved to be engaging and elicited a number of volunteers. By continuing these activities many more people will learn about the wood turtle and will know what to do if they see one. Developing an action plan with rural landowners also needs to be looked at further in order to help mitigate threats to the wood turtle. In order, to have a better understanding of the wood turtle population in the Annapolis River watershed future field seasons need to be conducted. This is important so that data can be compared across seasons and populations to foster a better understand of the species and how to help it.

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Appendices

Appendix A: Nova Scotia Turtle Daily Effort Card

NOVA SCOTIA TURTLE DAILY EFFORT CARD

Population : _____
Area: _____
Date: _____
Project: _____
Target spp: ☐ Blanding's ☐ Painted ☐ Snapper ☐ Wood

Observers	Vol. Effort*	Observers	Vol. Effort*

**Total volunteer effort includes on site time, preparation time and travel time*

Effort and activities					Weather at start of survey					Trapping details	# Observations				# Nests			
Section Name / Nest Site	Activity **	# Observers	On site time Start (24 hr)	On site time end (24 hr)	Precip. **	% Cloud Cover	Wind Speed **	Air Temp	Water Temp	Trap Session ID	Blanding's	Snappers	Painted	Wood	Blanding's	Snappers	Painted	Wood

***Refer to back for activity, precipitation and wind speed codes. Please fill out one observation card for each observation of a Blanding's turtle or wood turtle.*

Comments: _____

Summary of trap catch

Session ID	#	Trap Catch (turtles actually in trap)					List ID/species of all identified turtles	List ID/ species of all identified turtles near trap and put distance (m) to trap in brackets
		Blanding's	Snapper	Painted	Wood	Other (specify)		

*** Activity** (list only 1 activity per line):

R = Radio tracking S = Set traps B = Re-bait & check traps
V = Visual survey C = Check traps H = Habitat characterization
N = Nesting survey P = Pull traps O = Other (specify)

Precipitation

N = None M = Moderate-heavy rain
D = Drizzle/mist F = Snow Flurries
L = Light rain O = Other (specify in comments)

Wind Speed

C =Calm M = Moderate
L = Light S = Strong

Card modified 30-Nov-2010

Appendix B: Nova Scotia Turtle Observation Card

NOVA SCOTIA TURTLE OBSERVATION CARD

Entered? □ # _____

Species □ Blanding`s □ Snapping □ Wood □ Painted

Notches _____ **Turtle Number** *(w,s)* _____

Name _____ **Sex** □ M □ F □ J **Gravid** □ Yes □ No

Date _____ (dd-mmm-yy) **Time** _____(24 hr)

Cap. type □ First Capture
□ Recapture
□ Escaped/ Not Identified
□ Predated nest only: Suspected cause_____
□ Intact nest only (no turtle observed) Nest ID_____

Status □ Alive □ Dead: Suspected cause _____

Handling type □ Handled & released on site □ Not handled
□ Handled & brought into lab

Sighting method □ Visual survey
□ Nesting survey
□ Radio tracking Freq_____
□ Incidental to radio tracking
□ Trapping Session _____ #____
□ Incidental to trapping Distance to trap (m) _____
□ Incidental to other research (e.g. ribbonsnake sampling)
□ General observation / other (put details in comments)

Sighting type (if tracking) □ Turtle seen: first seen _____min after pinpointing
□ Pinpointed but not seen: □ Searched for 10 min
□ General location only (put details in comments)

Observer who wrote card_____
Additional observers _____

Please refer to maps for population / area / section designation

Project _____ **Population**_____
Area _____ **Section**_____

Location description *(where the site is relative to fixed landmarks)*

UTM *(please use NAD 83 datum or specify in comments)*
East:_ _ _ _ _ _ _ North:_ _ _ _ _ _ _ _ Zone____

UTM Source □ GPS unit (60+ second fix) Accuracy _____m
□ 1:50 000 Topo □ 1:10 000 Topo □ Air photo grid

