

TURTLE NESTS-ROAD SHOULDER MAINTENANCE BEST MANAGEMENT PRACTICES

A Guide for Municipalities

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Note as of April 2019:

References within this guide have changed:

The following document was prepared prior to changes to the responsible authorities for Species at Risk of the Ontario Ministry of Natural Resources (OMNR). The OMNR is now no longer responsible for Species at Risk Management and alternative branches or contacts within the government may or may not be set up as responsible agents in the coming months.

This guide was also written prior to proposals by Premier Doug Ford, to alter significantly the Endangered Species Act and other environmental protections within other legislations to favour development and short term economic gain over long-term biodiversity and maintenance of essential ecosystem services that support human health.

INTRODUCTION

This manual provides baseline considerations to mitigate and/or to reduce harm specifically to the nesting habitat sites of turtles at risk from routine municipal road maintenance activities which take place on or impact road shoulders specifically, such as grading, spraying, culvert replacement etc. However, this guide also touches on other aspects of routine road maintenance, as all road maintenance involves heavy equipment or vehicles which may compact nest sites on road shoulders or which pose other indirect risks to turtle nest sites. In addition to providing guidance for turtle nest protection, this guide touches on adult species of herpetiles and their protection, and provides some consideration for major road works.

This document therefore aims to assist in species conservation and recovery, but also to assist in observance of the Endangered Species Act (2007), and also in reducing costs and improving efficiencies for road maintenance. This manual provides information, tools and decision considerations which support determinations as well as the implementation of due diligence.

This document is a “living” work that may be edited or added to over time as new expertise, information emerges, and as the body of scientific and community-based knowledge regarding turtle biology and species at risk stewardship is advanced.

This manual fills a niche in road maintenance practices in order to refine and complement existing standards and frameworks that are available to support mitigation of herpetiles at risk such as:

- *MTO Best Management Practices Manual for Species at Risk Protection during Highway Maintenance Activities (currently draft);*
- *MNRF Best Management Practices for Mitigating the Effects of Roads on Amphibian and Reptile Species at Risk in Ontario;*
- *Best Management Practices for Public Works Department working within the Georgian Bay Biosphere Reserve. Georgian Bay Biosphere Reserve;*
- *The District of Muskoka’s Special Provisions Operational Constraints for the Environment; and*
- *Pembroke District OMNRF Guidelines for Turtle Mitigation for Road and Highway Projects.*

SPECIES AT RISK LEGISLATION AND MANAGEMENT

The level of risk to the subsistence of a species’ population is determined in Ontario by the Committee on the Status of Species at Risk in Ontario (COSSARO). The committee is an independent body that regularly reviews the status of species in Ontario. .

Species are placed in categories of risk:

- **Extirpated** species were historically found in the wild, but no longer live in the wild in Ontario
- **Endangered** species face imminent extinction or extirpation
- **Threatened** species are likely to become endangered if steps are not taken to conserve and protect the species
- Species of **Special Concern** are those which may face increasing risk to their populations because of biological characteristics and other identified threats¹

In 2007, the Endangered Species Act (ESA) came into effect in Ontario and which provides measures of protection for species at risk. Under subsection 9(6) it states that a member of a protected species is protected at any stage of its development. In addition, as part of the legislation, when species are listed as Endangered or Threatened, they as well as their “general habitat” are automatically protected.

“General habitat” is an area on which a species depends, directly or indirectly, to carry out its life processes. This includes places that are used by the species as dens, nests, hibernacula or other residences.

General habitat descriptions are technical, science-based documents that provide greater clarity on the area of habitat protected for a species. They have been developed for some of the species that are most likely to be affected by human activity.

Specific habitat is regulated under the ESA, after it is identified under a recovery strategy and receives a government response statement.

The Ministry of Natural Resources and Forestry (“MNR” or “the Ministry”) first and foremost encourages people to look for opportunities to carry out their activities in ways that will avoid any adverse effects on a species at risk or its habitat. However, where specific legislated requirements are met, the ESA enables the Minister the discretion to grant different types of permits or other authorizations allowing a person to engage in an activity that would otherwise be prohibited by Section 9 of the Act³. A person who carries out an activity that results in the killing, harming, harassing, capturing or taking of a protected species, without appropriate authorization under the ESA, may be prosecuted under clause 9(1)(a).

