

PROTECTING AND CONSERVING
WOOD TURTLES:
A STEWARDSHIP PLAN FOR NOVA SCOTIA



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PREFACE & ACKNOWLEDGMENTS

This is the the final version of *Protecting and Conserving Wood Turtles: A Stewardship Plan for Nova Scotia*. It was revised based on expert feedback. The authors would like to thank the following individuals and organizations for valuable feedback provided during the review process:

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JURISDICTION

Legal responsibility for the wood turtle in Nova Scotia is shared between the Government of Nova Scotia Department of Natural Resources (NSDNR), as detailed in the Endangered Species Act (1998) and the Government of Canada (Environment Canada) through the pending Species at Risk Act (SARA).

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PART I - BACKGROUND OF THE STEWARDSHIP PLAN

This section introduces the stewardship plan, its purpose, target audience and intended use.

THE PURPOSE OF THE STEWARDSHIP PLAN

The goal of Protecting and Conserving Wood Turtles: A Stewardship Plan for Nova Scotia is to secure a future for the wood turtle in Nova Scotia through heightened understanding, and to prevent the wood turtle from becoming a threatened or endangered species in this province.

The wood turtle (*Glyptemys insculpta*, formerly *Clemmys insculpta*) was listed under the Nova Scotia Endangered Species Act (1998) as Vulnerable in 2000. This designation means that there is concern for the future of this species in Nova Scotia. This stewardship plan was developed as a guide to help people understand how they can minimize negative impacts on the wood turtle. Hopefully, this plan will prevent the wood turtle from becoming an endangered or threatened species in Nova Scotia. This plan was developed by the Nova Scotia Department of Natural Resources (NSDNR), with help from the conservation community, to meet their responsibilities under the Nova Scotia Endangered Species Act (1998).

This document is a management tool that offers advice to people living, working and recreating in wood turtle habitat. As well, this document is a guide for people and agencies who have management responsibility for Nova Scotia's land and water (i.e. municipal, provincial and federal governments). To successfully implement this plan and secure a future for the wood turtle in Nova Scotia, we will need the ongoing commitment and support of many groups and individuals across the province.

WHO IS THIS STEWARDSHIP PLAN FOR?

This stewardship plan was written for individuals or organizations that have the potential to impact wood turtles and wood turtle habitat in Nova Scotia, and is specifically intended for five groups of end users:

1. LAND USERS AND LAND OWNERS

Individuals who own and/or use areas that may include wood turtle habitat for development, recreation, or other purposes. For example, farmers, foresters, and recreationists are land users. Land owners are responsible for the activities that take place on their property.

2. CONSERVATION COMMUNITY

The community of individuals and organizations who work to protect and conserve wildlife and natural resources in Nova Scotia. These groups are instrumental in helping to raise the awareness about wood turtles to Nova Scotians.

3. ACADEMICS AND RESEARCHERS

Individuals and organizations that will further develop the existing information base on wood turtles in Nova Scotia.

4. GOVERNMENT DEPARTMENTS AND AGENCIES

Municipal, provincial and federal departments and agencies responsible for enforcing rules and regulations relevant to wood turtle conservation.

5. GENERAL PUBLIC

People in the community who have the potential to positively or negatively impact wood turtles and their habitat, including: motorists, recreationists, stewards, educators, youth, etc.

HOW IS THE STEWARDSHIP PLAN ORGANIZED?

PART 1 - BACKGROUND OF THE STEWARDSHIP PLAN

Introduces *Protecting and Conserving Wood Turtles: A Stewardship Plan for Nova Scotia*, its purpose, intended audience, and intended use.

PART 2 - BACKGROUND ON THE WOOD TURTLE

Provides the most current information on the wood turtle, its status, distribution, and habitat.

PART 3 - THREATS FACING THE WOOD TURTLE

Describes the primary threats impacting the wood turtle in Nova Scotia. The reduction and elimination of these threats will help secure a future for wood turtles in this province.

PART 4 - CONSERVATION OBJECTIVES

Objectives that need to be realized in order to reverse known threats to wood turtles and wood turtle habitat in Nova Scotia.

PART 5 - BEST MANAGEMENT PRACTICES

Turtle-friendly advice for land owners and land users working or recreating in wood turtle habitat.



Wood turtle basking on the forest floor.

Photo: Mark Pulsifer

LIMITATIONS OF THE STEWARDSHIP PLAN

Staff at the Nova Scotia Department of Natural Resources (NSDNR), with guidance from experts, have prepared this stewardship plan. This plan defines goals, objectives and actions that are deemed necessary to protect and conserve Nova Scotia populations of wood turtles. It does not necessarily represent the views of all individuals involved in the plan's formulation, or the official positions of the organizations with which reviewers are affiliated. The goals, objectives, and actions are based on the best existing knowledge and research and are subject to modification based on changing objectives and new research. The implementation of this plan is subject to appropriations, priorities and budgetary constraints of the participating jurisdictions and organizations. Therefore, some aspects of this plan may not necessarily be implemented immediately, concurrently, or in their entirety.

SECTION 2 - THE WOOD TURTLE

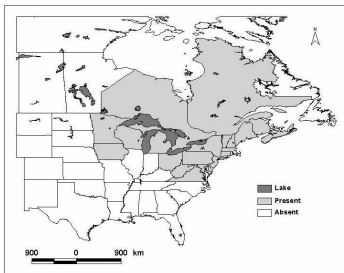
This section provides the most current natural history information on the wood turtle, its status, distribution, and habitat preferences.