Precipitation □ None □ Drizzle / mist □ Moderate –heavy rain
□ Light rain□ Snow flurries □ Moderate –heavy snow
□ Other: _____

Wind speed □ Calm □ Light □ Moderate □ Strong

Estimate percent cloud cover _____%

Air temp _____^{O}C **Water temp** _____^{O}C

Behaviour (*check only 1*) □ Aggression /Courtship
□ Atmospheric Basking □ Aquatic Basking □ Foraging/Eating
□ Aquatic Active □ Aquatic Stationary □ Copulating
□ Terrestrial Active □ Terrestrial Stationary □ Nest Search/Attempt
□ Nesting: Nest ID_____ Clutch size _____

Position
In water: □ Submerged □ Carapace Exposed □ Head Exp.
On land: □ All Exposed □ Partially Covered □ Covered

Dist. from: *nearest water* _____m *or nearest land* _____m

Habitat at capture □ Terrestrial □ Flooded □ Normally aquatic

Perch (*if applicable*) □ Sphagnum □ Grass/ Sedge □ Emergent Veg.
□ Mud □ Rock □ Log/ Sticks □ Lodge/ Dam
□ Buried in substrate □ Bottom □ Other:_____

General habitat description (dominant vegetation / features)

Comments_____

Measurements
(Blanding's –do all measurements; other species- do those denoted)

CL	_____cm (*s, w*)	PRE	_____cm (*s*)
CW	_____cm (*s, w*)	POST	_____cm (*s*)
CW_{Bridge}	_____cm (*w*)	LPS	_____cm
PL	_____cm (*s, w*)	HT	_____cm (*w*)
PW	_____cm (*s, w*)	CON	_____cm
$PW_{Femoral}$	_____cm	WT	_____ g (*s*)

Upper Lip *(Blanding's)* □ Striped □ Solid

Annuli □ New growth □ Visible, no new growth □ Worn Smooth

Annuli count: *from plastron* _____ *from carapace* _____

Algae present on limbs (blue green)? □ Yes □ No

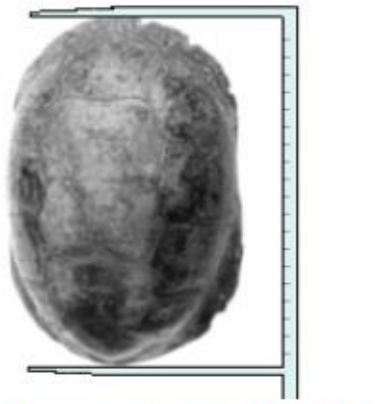
Algae present on shell (green, fuzzy)?□ Yes □ No

Detailed description of all identifying features (e.g. scars)

Procedures *(check all that apply)*
□ Photo { Numbers _____
□ Scan { Photographer_____
□ Blood sample Vial # _____
□ Skin sample Vial# _____
□ Transmitter attached Frequency _____
□ Transmitter removed
□ GPS Logger attached
□ GPS Logger removed

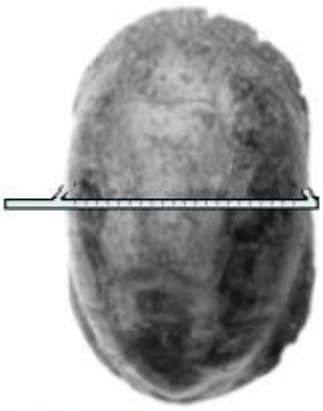
Card modified: 16-May-10

Appendix C: Wood Turtle Measurements (adapted from the Blanding's Turtle Recovery Team 2007)