DETERMINATIONS IN APPLYING BMP'S

Natural resource management in north America adopts the precautionary principle, which directs resource managers to apply a conservation ethic and to err on the side of caution with regards to any activity that may harm wildlife, and especially where there is limited data, information, or understanding of the species, habitat, natural features and/or of the impacts of the proposed activities on these resources.

The Policy Guidance on Harm and Harass under the Endangered Species Act (August 2014) provides concrete direction specifically for the implementation of clause **9(1)(a) of the ESA** that states that “No person shall kill, harm, harass, capture or take a living member of a species that is listed on the Species at Risk in Ontario List as an extirpated, endangered or threatened species.”

“A risk-management approach is incorporated in determining whether an activity is likely to kill, harm or harass a member of a species at risk. In some cases, there will be a moderate to high level of understanding of the biology of a species at risk, and the effects a proposed activity will have on living members of that species. In others, the level of understanding will be very limited...In specific cases where the anticipated effects of an activity on a member of a protected species cannot be predicted with reasonable confidence, determinations will generally err on the side of caution in favour of affording greater protection to the species. Decisions must be informed by the details of the activity, and the biology and behaviour of the species.”

Further it states under s 4.3 “An adaptive management approach is key to implementing the ESA and its related policies and guidance. Knowledge and information gained through research and monitoring activities improves the understanding of species at risk, their needs, and the effects of various human activities on them. As our collective understanding grows, future approaches, guidance and decisions for protecting and recovering species at risk will be adapted accordingly.”

Finally, s 4.4 states that “Determining whether an activity is likely to kill, harm, or harass a member of a protected species, will require consideration of whether there is evidence to suggest that a member of a protected species is likely to be present when the activity is taking place. Consideration is also required as to whether a member of a protected species is likely to be adversely affected by any delayed effects of the activity in some cases, alternate approaches to the activity may be adopted to avoid adverse effects on a protected species. These alternatives typically include:

- Modifying the timing of the activity to avoid critical periods in a species’ life processes;
- Altering the methodology of an activity to avoid adverse effects; or,
- Relocating the activity to an area where the members of a protected species do not occur.

TURTLE BIOLOGY AND CONSERVATION

Turtles play an essential role in our ecosystems and food webs; they are responsible for keeping fresh water ecosystems clean as well as maintaining healthy soils and plants. Turtles are scavengers that feed on dead and decaying matter in lakes, rivers, ponds and wetlands. Therefore, they remove potentially harmful bacteria and viruses from fresh water, and in doing so they also reduce the biological oxygen demand (BOD) within the water column that otherwise reduces the overall available oxygen and water quality.

Turtles have an important cultural and spiritual role in the world and here in North America: just as water is likened to emotions, the cleaning of water performed by turtles are likened to, according to First Nation’s, the cleaning of our “old emotional baggage” or our old and former selves. Turtle spirit medicine is the freeing of us from old outmoded and pent up emotions. In addition, the North American creation stories recount that the Creator created the world on the turtle’s back. Thus to First Nations, North America is known as Turtle Island. Aligned then, is that each turtle has 13 scutes or triangular portions on its shell that correspond to the 13 moons in a year, and each turtle has 28 ridges surrounding its shell, which correspond to the 28 days between moons.

Turtles live for a long time and likely, for the larger species such as Snapping Turtles up to 250 years old or more.² The long-lived nature of the species is commiserate with the need to recruit successful offspring, and with all turtles, recruitment levels are extremely low. In fact, successful recruitment for Snapping turtles in Algonquin park is estimated at a mere 0.01%³. Also, it is generally known that an average of 80 years of nesting activity is required to produce 1 successful offspring⁴. This low recruitment is exacerbated by late sexual maturity of female turtles, where some species need to reach between the ages of 10 and 25 years before they can begin reproduction⁵. Nest success is then dependant on many factors including temperature, which when too low prohibit turtles from hatching, and if slightly too cool, all hatchlings will be male⁶; and on predation where racoons, skunks, foxes, and other animals will prey on and destroy nests. More recently road maintenance and road vehicles or

traffic pose threats to nests by crushing, compacting or otherwise sealing nest sites and preventing young from incubating, hatching or emerging.