THE WOOD TURTLE

For more information on wood turtle biology see the Status Report on the Wood Turtle in Canada by Litzgus and Brooks (COSEWIC).

The wood turtle is a medium sized semi-aquatic turtle that ranges between 16 and 25 cm in length. The brown to grayish-brown upper shell (carapace) of the wood turtle is heavily sculpted, with a raised edge running down the centre of the shell. Each scute on the carapace has a raised pyramidal ridge of circular growth rings, often with black and yellow lines radiating from the apex. The underside of the shell (plastron) is yellow with dark blotches, has a V-shaped notch at the base of the tail, and lacks a hinge. The skin on the head and upper body is dark brown; the skin on the throat, tail and underside of the forelegs is characteristically yellow, orange or red.

Most people are surprised to learn that wood turtles can live for over 50 years in the wild. On average, captive wood turtles reach over 52 years and wild turtles reach over 30 years. The turtles reach sexual maturity when they are between 14 and 18. Females lay one clutch of between four and 18 eggs per year and may not lay eggs every year.

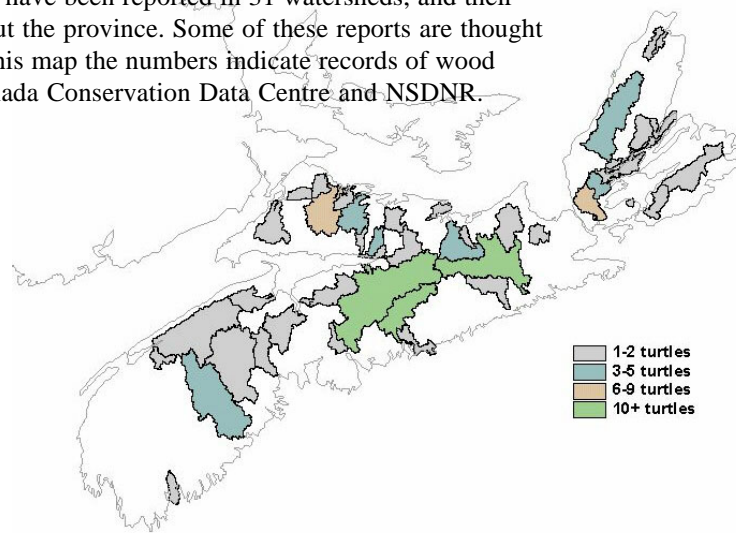


DISTRIBUTION OF THE WOOD TURTLE

The wood turtles range is restricted to northeastern North America. The wood turtle is found in Nova Scotia and New Brunswick, south to Virginia, and west through southern Québec, south and north-central Ontario, and New York, to northern Michigan, Wisconsin, eastern Minnesota, and northeastern Iowa.

DISTRIBUTION IN NOVA SCOTIA

In Nova Scotia, wood turtles have been reported in 31 watersheds, and their distribution ranges throughout the province. Some of these reports are thought to be released captives. On this map the numbers indicate records of wood turtles from the Atlantic Canada Conservation Data Centre and NSDNR.



HABITAT REQUIREMENTS

Wood turtles are generally found in riparian areas or flood plains. Wood turtles need three key habitat components: a stream or river, a sandy nesting substrate, and a forested area.

1. A STREAM OR RIVER

Wood turtles need access to water for thermoregulation, movement, hibernation and mating. In spring when temperatures are cool, the turtles are often found associated with clear, moderately flowing streams, creeks or rivers. At this time, they usually overwinter in the water, but spend much time during the day on land, basking along the shore. Wood turtles prefer hard-bottomed streams and rivers composed of sand or gravel, and avoid clay or muck-bottomed drainage. Clear medium sized (7 to 100 feet wide) rivers and streams are ideal.



The St. Mary's River is the best known wood turtle habitat in Nova Scotia. In this province, it is generally unknown how wood turtles partition habitat based on season and/or sex.

Photo: Mark Pulsifer

2. SANDY NESTING SUBSTRATE

Wood turtles nest in sand or sand-gravel areas like sand bars, sand points, and cutbanks along or in the river. They will also use artificial nesting sites (e.g. gravel pits, logging roads, road shoulders, bridge crossings, residential settlements) when they are available.

3. FOREST

The wood turtle is the most terrestrial of the freshwater turtles in the family Emydidae. In summer when temperatures are warmer, wood turtles spend more time on land. Wood turtles make their home in shaded, wet-mesic forested (coniferous or deciduous) flood plains or riparian areas. The turtles use dense mixtures of low-growing vegetation for foraging, and bask in sunlit openings.

The St. Mary's River is an extensive, clean, and clear river. In some sections, the river has slow moving, meandering, deep sections of soft to firm clay bottom where the turtles hibernate. The river has mud banks lined with alders, choke-cherry, and willow through meadows (most of which have been converted to hayfields) where the turtles forage. In other areas, the river has slow to moderate flow over hard bottom (cobble-gravel), shallow sections, with some riffles through wooded areas. The river also has tributaries, ox-bow ponds, and sand and/or gravel banks on bends with southwest exposure where females dig nests. Wood turtles migrate up and down tributaries, and move up on roads to create nests.