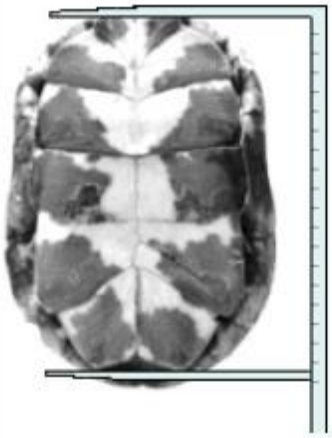


CL = maximum carapace length

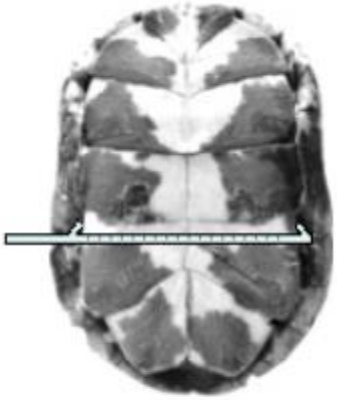
CW= Maximum carapace width



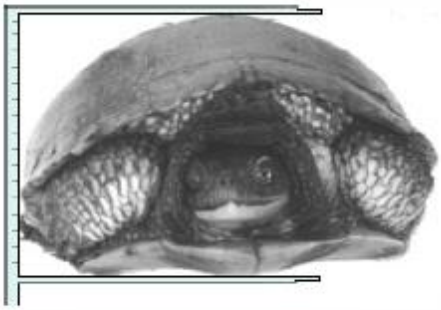
CW_{Bridge} = Width at the bridge



PL = maximum plastron length



PW=Width below bridge

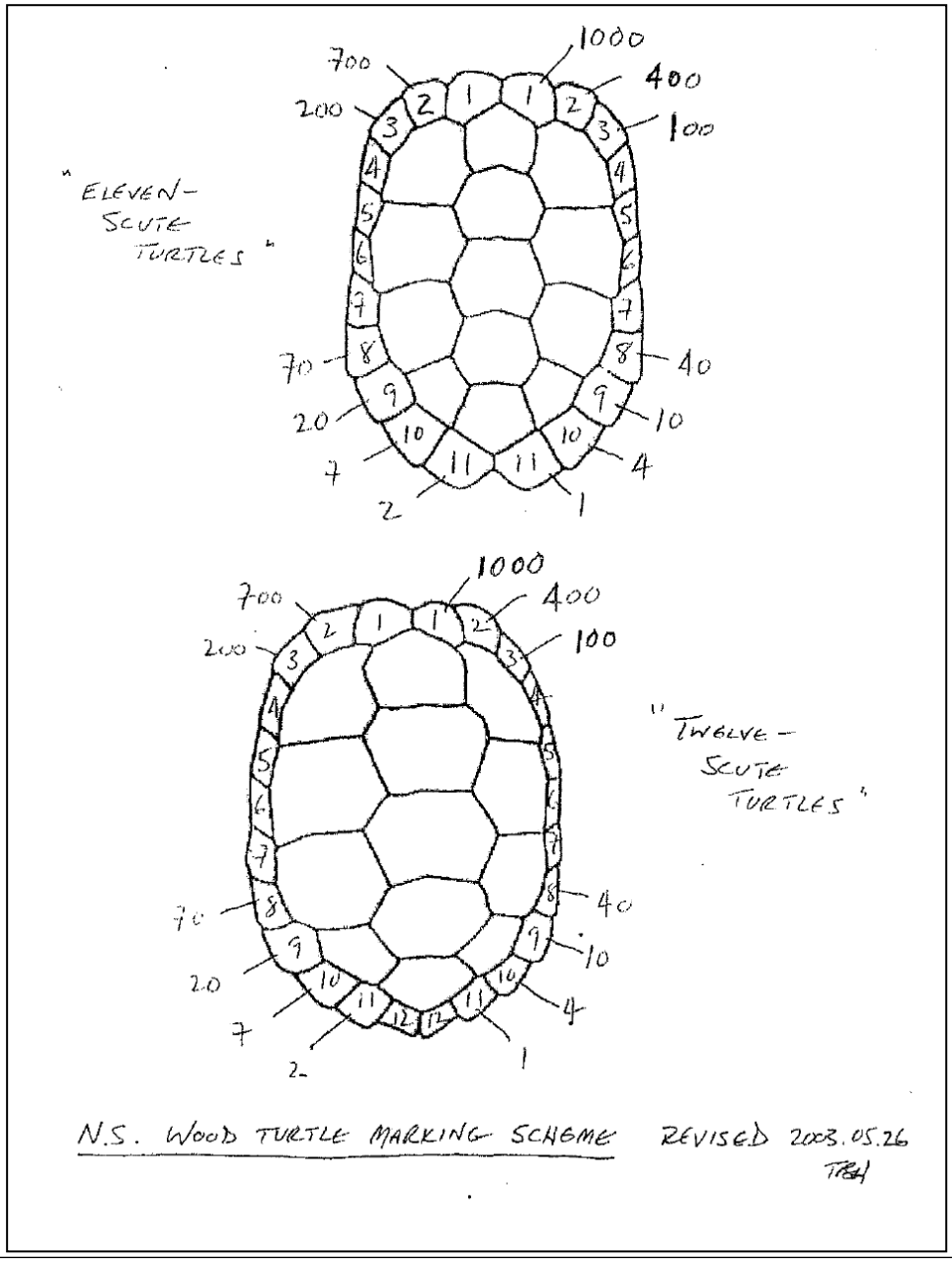


Ht = Maximum shell height on the bridge

Appendix D: Wood Turtle Notch Code

In order to use the wood turtle notch code a set of codes needs to be assigned to the project. CARP's assigned notch codes are 451-500. To read a notch code where a turtle has been previously notched count the number of marginal scutes and use appropriate coding system for the eleven or twelve scute turtle. Locate which marginal scutes are notched on the left and then right side of the shell and then add up the values (number above scute) associated with those scutes. This will provide you with the turtle's notch code number.

To provide a new turtle with an assigned notch code count the number of marginal scutes and use the appropriate coding system for the eleven or twelve scute turtle. According to the notch codes you have been given, file the fewest number of marginal scutes using a ½" triangular file whose value (number above scute) add up to the notch code number you are using. For example, if your notch code was 451 on an 11 scute turtle you would file right marginal scutes 2, 8, 9 and 11.



Appendix E: NS Turtle Nesting and Observation Card

NS TURTLE NESTING AND OBSERVATION CARD