Finally, should hatchlings emerge from nests successfully, a whole suite of new threats face the species: Predators of blue jays, crows, ravens etc. will prey on the young, and if reaching water within season, bass and other fish species also devour young. It has been discovered that many hatchlings will return to nest sites or remain in nest sites and overwinter before emerging in the spring. This overwintering then exposes hatchlings to additional threats including road maintenance, traffic, and changes that reduce moisture levels of nest sites to expose turtles to increased risk of freezing^{6,7}.

Road mortality of adult turtles is a significant contributor to the low population levels and the inability of the populations to rebound⁸. The majority of turtles at 61% that are killed on roads tend to be females on their way to nesting sites, so that the mature turtles in ponds are predominately male⁹. Therefore, current scientific evidence suggests that despite efforts to assess and recover populations, because of the low recruitment levels of turtles coupled with the high turtle mortality, most turtles are already beyond levels where populations can be recovered to sustainable levels⁹.

Despite these bleak conditions, it is imperative that collectively all possible mitigating actions are taken to protect and to recover these and other species at risk.

TURTLES AT RISK IN THE LAND BETWEEN

The Land Between region extends across central Ontario from Georgian Bay to the Frontenac Arch and skirting the Algonquin Dome and includes the large portions of 9 municipalities of: North Simcoe, District of Muskoka, southern Parry Sound, Haliburton, City of Kawartha Lakes, North Peterborough, Hastings, Lennox-Addington, and Frontenac. There are eight turtle species in Ontario. Seven are found in The Land Between region, of which six are at risk:

- Wood Turtle (*Glyptemys insculpta*): **Endangered**
- Spotted Turtle (*Clemmys guttata*): **Endangered**
- Blanding's Turtle (*Emydoidea blandingii*): **Threatened**
- Northern Map Turtle (*Graptemys geographica*): **Special Concern**
- Snapping Turtle (*Chelydra serpentina*): **Special Concern**
- Stinkpot/Eastern Musk Turtle (*Sternotherus odoratus*): **Special Concern**
- Painted Turtle (*Chrysemys picta*): **Not at Risk**

To find out more about turtle identification see Ontario Nature's Reptile and Amphibian Atlas Field Guide: https://www.ontarionature.org/protect/species/reptiles_and_amphibians/index.php

Or the Toronto Zoo's Turtle Tally and Adopt a Pond programs resource guides: <http://www.torontozoo.com/adoptapond/turtles.asp>

TURTLE BEHAVIOUR

Turtles travel to nest sites following the same patterns annually and do not veer very far off their annual migration course, rarely moving more than 15m within annual travel routes, even when those routes may be across several road and highways and extending long distances of more than 60km¹¹

Turtle activity on roads will begin for some at risk species, as early in the season as the middle of April. After the ice melts turtles begin emerging from hibernation. Turtles crossing and on roads at this time will include: turtles seeking basking areas to support their metabolic processes; males moving from wetland areas to reach new breeding sites; newly gravid females moving towards nesting areas; and rarely, but also notably, newly emerged hatchlings that have overwintered in nest sites and which are seeking aquatic habitats and food sources.

After this early activity, and towards June and onwards, the majority of turtles on roads will be females attempting to reach nesting sites or actively nesting.¹⁰

Therefore, the threat of road mortality for live turtles is pronounced from late April through to October. Moreover, during these times, contractors should be aware of turtles on roads, and prepared to identify and report turtle occurrences as well as mitigate impacts to live turtles by moving turtles safely off roads in the direction they are heading, or leaving nesting turtles to complete their laying.



TURTLE NESTING



Turtles typically begin active nesting in mid to late May towards July. However, some turtles have been known to double-clutch (lay two nests over the course of the summer months) and therefore, although quite rare, nesting may take place as late as August.

Turtles may return to the nesting site many times before completing the nesting process, and this course may take many days. In addition, once the female is actively depositing eggs, the active nesting may take many hours to complete.

While there are six turtles at risk within the region presently, only four of these are known to travel distances from aquatic habitats in order to reach nest sites, and then three of these are likely to utilize unpaved road shoulders preferring gravel and sand substrates to natural woody debris. Therefore, both turtles found on road shoulders, and nests within road shoulders are usually of Blanding's, Snapping, and the not-at-risk Painted Turtle. Rarely, but with a few records, both the Northern Map and Spotted turtle, have been seen on roads, and they are highly unlikely to utilize roads for nest sites. There are almost no records of the Endangered Wood turtle or the at risk Eastern Musk turtle on roads in the region.