AMOUNT OF HABITAT WOOD TURTLES USE

Wood turtles are **omnivores**, which means they eat plants and animals. Plants in their diet include strawberries, blackberries, cinquefoil, violets, algae, moss, willow, as well as alder leaves and grasses. Animals include molluscs, insects, tadpoles, earthworms, newborn mice and possibly eggs.

Wood turtles range over relatively small areas. These home ranges tend to increase with increasing latitude. This increase in home range size is likely due to the lower productivity in northern regions, forcing animals to move further in search of food. It has also been suggested that home ranges are less restricted in the north because of less extensive habitat alteration. Limited evidence from Musquodoboit and St. Mary's rivers in Nova Scotia supports this suggestion.

In the Mauricie region of Quebec, at the northern limit of the species range, the wood turtle has an average home range of 28.3 ha. Researchers reported an average home range of 24.3 ha in Algonquin Park, Ontario. In the Centre County region of Pennsylvania home range was substantially smaller at an average of 4.32 ha.

STATUS OF THE WOOD TURTLE

STATUS IN NOVA SCOTIA

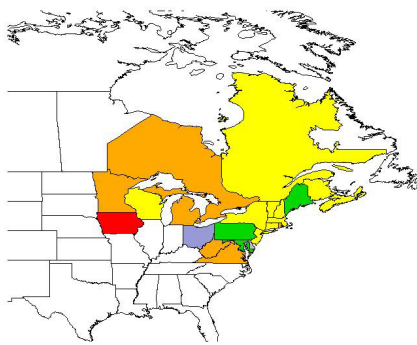
The wood turtle was listed as Vulnerable in 2000 under the Nova Scotia Endangered Species Act (1998). Threats to wood turtles in Nova Scotia include alteration and destruction of river and stream habitats, and the translocation of turtles by people. The wood turtle is also protected under the Nova Scotia Wildlife Act.

STATUS ELSEWHERE

The wood turtle was globally listed as Vulnerable in 1996 by the International Union for the Conservation of Nature. As well, the wood turtle is also designated under the Convention for International Trade in Endangered Species (CITES). In Canada, the wood turtle was listed in 1996 by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as a species of Special Concern. This listing resulted from: 1) the small size and scattered nature of the wood turtle populations in Canada, 2) the species having very specific habitat requirements, and 3) because the species is vulnerable to commercial exploitation for the pet trade.

The Nature Conservancy ranks the global status of wood turtles as G4, meaning the species is seemingly secure globally. The Nova Scotia status assigned by the Atlantic Canada Conservation Data Centre is S3 meaning the species is vulnerable in the province.

The wood turtle is listed in the Endangered Species Act of the province of Ontario as vulnerable. Although the wood turtle has not been given an official designation in the province of Quebec, the species is currently on a list of 76 species in the province to be designated as threatened or vulnerable, and it is expected the species will receive official designation in 2003. The wood turtle is protected under the New Brunswick Fish and Wildlife Act, however the species is not listed under the New Brunswick Endangered Species Act.



- S1 - Critically Imperiled
- S2 - Imperiled
- S3 - Vulnerable
- S4 - Apparently Secure
- SR - Reported
- SH - Possibly Extirpated

USING SCIENCE TO GUIDE STEWARDSHIP: WOOD TURTLE RESEARCH IN NOVA SCOTIA

Scientific research on wood turtles is a key component of successful stewardship and provides a basis for guiding future protection and conservation. In this province there has been very little research done on wood turtles and much remains to be done. What follows is a short summary of some of the main scientific studies that have taken place in Nova Scotia.

John Gilhen's work in the 1970's provides a foundation for our understanding of wood turtles in Nova Scotia.

WOOD TURTLE RESEARCH IN THE ST. MARY'S RIVER

Mark Pulsifer, NSDNR, Jody MacEachern, St. Francis Xavier University, and Lauren Allen, Dalhousie University (2003)

The largest known wood turtle population in Nova Scotia occurs in the St. Mary's River. In 2003 turtles were marked and standard measurements, as well as location, age, and sex were taken on more than 140 turtles. Nesting beaches were identified and described within the study area.



Researcher measuring an adult wood turtle.
Photo: Mark Pulsifer

WOOD TURTLE RESEARCH IN THE ASPY RIVER WATERSHED

Jill Adams, Parks Canada (2002-2003)

One female wood turtle has been tracked in the Aspy River Watershed using radio-telemetry. This turtle has a home range of 6.4 ha and has been found in the riparian zone, a hayfield, deciduous forest, and an alder swale. Potential nesting areas were mapped along the Aspy River Watershed. In 2003, volunteers will be trained to recognize wood turtles and nests, and the Aspy River Watershed will be surveyed for evidence of additional wood turtles.

INTERVIEWS WITH LOCAL KNOWLEDGE HOLDERS

Jill Adams, Parks Canada (2001)

Adams conducted interviews about wood turtles with people from Cape Breton. Sightings were reported in Lake Ainsle, Baddeck, Englishtown, Pleasant Bay, Grand Anse, Margaree, Cheticamp, and the Aspy River. It is thought that the Aspy and Margaree Rivers contain native wood turtle populations.