Entered? □ # _____

Species □ Blanding's turtle □ Snapping turtle □ Wood turtle □ Painted turtle

Turtle ID _____
Turtle Name _____
Date _____
Population _____
Area _____
Section _____
Observers _____

Capture type
□ New turtle (no prior notches)
□ Previously notched turtle
□ Turtle not identified
□ Predated nest only
□ Intact nest only (no turtle seen)

Handling type
□ Not handled
□ Handled and released on site
□ Handled and brought into lab
If handled, was the turtle gravid?
□Yes □No

Method
□ Nesting survey □ Other (*please put details in comments)*
□ Incidental to tracking
□ Radio tracking (Freq_____)
If tracking, how closely did you track the turtle?
□ Turtle Seen □ Pinpointed □ General area

Weather at first sighting
Precip □ None □ Light rain □ Drizzle/mist □ Heavy rain
Wind □ Calm □Light □ Moderate □Strong
Cloud cover _____ %

Activities: IF THE TURTLE NESTED, PLEASE FILL OUT DETAILS ON BACK. **UTM source:** □GPS unit □Air photo with grid □Other

Time	UTM East	UTM North	Activity	Air	Location (where on the site was the turtle) and comments
	3	4			
	3	4			
	3	4			
	3	4			
	3	4			
	3	4			
	3	4			
	3	4			
	3	4			

Activity key FP: Face ploughing D: Digging L: Laying B: Burying C: Concealing
TB: Terrestrial basking AB: Aquatic basking NS: Nest search AA: Aquatic active TA: Terrestrial active
TS: Terrestrial stationary AS: Aquatic stationary ML: Move onto land RW: Return to water G: Gone

Nest Details
Don't forget to fill out the turtle ID on the front of the card!