TURTLE NESTING BIOLOGY AND HABITAT CHART- THE LAND BETWEEN REGION^{12,13, 14}

Species	Age of Sexual Maturity	Nesting Substrate	Active Nesting	average # of eggs	Egg incubation period	Upland Mobility rating	Likelihood of road shoulder nesting
Northern Map Turtle	10- 12 years	sandy, open area close to water	June - July	10 to 17	~75 days	Low-Med	Low-Med
Musk or Stinkpot Turtle	3-7 years	waters edge under leaves or debris, or on rocks	May - early June	3 to 6	60 to 84 days	Low	Very Low
Blanding's	14-20 years	open areas, sandy/ soil/ soft gravel or cobble	late May- June	5 to 15	45 to 80 days	Med-High	Med-High
Wood Turtle	17-18 years	open areas, sandy, soft gravel by rivers	late May- June	5 to 15	47 to 69 days	Med-High	Low

Painted Turtle	7-16 years	soft, sandy soil	June	4 to 16	72 to 76 days	High	High
Snapping Turtle	15 to 20 years	open area, sandy, soft gravel	June- July	40 to 50	63 to 126 days	High	High
Spotted Turtle	7 to 10 years	wooded areas, soft soil, leaf litter (close to wetland)	June	1 to 5	60 to 125 days	Low-Med	Very low

Note: While the majority of turtle nests will hatch out and hatchlings, although disoriented, will vacate the immediate areas in search of water and food sources by October, some species such as Blanding’s and Painted turtle have been known to remain or return to the nest sites and overwinter, only emerging the following spring in April/early May.

UNDERSTANDING AND IDENTIFYING TURTLE NESTING SITES

Identifying a turtle nest is extremely difficult unless the nests are already predated or unless one observes where nesting activity occurred.

Most often turtle nests are recognized at a site after being excavated by small mammals; small open depressions in the soil and the presence of soft white shell remnants, which are often curled and empty, are what remain of predated nests.

Beyond those destroyed nest sites, or direct observations, cumulative suggestive clues may be used to assess potential nesting sites:



- Turtles may create several dummy nests, digging out small holes and then filling them in. This behaviour may be a means of testing site conditions or may be attempts to disguise the true nest site from the multitude of predators. Therefore, the presence of many small depressions within close proximity of one another with the substrate, or too, similar evidence of disturbances in the soil are suggestive of nests.



- In addition, the type of substrate as well as the location of the substrate, although not reliable, are determining factors for turtle nesting. Areas containing mixed sand and even with significant gravel are preferred nesting material for many turtles (Snapping, Blanding's, Wood, Northern Map and Painted turtles). Add to this, the presence of these substrates when close to or adjacent to wetland and aquatic areas, and candidate nesting sites can be determined. Therefore, unpaved road shoulders provide ideal nesting sites for these turtle species.



- Finally, and unfortunately, the presence of turtle shell fragments (thin arched bone pieces) resulting from road kills may add some additional support to the previous evidence when locating nesting areas.



REGULAR ROAD MAINTENANCE ACTIVITIES

Many activities are involved in typical County road maintenance and which may be minor, singular, or larger activities involving earth works and other heavy equipment applications of:

- filling cracks and potholes,
- installing signs,
- repairing or installing guard rails
- road painting,
- applying dust suppressants and road salts,
- grading shoulders,
- ditching and ditch clean outs,
- tree removal and vegetation control,
- beaver dam removal etc.
- Maintenance can also include larger earth works including erosion control, culvert replacement, bridge maintenance etc.

While some activities have the potential to directly impact turtle nest sites such as road grading or earth works, all road maintenance activities, even filling of cracks and installing signs, although not interfering directly with turtle nest sites, have the potential to harm turtle nest sites simply by driving of road maintenance vehicles and other heavy equipment on unpaved shoulders.

While this BMP guide attempts to address potential harm for most standard activities, it is recommended that the provincial standard of 1.5m wide paved shoulders is applied where feasible. Paving of road shoulders, although requiring significant initial capital investment, when completed, would deter turtle nesting and alleviate a majority of threats posed by regular and standard road maintenance. In addition, paved shoulders frequently increase tourism, health, and recreation within municipalities as being used by cyclists, runners, etc.