UNDERSTANDING DISTRIBUTION USING PUBLIC SURVEYS

Jill Adams and Tom Herman, Acadia University (1995)

People were asked to report wood turtle sightings. Once confirmed, a map was developed to show wood turtle distribution in Nova Scotia. With help from the public, the known wood turtle range was extended to include Cape Breton, and some southern counties, including Queens, Shelburne and Annapolis.

Information from the public has helped to identify watersheds containing wood turtles and has also helped to guide future research on wood turtles in Nova Scotia.

HOME RANGE SIZE OF WOOD TURTLES IN NOVA SCOTIA

Dean McCurdy and Tom Herman, Acadia University (1995)

Wood turtles from the Musquodoboit and St. Mary's rivers were transplanted and movement was compared before and after the turtles were moved. Native and transplanted turtles on the St. Mary's River had larger home ranges than turtles on the Musquodoboit River because of the the similarity of habitat in the Musquodoboit, where turtles have no reason to leave the river to find food.

PART 3 - THREATS FACING THE WOOD TURTLE IN NOVA SCOTIA

This section describes threats impacting the wood turtle. The reduction and elimination of these threats will help secure a future for wood turtles.

ROAD MORTALITY



If you find a turtle crossing the road, help it across in the direction it was moving if it is safe for you to do so. Do not stop your car on a busy road to move a turtle.

Photo: Mark Pulsifer

Turtles are often injured or killed by vehicles on roads; thus road mortality is one of the main threats to wood turtles. Expanding road networks and increasing volume and speed of traffic increases this threat. Many roads are located next to rivers, and gravel edges entice nesting turtles onto roads where they are likely to encounter vehicles. Turtles have traditional affinities to specific nesting sites and the same turtles often return to gravel road edges year after year. As well, turtles are often forced to cross roads daily for food and basking sites, and seasonally to nest and hibernate.

As most bridges are located perpendicular to rivers turtles encounter bridges when moving up and down the river. The wood turtle reaches the bridge, is faced with maneuvering around the bridge, and sometimes climbs up and over the bridge and onto the road. In Nova Scotia, wood turtles are sometimes found crossing roads at this location.

The use of ATVs on gravel bars and beaches can impact nesting sites and using ATVs on the flood plains may impact foraging turtles.

TURTLES AS PETS

Most people are surprised to learn that small-scale local collection of wood turtles for pets can lead to significant population declines.

Wood turtles are sometimes collected by people for pets. The turtles are held captive for a short time and released in a different location. Although the turtles can survive in the new habitat they are lost from their breeding population. The life-history of turtles make them very vulnerable to reductions in large juveniles and adults, and it is these individuals that are usually collected. In 10 years, two populations of wood turtles in Connecticut declined by almost 100%, in part because the turtles were seemingly being captured for pets.

COMMERCIAL TURTLE TRADE

Notify NSDNR if you suspect illegal turtle collection in your area. The Nova Scotia Endangered Species Act (1998) prohibits the collection and disturbance of species at risk, and violators of this Act face potential fines.

Wood turtles are part of the international pet trade and declines in populations resulting from the pet trade have been reported in the United States. As such, the wood turtle was designated under the Convention for International Trade in Endangered Species (CITES). The protection provided by CITES is difficult to enforce, however, and black market trading continues. There is no evidence that the commercial pet trade in wood turtles is an issue in Nova Scotia. As populations in the United States are depleted, however, the pet trade may become a serious threat to wood turtles in this region.

PREDATORS AND WASTE DISPOSAL

Raccoons are the dominant predators on wood turtles in Nova Scotia. These animals coexist with humans, and both the distribution and abundance of raccoons has increased with increasing human activity. Raccoons, as well as skunks, crows and coyotes prey on turtle eggs, juveniles, and sometimes adults. Although adults often survive predatory attacks, they are sometimes injured, which can compromise their long term prospects for survival. Rates of predation increase in areas where food sources, like garbage, are available.

Garbage attracts unwelcome wildlife. Be responsible about waste and garbage disposal. Store waste in secure containers away from turtles and their predators.

CHANGES IN HABITAT

Nova Scotia has a long history of land use. Although current practices are considerably more sustainable than practices of the past, it is difficult to understand the cumulative effects of these changes. A description of three of the practices that may impact wood turtles follows:

1. FARMING

Researchers in Québec and elsewhere have found that agricultural development near wood turtle habitat has resulted in increased predation, reduced growth and recruitment, and increased death in adults. The majority of these conflicts with agriculture occur on flood plains. Death among adults resulted when turtles were struck by farm machinery (i.e. hay mowers) or when turtles were buried alive (i.e. plow). Some of these same factors are thought to be impacting wood turtles in Nova Scotia. As well, livestock can disturb nesting beaches and in areas where cribbing is used to stabilize riverbanks turtles often have low nesting success.

Ecological traps are created through the placement man-made structures such that turtles, their eggs, or young have increased likelihood of being harmed.

2. FORESTRY

Some forestry harvesting practices can change the hydrodynamics in an area for several years following harvesting. For example, clear cutting increases the amount of runoff into nearby streams and rivers. Although it only takes a few years before these sites are regenerated with young new trees, the short-term changes in water levels may result in a loss of wood turtle nests in flooded areas.

Examples of ecological traps include: man-made sand and/or gravel pits close to water courses with known wood turtle populations, as well as road abutments placed in the water causing turtles to cross the highway.