Nest ID _____ # Eggs _____
□ Nest Protected □ Eggs collected for laboratory incubation
□ Nest Predated □ Nest Moved

UTM of nest (NAD 83 datum):
Easting _____ Northing _____
UTM source : □ GPS unit Accuracy _____m
□ Air photo in kit □ Other_____

Digging Start: _____ Laying Start: _____
Laying Finish: _____ Burying Start:_____
Concealing Start:_____ Nest Finish: _____

Egg#	Time	Egg#	Time

Dist. to water: _____m Dist. to veg:_____m
Height above water:_____m
Temperature loggers:_____

Identifying features -*Check the turtle list to confirm features*

_____
_____
_____
_____

Measurements

CL	_____cm
CW	_____cm
CW_{Bridge}	_____cm
PL	_____cm
PW	_____cm
$PW_{Femoral}$	_____cm
PRE	_____cm
POST	_____cm
LPS	_____cm
HT	_____cm
CON	_____cm
WT	_____g

Procedures *(check all that apply)*
□ Photo Numbers _____
Taken by_____
□ Scan
□ Blood sample Vial _____
□ Skin sample Vial _____
□ Transmitter attached Freq. _____
□ Transmitter removed
□ GPS Logger attached
□ GPS Logger removed

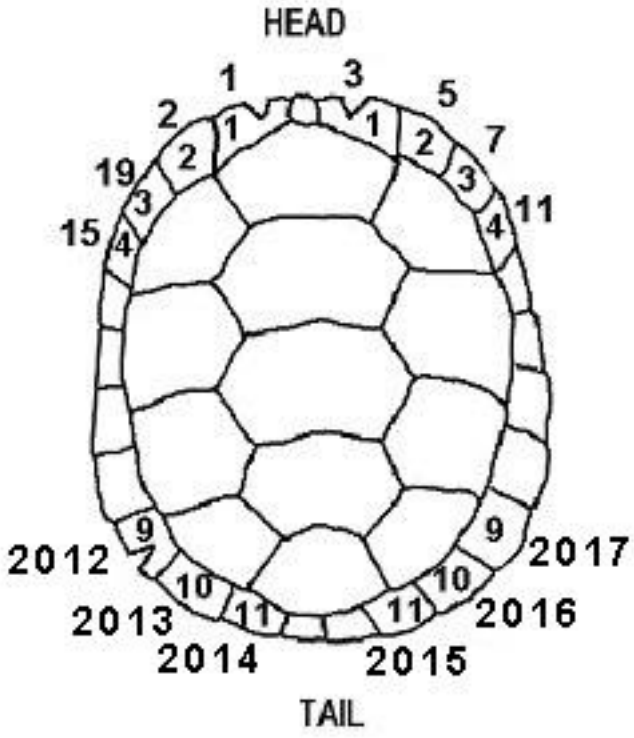
Comments
_____
_____
_____
_____
_____
_____
_____

Card modified 17-May-2011

Appendix F: Hatchling Notch Code

Notches on scutes 1-4 = Nest ID
Notches on scutes 9-11 = Nest year

In order to assign the hatchling a notch code you will use your nest ID and the values (numbers above each marginal scute) to notch the fewest scutes that add up to your nest number and then you will notch the scute assigned to the correct year.



Appendix G: Blanding's Turtle Emergence Card

Blanding's Turtle Emergence Card

Nest description

Nest ID: _____
Mother's ID: _____
Date laid: _____
Clutch est. at laying: _____
Population: _____
Area: _____
Section: _____

UTM (*NAD 83*) East:3_ _ _ _ _ _ North:4_ _ _ _ _ _ _
UTM Source ☐ GPS unit (60+ second fix) Accuracy _____m
☐ 1:50 000 Topo ☐ 1:10 000 Topo ☐ Air photo with grid
Location description_____

Nest Status ☐ Full emergence ☐ Partial emergence ☐ No emergence
Cause of failure ☐ Nest flooded ☐ Nest predated ☐ Unknown ☐ Other_____