Another solution to limit use of shoulders by turtles for nesting is to vegetate shoulders with low-lying native ground covers and grasses because turtle will not nest as readily on vegetated road shoulders.

MAPPING AND MODELING POTENTIAL NEST SITES

Data available to identify turtles and turtle nest sites has many limitations: The data is incomplete for several reasons:

- Not all data is reported to central clearing houses such as the NHIC, or regional clearing houses that share their data to the NHIC;
- Information captured in data does not always indicate if a turtle was nesting;
- There is no comprehensive and stand-alone database for turtle nest sites;
- Turtle nest reports generally do not include species type; therefore only where turtle nesting activity is witnessed and reported can the determination of both nest sites and risk category be made.

Therefore, the mapping of turtle nest sites is difficult, so often it is rather potential nesting sites that are modeled according to criteria below. Mapping can support the exercise of applying **timing**

windows (see definition under BMP section) for road maintenance activities, and is rather helpful in identifying areas requiring greater scrutiny during the in-field reconnaissance:

- Turtle occurrence records of hatchling or adult turtles that were found immediately adjacent to roadways are used as precursors to potential nesting activity (within a 20m buffer to account for road width with variations in data accuracy);
- The presence of turtle species were classified by ascending gradation of colour to correspond to ascending levels of risk which the species faces - and therefore which correspond to the legislative requirements for mitigation and protection, which are of a higher level of priority, and therefore too, which correspond the increasing need for caution. For example, yellow hues were chosen for areas harboring species that are not at risk, orange for those of Special Concern, and red was chosen for areas with species listed under Schedule 1 of the ESA and are Threatened or Endangered. Red areas require heightened caution and are areas of higher priority for protection under the legislation;
- Any known nesting sites are demarked with symbology;
- Although the presence of wetlands near roadways do not absolutely mean that the adjacent road shoulders are nesting sites, they are one of a few indicators of possible nesting. Therefore, wetland habitats adjacent to roads and with recorded occurrences of turtles have been included in mapping in order to provide another measure for consideration in the likelihood of nesting areas and therefore for road maintenance activities.

Therefore, while uncertainty exists for where turtles nest, the application of timing windows to a mapping and modeling exercise can be a first step in supporting the application of the precautionary principle in managing species at risk turtles.

New occurrence reports from road crews and members of the public that are shared with the NHIC, and regional NGO groups that have partnered or worked with road departments, will continually inform the application of timing windows, contributing information to where turtles nest. Mapping, therefore, should be revisited annually to measure change and to indicate important areas for mitigation.

BEST MANAGEMENT GUIDELINES FOR MITIGATING HARM TO TURTLE NEST SITES

TIMING AND CAUTION WINDOWS FOR MITIGATING HARM TO TURTLE NEST SITES IN CENTRAL ONTARIO

Timing windows are designated timelines when road maintenance activities can occur.

Timing caution windows for all maintenance activities directly affecting unpaved road shoulders is **between October 15th to May 20th**

Turtles in this region of Ontario will begin nesting in June and most hatchlings will fully emerge from nests by October. Due to new evidence that some species of turtle hatchlings may overwinter in nest sites and exit in the spring, the potential to impact active nest sites may exist in areas for almost the entire year, from late May or early June through to the following May. This only leaves a small window for some routine road-maintenance activities. However, the likelihood of the presence and of encountering an active nest beyond October is rare, and this likelihood is understood as being mainly in areas immediately adjacent to aquatic habitats. Therefore, the timing windows assigned for road

maintenance activities, which may affect nest sites, is identified to reflect these reasonable expectations, and not to place undue restrictions on activities.

Caution should be applied at all times on road shoulders, in all mapped potential and actual nesting areas, and including in areas adjacent to aquatic habitats. Caution should always involve site inspections/reconnaissance before commencing immediately before any road works, and should include alertness despite timing windows. This attention and inspection is applied recognizing the potential for new data and evidence of Threatened and Endangered species nest sites to be found, of overwintering nests, second clutches, or other changes due to alterations or climate change affects that would result in active turtle nests being present.