3. WATER COURSE ALTERATION

Similar to some forestry activities, road building, dams, power generators and other forms of water course alteration can also cause changes in water levels. These changes may result in loss of wood turtle clutches.

If you are engaging in any activities noted above that affect wood turtles or their habitat, be sure to contact the regional biologist in your area to learn how you can minimize negative impacts on turtles.

PART 4 - CONSERVATION OBJECTIVES

Objectives that need to be realized in order to reverse known threats to wood turtles and wood turtle habitat in Nova Scotia. Objectives are grouped into five categories: Research and Monitoring, Collecting and Sharing Information, Capacity Building, Stewardship and Education, and Habitat Management.

RESEARCH AND MONITORING

Objective: Increase the amount of information available for making good conservation and management decisions.

Encourage research on wood turtles.

Research should focus on estimating population size, age structure and demographic trends in watersheds with known wood turtle populations; as well as the genetic relations between said populations.

Encourage research on wood turtle habitat.

Research should focus on characterizing wood turtle habitat (i.e. basking, foraging, nesting, overwintering sites, movement corridors), identifying key habitats in each population, and changes in habitat availability and use.

Identify groups and foster involvement in wood turtle conservation through monitoring.

Groups may include, but are not limited to outdoor oriented groups like hunters and anglers, as well as environmental, youth, or other community groups.

COLLECTING AND SHARING INFORMATION

Objective: Develop, implement and make accessible a standardized protocol for data collection.

Adopt a protocol for capturing, handling and marking turtles.

Revise protocol currently in place for Blanding's turtles for wood turtles.

Develop data collection cards for use in the field.

Fields on the data card should include, but are not limited to: turtle behavior, capture method, habitat description, precise location, digital image of the plastron and carapace, length, width, sex and age. Data cards should be adapted for use with the NSDNR Wildlife Investigation Report Form and made available to individuals working on wood turtles.

A separate data card should be developed for the public that includes the species of turtle, when and where the turtle was seen, and habitat description.



A consistent method for collecting and recording data on wood turtles is needed. Here, a researcher weighs an adult wood turtle.

Photo: Mark Pulsifer

Objective: Maintain, validate, keep current and make accessible the Nova Scotia wood turtle database.

Continue developing a secure, unified database for the Nova Scotia population *For understanding long-term changes in wood turtle populations and habitat at the provincial scale, a single, integrated database is needed. This could be achieved by using a consistent data collection card and ensuring data collected is submitted to NSDNR in an appropriate form.*

Facilitate data access and use.

At present, the Nova Scotia wood turtle database is held jointly by Atlantic Canada Conservation Data Centre (ACCDC) and NSDNR. A range of users will require access to the database, including: faculty and student researchers, local decision makers, land owners, and the conservation community. Access should be made by formal requests through the ACCDC or NSDNR. Ensure users are responsible and data is used solely for conservation purposes.

CAPACITY BUILDING

Objective: Provide guidance to scientists wishing to incorporate wood turtle biology into their research.

Share information about the location of wood turtles and their habitat with faculty and student researchers.

Researchers may formerly request access to the Nova Scotia Wood Turtle data base through the ACCDC and NSDNR.

Scientists should make strides to integrate research with stewardship.

Research should focus on questions outlined in the Research and Monitoring section in areas of Nova Scotia with known wood turtle populations.

Objective: Where appropriate, encourage local community groups to incorporate wood turtle conservation issues into their mandate.

Inform and educate groups about the status of, and threats to, wood turtles. *Community groups should be informed of the presence of wood turtles in their area, threats to the wood turtle, and specific conservation actions needed.*

Community groups include naturalist organizations, outdoor groups like ATV users and anglers, as well as youth and other groups.

Provide community groups with educational resources on the wood turtle to distribute in the local community.

Objective: Work cooperatively with researchers, the public, government, and members of the conservation community to share information and ideas on wood turtle conservation.

STEWARDSHIP AND EDUCATION

Stewardship and education efforts should focus on three key groups: general public, local decision makers, and land owners.

Objective: Increase the knowledge of, appreciation of, and concern for the wood turtle and its habitat among the general public through the implementation of an education and outreach plan.

Develop education materials about the wood turtle.

Materials may include, but are not limited to posters, brochures, or a Web Site. These resources should be distributed to target audiences (e.g. naturalists, sportsman and outdoor recreation groups, community events, sports stores and schools). Educational materials should include an image and brief description of the wood turtle and its life history, and identify contact individuals/ organizations to report possible wood turtle sightings.

Use the news media effectively when conducting education and outreach.

The plight and conservation status of the wood turtle should be emphasized during public education and outreach efforts, along with current efforts in place to conserve the species. Reference should be made to education materials that are available through many agencies.

Objective: Provide guidance to local decision-makers who manage wood turtle habitat to ensure better protection of the species and its habitat.

Share information about the location of wood turtles and their habitat to local decision-makers.

Decisions which negatively affect the wood turtle are often made without knowledge that an area is important to the species. By providing decision-makers with the names of areas that are important to wood turtles, these individuals will be able to seek guidance from the NSDNR to avoid adverse affects when initiating development in these areas.

Guidelines for local decision makers and land-owners should include, but are not limited to: the types of land use that are not compatible with wood turtle habitat, the type of land use that is more compatible with wood turtle habitat, amount of upland buffer required, ways to engineer road crossings (and when to deny crossings), and how to manage run-off and water quality. Guidelines should be presented in a best management practice format to empower local decision-makers and land-users to make better choices.