Summary

Total emerged hatchlings: _____
Total excavated live hatchlings: _____
Total excavated dead hatchlings: _____
Total excavated eggs: _____
Estimated number of escapees: _____
Clutch size estimate at emergence: _____

Total incubated eggs: _____
Incubated eggs that emerged: _____
Total captive reared: _____
Total tracked after emergence: _____
Date excavated: _____
Nest depth (cm): _____

Comments (include excavation details)

Card modified 05-Sep-2007

Hatchling and Egg Measurements (mm)

Hatchling notch code_____

#	CL / egg length	CW / egg width	PL	PW	Weight turtle/ egg (g)	Date (dd-mmm-yy)	Status	Fate	Vial	Deformities and comments (include individual hatchling ID and frequency, if given)

Status: 1. Live hatchling that emerged from nest
2. Live hatchling that was excavated from nest
3. Dead hatchling that emerged prior to death
4. Dead hatchling found in nest cavity
5. Undeveloped egg
6. Egg with dead embryo
7. Egg with live embryo

Fate: 1. Hatchling released at nest site
2. Hatchling released away from nest (put details in comments)
3. Hatchling brought in to lab (put date died or released in comments)
4. Egg incubated
5. Egg opened and discarded
6. Egg or hatchling reburied

Add a T after fate if the hatchling had a transmitter attached

Appendix H: Wood Turtle Overwintering Data Sheet

Entered ☐

Wood Turtle Overwintering Data Sheet

Population:
Area:

Date :
Project:

Time:
Data recorded by:

Water Quality Data

	Control Site (4924J)	Overwintering Site (4925J)
Station name	CS1	OWS1
Time sampled		
GPS coordinates (UTM-20T)		
Temperature (°C)		
DO (%)		
DO (mg/L)		
Specific Conductance (µs/cm)		
Cond. (µs/cm)		
TDS (mg/L)		
SAL (ppt)		
pH		

Site Data

	Control Site (4924J)	Overwintering Site (4925J)
Station name	CS1	OWS1
Time sampled		
GPS Coordinates (UTM-20T)		
Water depth (m)		
Distance from shore (m)		
Substrate type		
Presence and type of submerged structure		
Ice thickness (cm)		

Turtle Data for 523

GPS coordinates (UTM-20T)	
Behaviour	
Direction/positioning	
Water depth (m)	
Distance to shore (m)	
Substrate type	
Presence and type of submerged structure	
Distance moved from last tracking (m)	

Comments:

Appendix I: Have you seen a wood turtle poster

Have you seen a Wood Turtle?

You can help protect this threatened species!

HOW TO HELP

Do not collect or disturb the turtle

Report all sightings

Become a wood turtle volunteer

Leave a buffer of natural vegetation around water courses

Raise the blade of your mower when haying

Hatchlings are only the size of a toonie!

WHAT THEY LOOK LIKE

- 16-21 cm shell length
- Top shell grey-brown with a carved wood-like appearance
- Orange-red colour on neck and legs
- Bottom shell yellow with black patches

WHERE THEY LIVE

- In and around slow moving streams and rivers
- On land in fields, river banks, alder stands and roadsides

To report a sighting or learn how to get involved
call toll free:1-866-727-3447
or email: sightings@speciesatrisk.ca

This project was undertaken with financial support from the Nova Scotia Department of Natural Resources and from the Government of Canada provided through the Department of Environment. Photos by Wendy Holman and Jeffie McNeil

Avez-vous vu une tortue des bois ?

Vous pouvez aider à protéger cette espèce vulnérable!

COMMENT AIDER?

Ne colletez pas ou ne dérangez pas la tortue

Signalez toutes les observations

Devenez un volontaire pour les tortues des bois

Laissez une zone tampon naturelle autour des cours d'eau

Soulevez la lame de la tondeuse lorsque vous tondez votre gazon

Les nouveau-nés ont la taille d'un deux dollars!