BEST MANAGEMENT GUIDELINES

MANAGEMENT GUIDLELINES

- Road maintenance departments should check with the partnered NGO or NHIC (district MNRF SAR biologist) and use the most up to date maps to prioritize areas with verified and potential risk sites. All high priority areas/areas of heightened caution and therefore which harbor actual or potential nests of Threatened and Endangered species, should be flagged in mapping and, if possible on the ground. Too any nests should be marked in mapping and on the ground.
- As the presence of a nest may not be verified or denied during the works, it is recommended that surveys be conducted in early spring and summer for areas where works are to occur in order to ascertain more information and locations of turtle nests. This recommendation is at the discretion of the road department and should be made considering the level of priority species within the area;
- Site inspections/reconnaissance immediately prior to works should be conducted by qualified persons irrespective of mapping and priorities identified in mapping;
- At all times, special attention should be given to the impacts on nests caused by driving road maintenance vehicles on unpaved road shoulders. Traffic on shoulders compacts nests, limits egress (the ability of hatchlings to exit the nest site), and can destroy or suffocate eggs and juvenile turtles. Traffic should be limited to timing windows but especially in all known and high priority potential nest areas;
- Minor road maintenance and repairs that do not directly affect road shoulders (pothole and crack filling, guard rail repairs etc.) can occur at any time outside of timing windows, however maintenance vehicles and heavy equipment will make meaningful attempts to avoid all notable nesting areas, and will otherwise always apply low speeds to reduce compression on shoulders.

GUIDELINES FOR NOTABLE AREAS

High priority areas/areas of heightened caution are those road shoulder segments that harbor or may harbor nests of **Threatened and Endangered Species**.

- No routine grading or road spraying should occur in these areas at any time.
- If the need for grading is dire to impact human safety and road integrity, grading can occur during timing windows.
- Timing windows should be applied to all other activities within 150m of these areas.
- Heightened caution should be applied in these areas at all times.
- Special attention should be given to any earth works even during timing windows that may disrupt overwintering nests (see Details for Maintenance Specific Guidelines)

Significant areas are those harboring potential or actual nests of **Species of Special Concern**, and secondarily areas where **turtles that are not at risk** may be nesting.

- In these areas, timing windows are optional in support of conservation, as they are not necessitated by legislative requirements
- Grading and road spraying is not recommended in these areas, however, if enacted, grading and spraying should be applied with caution and during timing windows.
- Caution should be applied within 150m of these sites at all times (recognizing too that data is often incomplete and new evidence may be found of Threatened or Endangered species).

Important areas are those areas without records of turtles or nesting activity, yet where unpaved road shoulders abut or are adjacent to aquatic habitats of rivers, lakes, ponds or wetlands.

- Caution should be applied within 150m of these areas and which includes a site inspection/site reconnaissance before commencing works

DETAILS FOR MAINTENANCE SPECIFIC GUIDELINES:

Shoulder Grading

No grading should occur in high priority or significant areas at any time if possible. Within timing windows if the requirement for grading is dire, caution and alertness should be applied within 150m of the areas, and road vehicles and equipment will maintain low speeds.

Vegetation Management/Dust Suppression/Road Spraying

No dust spraying, or applying herbicides or pesticides should occur in high priority, significant or notable areas at any time if possible, but can be applied with caution within timing windows and keeping the 150m buffer from aquatic habitats.

Sprays and applications should be limited to only those that are known to be environmentally safe, and therefore broad-spectrum herbicides used in vegetation management which are known to harm other species indiscriminately and which may bio-accumulate should be limited.

Additionally, although primarily used in winter, brines not only cause immediate severe corrosion of vehicles, cause detriment to aquatic habitats and other vegetation, but also may seep into overwintering nest sites or encrust nests in turn harming juvenile turtles.

Where possible simple mechanical maintenance of vegetation is recommended.

The use of alkaline applications such as calcium are effective means for traction on the ice and which actually support aquatic habitats instead of harming them.

Earth Works: Culvert Replacement/Bridge Maintenance/Erosion control applications

At all times, special attention shall be given to those areas immediately adjacent to aquatic areas during earth works which alter the structure of the substrate, which may reduce moisture in soils, or which place new fill materials on site. New fill has the potential of smothering nest sites. Earth movement and excavations have the potential to unearth and disturb nest sites and reduce moisture of nests, including overwintering nests. At all times, but also outside of timing windows, crews should be prepared to apply recovery actions of relocating nests. If earth works and erosion control are required to abate threats to human safety, see section on Special Circumstances.