When new development falls in areas that are important to wood turtles, provide decision-makers with guidance to ensure adverse affects are avoided. *Guidelines must be in place for local decision-makers to manage development and infrastructure improvements when the presence, or potential presence, of wood turtles is known.*

Objective: Inform land-owners who own and manage wood turtle habitat about the species and threats to its existence.

Inform and educate land-owners about wood turtles on their property.

Land owners should be advised of the presence of wood turtles on their property and site-specific threats to wood turtles and their habitat.

Provide land-owners with guidance on avoiding adverse effects to wood turtles.

When the presence of, or potential presence of, wood turtles is known, guidelines must be in place to manage wood turtle habitat so as not to adversely affect the species and its habitat.

Objective: Reduce the number of turtles that are injured or killed by vehicles on existing roads.

Identify areas where turtles are at risk from road mortality.

Develop road signage indicating high densities of turtles crossing roads and/or the presence of significant turtle nesting sites. Where appropriate, erect signs advising motorists of the possible presence of turtles.

Develop and deliver public outreach and education during May and June when turtles are most vulnerable to raise awareness of conservation concerns. *The Canadian Amphibian and Reptile Conservation Network (CARCNET) has produced communication materials that are available for use for this purpose. Please visit the website www.carcnet.ca for more information.*

HABITAT MANAGEMENT

Objective: Develop, adopt and apply management techniques in relevant areas to protect and/or enhance wood turtle habitat.

Foster dialogue with relevant agencies that have the potential to impact wood turtle habitat.

Provide management options and techniques for protecting and/or enhancing wood turtle habitat to relevant land owners and land users including agriculture, highways, forestry, etc.

Tools and technologies change and evolve over time. Provide decision makers and those who would alter wood turtle habitat with the latest approaches to mitigation and conservation.

LEGAL PROTECTION FOR WOOD TURTLES

Several legal tools exist to help protect wildlife species and their habitat. It is important that people are aware these tools and the enforcement community are available for use when there is a demonstrated need. These tools include:

- Nova Scotia Endangered Species Act (1998)
- Nova Scotia Wildlife Act (1991)
- Nova Scotia Environment Act
- Environmental Assessment Process

Turtles are protected. It is illegal to collect or disturb turtles.

PART 5 - BEST MANAGEMENT PRACTICES

Turtle-friendly advice for land owners and land users to use when working or recreating in wood turtle habitat.

WOOD TURTLES ON THE FLOOD PLAIN AND IN THE RIPARIAN ZONE

Temporary or seasonal lands that are flooded in spring or after periods of heavy rain are known as **flood plains**.

The transition zone between land and water is known as the **riparian zone**. The riparian zone borders the flood plain and streams, rivers, lakes, wetlands, or other areas where water is plentiful. These zones are belts or corridors of vegetation that parallel the water's edge.

The flood plain and riparian zones are extremely productive, and provide large quantities of forage for livestock and wildlife. These wet areas differ from drier upland areas because of the abundance of water and lush vegetation. These areas are often converted to agricultural land because they are so productive. Wood turtles are often found in riparian areas or on the flood plain; as a result interactions between people and turtles frequently occur in these areas.

Healthy streams, riparian areas and flood plains are important to wood turtles and provide clean water, livestock forage, fish and wildlife habitat, and recreational opportunities.

Most activities that increase the quality of fish habitat and water quality will also benefit wood turtles.

HEALTHY FLOOD PLAINS AND RIPARIAN ZONES PROVIDE MANY BENEFITS

- **Improve water quality** by trapping sediment and organic matter in the vegetation and filtering out nutrients and runoff containing pesticides, fertilizers, heavy metals or pollutants.
- Overhanging vegetation common in a healthy riparian zone **provides shade**, optimizing water temperatures for water-dwelling wildlife deep-rooted woody, overhanging vegetation.
- Thick riparian vegetation that thrives in a healthy riparian zone **reduces erosion and stabilizes streambanks**, further improving water quality.
- Acts like a sponge, increasing infiltration of water into the soil and **recharging ground water**.
- The flood plain and riparian area provides **habitat and travel corridors** for many different species of wildlife.

SIGNS OF DEGRADED RIPARIAN AREAS

- Increased flooding during peak periods and a decrease in seasonal flows.
- Presence of shallow rooted vegetation that is low in productivity; lack of deep-rooted woody, overhanging vegetation.
- A wide stream with shallow, muddy water.
- Exposed soil on the streambank and on the flood plain.
- Erosion of the streambank.
- Presence of exotic plant species and the absence of native vegetation.
- Absence of beavers.



Streambank erosion can occur when the riparian buffer is removed.
Photo: Mark Pulsifer



Riparian buffers offer many benefits to wood turtles and other wildlife.
Photo: Mark Pulsifer

WORKING IN WOOD TURTLE HABITAT

The following sections offer advice for working in wood turtle habitat, including: zoning, building new roads, waste and garbage disposal, and farming.

ZONING

Consider ways you can manage the land near water courses on your property to help protect wood turtles. Delineate zones on your land where traditional practices are restricted or limited.