À QUOI RESSEMBLENT-ELLES?

- Longueur de la carapace : 16-21 cm
- Dessus de la carapace brun-gris avec une apparence de bois sculpté
- Cou et pattes de couleur orange-rouge
- Plastron jaune avec taches noires

OÙ VIVENT-ELLES?

- Dans et autour des rivières et des ruisseaux à lent débit
- Dans les champs, sur les berges, dans les aulnaies et sur le bord des routes

Pour signaler la présence d'une tortue,
pour en apprendre plus ou pour savoir comment
vous impliquer, composez sans frais: 1-866-727-3447
Ou par courrier électronique: sightings@speciesatrisk.ca

Ce projet a été réalisé avec l'appui financier du Ministère des ressources naturelles de la Nouvelle-Écosse et du Gouvernement du Canada par l'entremise du Ministère de l'environnement. Photos par Wendy Holman et Jeffie McNeil.

Appendix J: Annapolis County Spectator article, "Meet Earl".

12 Environment | The Annapolis County Spectator August 16, 2012

Meet Earl

CARP, partners conducting wood turtle surveys in Annapolis, Kings counties

Meet Earl. He's a rare find. In fact so rare biologists have equipped him with a radio transmitter so they can keep tabs on him. He's a wood turtle and his kind is in danger of extinction.

The Clean Annapolis River Project in collaboration with Acadia University and the Mersey Tobeatic Research Institute are conducting wood turtle surveys and stewardship within the Annapolis River watershed (Annapolis and Kings counties).

CARP biologist Carolyn Hann and her team of field assistants and volunteers have spent the last few months searching for wood turtles within the watershed. After weeks of combing through the thick vegetation along many sites the team's efforts were rewarded when local volunteer Earl Acker spotted one. In honour of this volunteer the male turtle was named Earl.

"It was a great feeling of doing the impossible," Acker explains about finding the wood turtle. "I never thought I would find a wood turtle so easy as finding Earl. I saw a hole in the sand by the corn and said to myself 'there must be a turtle around here someplace,' looked up and there he was – just looking at me – it was super."

Earl the wood turtle was brought back to CARP's office and fully equipped with a radio transmitter, then released at the site where he was found the following day. Attaching this device will allow CARP to track Earl's whereabouts weekly. "By equipping Earl with a radio transmitter we will be able to monitor his movements and get a sense of wood turtle activities, home ranges, and preferred habitat types," said Hann. "These surveys will also allow CARP to gain insight into population size, ages, and sex ratios."

CARP is also delivering and outreach program to help create awareness and provide education about the wood turtle.

Wood turtles are a species at risk: they are designated as vulnerable under the Nova Scotia Endangered Species Act and threatened under the Federal Species at Risk Act. They are likely to become endangered if nothing is done to reverse the factors leading to their extinction. Common threats to wood turtles in Nova Scotia include agricultural mower blades, loss and degradation of habitat, human disturbances, predators, and road mortality. They are distinguished by a woody looking outer shell and bright orange under arms.

CARP said if you see a have seen a wood turtle don't disturb it. You can take a photo and call the species at risk hotline toll free 1-866-727-3447 or send an email to sightings@speciesatrisk.ca. If you are interested in volunteering or would like more information please contact Carolyn Hann at CARP at 902-532-7533.

The Clean Annapolis River Project is a charitable organization working towards an ecologically healthy Annapolis River watershed through science, leadership and community engagement. For more information on this and other projects please visit the Clean Annapolis River Projects website at http://www.annapolisriver.ca/.

A wood turtle named Earl, after the volunteer who first found him, is equipped with a radio transmitter. CARP will be following its movements over several months to better understand this species at risk. Contributed

Local volunteer Earl Acker holding a wood turtle, a species at risk in Nova Scotia. Contributed

Earl the wood turtle is a species at risk in Nova Scotia. He will be radio tracked for several months by CARP to help better understand habitat and ecological needs. Contributed