Ditching and Ditch Clean Out/Bear Dam Removal/Drawdowns

See Special Circumstances for beaver dam removal or ditch clean outs which actions are necessary to secure human safety.

Drawdowns (the draining of waters or altering water channels to reduce water levels) that occur to facilitate road maintenance, and not as a result of potential flooding such as with beaver dams, and ditching or ditch clean outs when issues do not threaten human safety, should consider the potential for overwintering nest sites. Drawdowns often occur in the same areas as existing and/or potential nest sites and therefore in areas that potentially harbor overwintering nest sites. Therefore, consideration beyond standard timing windows should be given to the priority of the site (Threatened or Endangered turtles are known to be in the area).

Care should be taken not to place excess materials from clean outs on nesting habitat areas (sand and gravel shoulders).

Immediately transfer any materials from clean outs or sand piles to storage or disposal facilities. Sand piles on site may attract gravid female turtles, becoming nesting areas. Care should be taken when moving any sand piles outside of timing windows.

As these works have the potential to reveal live nests, crewmembers should be prepared to apply recovery activities of hospitalizing and incubating live hatchlings or relocating nests to new areas.

In the very rare case that overwintering nests are discovered or known to be at the site, a special permit should be sought from OMNRF for the works.

Minor singular maintenance (pothole and crack patching, road sweeping, pavement line markings, installation and maintenance of signs, guide rail repair, fence repair etc.)

Often these activities do not directly affect nest sites. Instead it is the presence of road crew vehicles and other heavy equipment where potential harm to nests exists through compaction and traffic. Care at all times, but especially during the nesting period (outside of the timing windows) should be taken

to avoid parking and driving on unpaved road shoulders within 150m of identified nesting areas, and within 150m of aquatic habitats, which may contain uncharted nest sites.

SPECIAL CIRCUMSTANCES- MAINTENACE SCENARIOS

Human Safety:

When timing of repairs and maintenance needs extend beyond allowable limits of timing windows, such as beaver dam removal or undercutting of road banks etc., the works should only proceed with special permits issued by and in consultation with OMNRF biologists, and with preparedness to apply immediate recovery actions.

Cumulative impacts/Costs:

When costs of maintenance will increase due to requirement to extend operations beyond timing windows, or the maintenance issue will be exacerbated, proceed only after evaluation by OMNRF biologist and with permit issued. The presence of any known Threatened and Endangered species as well as assessment of potential recovery actions needed should be included in the evaluation of permissions to proceed.

Therefore, where maintenance is required outside of timing windows and is needed to reduce risks to humans, or where road stability is required so as to limit excessive burden of repair or costs, direction should be sought from OMNRF on proceeding and in preparedness and for applying mitigating measures.

ON SITE/FIELD WORK PRACTICES

QUALIFIED/TRAINED PERSONS

A lead crewmember that is a qualified person should be on site at all times. A qualified person is one who has had training in species at risk identification and in species at risk legislation, and is therefore able to understand and apply mitigating measures, take restorative actions, identify species and report species occurrences. Education in species at risk biology, ecology and handling is also beneficial.

SITE RECONNAISSANCE AND INSPECTION

Regardless of any identified areas for mitigation through mapping exercises, each and all sections of road to be improved or maintained should undergo a basic site reconnaissance prior to any works commencing, but it is also recommended that sites are surveyed during early nesting season to ascertain species and locations or gather new evidence and data.

A preliminary site inspection before commencing any works entails walking the extent of the roadway/road shoulder where maintenance is occurring and/or where maintenance activities will affect the species' habitats. When walking along the road shoulder, the individual shall look at brush areas, in adjacent wetlands, and immediately on roads and shoulders for species occurrences, but also will look for evidence of turtle nest sites (see turtle nesting), and including other evidence of the presence of turtles or egg shell fragments. Occurrences shall be recorded and all observations

reported. Nesting areas of turtles shall be flagged/marked and timing windows applied in those areas regardless if the area was previously uncharted.