*Try creating a **living fence** by densely planting trees and shrubs. Living fences are attractive and provide cover and habitat for wood turtles and other wildlife.*

- Leave adequate, permanent buffers of vegetation around important wood turtle habitat. If necessary, plant an appropriate mixture of shrubs and trees to create a buffer.
- Use fences to restrict livestock access to rivers and streams. Fences may also be used in other sensitive rivers and riparian areas.

WILDLIFE HABITAT AND WATER COURSES PROTECTION REGULATIONS

The Wildlife Habitat and Water Courses Protection Regulations of the Forests Act make guidelines for forestry operations mandatory on all lands, providing protection of water quality, biodiversity and wildlife habitat. These regulations were developed by NSDNR.

The regulations require that:

- Harvesters leave at least a 20 m strip of vegetation along water courses greater than 50 cm wide (some partial harvesting is permitted inside this special management zone).
- A specified number of trees are to be left standing in harvested areas. These **clumps** provide nesting areas and shelter for birds and other wildlife, as well as biodiversity protection.
- Harvesters leave dead trees standing and coarse woody debris to provide wildlife habitat and nutrients.

The Special Management Zone required under the Wildlife Habitat and Water Courses Protection Regulations provide some protection to wood turtles and wood turtle habitat in harvested areas in Nova Scotia.

For more information contact:

Nova Scotia Department of Natural Resources
www.gov.ns.ca/natr/forestry/strategy/

Your local DNR Regional Biologist is available to help you make good conservation decisions when working in wood turtle habitat.

USE THESE ZONING TOOLS TO MAKE YOUR PROPERTY WOOD TURTLE FRIENDLY:

BUFFER - an area of land including, and adjacent to, important habitat for wood turtles (nesting and foraging) where land use is restricted.

SPECIAL MANAGEMENT ZONE - an area of land established adjacent to a water course to protect the water course, wood turtles, and other wildlife habitat from the effects of management. The Special Management Zone is not intended to provide habitat for wood turtles, but to help maintain the integrity of the watercourse.

SPECIAL MANAGEMENT AREA - an area of land next to the Special Management Zone where special precautions are made by limiting and modifying traditional activities to protect important wood turtle habitat and other wildlife resources.

SAFE PATHS - If you plan to maintain access to the waters edge, establish safe paths for people to travel on. Keep these narrow paths well away from known turtle nesting sites, and create paths on hard terrain to prevent erosion.



A riparian buffer along a water way. Riparian areas provide important habitat for wood turtles.

Photo: Mark Pulsifer

BUILDING NEW ROADS AND WATER CROSSINGS

The Nova Scotia Department of the Environment is responsible for authorizing permits for activities that will alter a watercourse. Some of these activities include: diverting a watercourse, building a pond, enhancing a beach, or building a bridge. To determine if your proposed activities requires approval from the Department of the Environment, see the Activities Designation Regulations.

If you plan to build new roads or install water crossings on your property be sure to obtain a permit and follow the guidelines provided by the Department of the Environment. Also, when planning your new roads or water crossings avoid areas that are important to wood turtles.

- Plan permanent and temporary roads and water crossings in advance to help prevent turtle mortality and protect water quality.
- Identify, and avoid, sensitive wood turtle habitat sites (e.g. nesting areas) when building new roads and water crossings.
- Minimize the amount of road that linearly parallels a water course.
- Build new roads away from wood turtle streams and rivers, maintaining stream buffers and special management areas.
- Never build roads below the high water mark of streams and rivers.
- Always build bridges with their abutments out of the streambed and on firm shorelines with adequate setbacks from the water.



Where appropriate, erect signs on roads advising motorists of the potential presence of turtles.

WASTE AND GARBAGE DISPOSAL

Reduce, reuse and recycle

Gravel bars and sandy shores on rivers and streams can provide recreational opportunities for people; these areas can also provide important nesting habitat for wood turtles. When waste and garbage are not properly disposed of in these areas, predators like raccoons, crows, foxes, ravens and skunks may be attracted to turtle nesting areas.

- Dispose of waste in designated areas away from known turtle habitat.
- Store all waste and garbage in secure containers to deter scavengers.
- Transport garbage to a nearby waste management facility weekly.

FARMING ON THE FLOOD PLAIN

There are some easy things you can do to help wood turtles on your property:

LEARN about the wood turtles and other wildlife that share your land. Specifically, watch the turtles and learn what areas they are using for nesting, basking and foraging.

Ask your local NSDNR Regional Biologist to walk your property with you to point out potential wood turtle habitat.

VISIT YOUR LOCAL LIBRARY or contact the regional biologist in your area to get more information. Your new knowledge will help you to make better management decisions that benefit wood turtles.

PLAN ways to make your land more wood-turtle friendly. See the examples below for ideas.

LOOK FOR HELP implementing your plans from local community, youth or school groups. Many groups would welcome the opportunity to spend the day working to help wood turtles and other wildlife. Get help building a fence, creating a safe path or planting a buffer.

WOOD TURTLE FRIENDLY FARMING

- Time your work through the seasons of the year to reduce the probability of accidentally harming wood turtles or their habitat.
- Do not disturb turtles during the nesting season (June 10-30).
- Raise the blades of hay mowers to help avoid injuring or mutilating wood turtles.
- Fence all areas used by wood turtles and restrict livestock access in these areas.
- Create alternate locations where livestock have access to water. By pumping water to designated troughs you will reduce the number of potentially harmful interactions between wood turtles and livestock.

NOVA SCOTIA ENVIRONMENTAL FARM PLAN PROGRAM

The Environmental Farm Plan (EFP) Program is a simple, voluntary program that helps farmers identify and assess environmental risk, like species at risk, on their land. The EFP allows farmers to include environmental considerations into their everyday business decisions at no cost. Farmers work with the EFP Program Coordinator to develop an EFP for their operation.

The EFP is designed to assist farmers to evaluate and rate current farm practices and farmstead characteristics. This assessment will identify areas of concern and offer solutions to enable farmers to meet or exceed recommended standards. By developing an EFP farmers are taking a pro-active step for their farms wealth and for the environment in Nova Scotia.

For more information contact:

Nova Scotia Federation of Agriculture 902-863-2293

Nova Scotia Department of Agriculture and Fisheries 902-424-4560

BE CREATIVE WHEN THINKING OF WAYS TO PROTECT WILDLIFE ON YOUR PROPERTY

For example, the flushing bar was invented to reduce the number of birds killed during harvesting. The bar is attached to the front of the mower, hung by a series of chains. The bar drags ahead of the mower to flush birds off their nests before the mower reaches them. Although nests may be lost, studies show up to 90 percent of birds can be saved using this innovative technique.



USEFUL RESOURCES

WEB SITES

Committee on the Status of Endangered Wildlife in Canada (COSEWIC) - www.cosewic.gc.ca

Wild Species 2000 - The General Status of Species in Canada - www.wildspecies.ca

Nova Scotia Department of Natural Resources, Wildlife Division - www.gov.ns.ca/natr/wildlife

Nova Scotia Museum of Natural History - www.museum.gov.ns.ca/mnh/

Nova Scotia Herpetofaunal Atlas - landscape.acadiau.ca/herpatlas/

WoodTurtle.com - www.woodturtle.com

PUBLICATIONS

Adams, J.D., and T.B. Herman. 2002. An evaluation of wood turtle (*Clemmys insculpta* Leconte) distribution in Nova Scotia through public surveys. In prep.

Adams, J.D. 2002. Population assessment of wood turtle (*Clemmys insculpta*) in the Aspy River Valley. Unpublished report. Cape Breton Highlands National Park, Ingonish Beach, NS.

Adams, J.D. 2002. An evaluation of wood turtle distribution in the northern Cape Breton ecosystem using traditional ecological knowledge. Unpublished report. Cape Breton Highlands National Park, Ingonish Beach, NS.

Arvisais, M., J.C., Bourgeois, E. Levesque, C. Daigle, D. Masse, and J. Jutras. 2002. Home range and movement of a wood turtle (*Clemmys insculpta*) population at the northern limit of its range. *Canadian Journal of Zoology* 80:402-408.

Carroll, T. E. and D. W. Ehrenfeld. 1978. Intermediate-range homing in the wood turtle, *Clemmys insculpta*. *Copeia* 1978(1): 117-126.

Ernst, C.H. 1986. Environmental temperatures and activities in the wood turtle, *Clemmys insculpta*. *Journal of Herpetology* 20:222-229.

Ernst, C. H., R. W. Barbour, and J. E. Lovich. 1994. *Turtles of the United States and Canada*. Smithsonian Institution Press, Washington, D.C. xxxviii + 578 pp.

- Gilhen, J. 1984. Amphibians and Reptiles of Nova Scotia. Nova Scotia Museum, Halifax, NS.
- Kaufmann, J. H. 1992. Habitat use by wood turtles in central Pennsylvania. *J. Herpetol.* 26:315-321.
- Kaufmann, J. H. 1995. Home ranges and movements of wood turtles, *CLEMMYS INSCULPTA*, in central Pennsylvania. *Copeia* 1995:22-27.
- Litzgus, J.D., and Brooks, R.J. 1996. Status of the wood turtle, *Clemmys insculpta* in Canada. Status assigned by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). Canadian Wildlife Federation, Kanata, Ont.
- McCurdy, D.G. 1995. Orientation and movement patterns of reciprocally transplanted wood turtles (*Clemmys insculpta* Leconte) in Northeastern Nova Scotia. BSc Thesis, Acadia University.
- Quinn, N. W. S., and D. P. Tate. 1991. Seasonal movements and habitat of wood turtles (*CLEMMYS INSCULPTA*) in Algonquin Park, Canada. *J. Herpetol.* 25:217-220.
- Saumure, R. A., and J. R. Bider. 1998. Impact of agricultural development on a population of wood turtles (*CLEMMYS INSCULPTA*) in southern Quebec, Canada. *Chelonian Conservation and Biology* 3:37-45.
- Smith, K. 2000. Demography and home ranges of wood turtles, *Clemmys insculpta*, in Algonquin Park, Ont. Vol 4(1), Canadian Amphibian and Reptile Conservation Network, Quebec, Que. p6.
- Strang, C. A. 1983. Spatial and temporal activity patterns in two terrestrial turtles. *J. Herpetol.* 17:43-47.
- Thompson, F. G. 1953. Further evidence of the occurrence of the wood turtle, *Clemmys insculpta* (Le Conte) in northeastern Ohio. *Herpetologica* 9:74.
- Walde, A. 1998. Ecology of the wood turtle, *Clemmys insculpta*, Quebec, Canada. MSc Thesis. McGill University, Montreal Que.