Note: Reptiles will be most active and visible after 10am on warm days where the ambient temperature is 25 degrees Celsius or higher.⁶ However, turtle egg laying will occur at any time throughout the day and into the evening during nesting seasons. Frogs and other amphibians are most active in early morning and at night and after rain events. See species occurrences for more information.

The crewmember will take care to be aware of any species occurrences throughout the course of the entire road works.

SPECIES OCCURRENCES AND ENCOUNTERS

Beyond a simple sighting of a turtle, snake or amphibian within the area, it is rather the presence of a species within the immediate vicinity of the individual and area of undertaking that becomes an occurrence. This may include a turtle crossing the road, basking on the road, or turtles engaged in actual nesting activity.

Snakes will also be found basking on roads as they, like turtles, are reptiles and are exothermic (aka “cold blooded”). Therefore, for basic metabolic processes these animals need to increase their body temperatures by basking. Basking is often on logs, rocks and especially paved roadways where there is a storehouse of radiant heat.

Often turtles and snakes will be found basking on roads on days when the ground temperatures have reached 25 degrees Celsius by 10am¹¹. They will more often be found on roads in the morning soaking up this essential heat for the day, but on warm days will also be found throughout the day and late into the night.

Amphibians such as salamanders, frogs, and toads will be found on roads during spring and fall migration seasons, during or after rain events, and usually in very early morning hours, late evening and during night hours.

Predated nests, although currently void of species activity, are also indicative of important activity at the site, and therefore constitute an occurrence. It is important to record and report these areas even if the species of turtle is unknown, as this allows for the future monitoring of the site by biologists, contributes to the body of science for species recovery and allows Road Departments to identify sites for implementing future mitigation measures. S

Note: shell fragments themselves do not constitute an occurrence, but are valuable information to record when reporting an occurrence as supporting evidence.

Note: there are no venomous snakes within the Land Between region proper. The only venomous snakes of the Massasauga Rattlesnake are found at the far western edge of the region towards Georgian Bay. The Eastern Hog nosed snake that is found across the region will behave like a rattlesnake, but this is a defensive tactic, as the species has no teeth at all. Snakes have very poor eyesight, and so invoking a reaction from any snake usually entails coming in very close proximity of the snake. In addition, the scales that make up the skin of snakes do not hold bacteria, and therefore can be touched without worry of contamination.

SPECIES REPORTING

Any species at risk observations should be recorded and reported in order to increase the scientific body of knowledge towards the protection of Ontario's biodiversity and to afford more informed decisions for future road works and maintenance activities and to ensure legislative compliance. All rare species occurrence reports should be submitted to the OMNRF through the Natural Heritage Information Centre and a request to copy the local road department should be made at the time of the report. Single or multiple species reports can be completed and submitted. Species reporting forms may be made available by the Road Department and returned to them for submission, or are available on line: <https://www.ontario.ca/page/report-rare-species-animals-and-plants>.

Data to be recorded and provided within the report includes:

- Name of Observer
- Contact information for the Observer
- Date and time of observation
- Species name
- How many species
- Location of observation (GPS UTM data, and often online forms will provide ge positioning or mapping capacity)
- Habitat (where found)
- Other remarks such as the activity (what was the species doing- basking, nesting, etc)
- Often a photo is requested and appreciated as providing ready evidence of the species type

All reptiles and amphibian species including at risk and not at risk species can also be reported to Ontario Nature, for the Ontario-wide Atlas, and to Turtle Guardians, or the Toronto Zoo through their Turtle Tally and FrogWatch programs. These reports are also shared with the OMNRF. Online reporting forms are available:

<https://www.turtleguardians.com/sighting-report-form>

<http://www.ontarionature.org/dynamic-maps/vetting-cloud/onlineform/index.php>

<http://www.torontozoo.com/adoptapond/turtleally.asp>

<http://www.torontozoo.com/adoptapond/FrogwatchOntario.asp>

Finally, both Ontario Nature and Turtle Guardians have free online Apps that can be downloaded to facilitate easy reporting of reptiles and amphibians:

<https://www.ontarionature.org/protect/species/app.php>

<https://www.turtleguardians.com/app.php>

SPECIES HANDLINING

Turtles

The top shell (carapace) of these turtles are made of bone. This bone is fused to the turtle's spine and which extends to the turtle's tail. Therefore picking up a turtle by its tail may cause significant injury to its spine in turn affecting its movement and therefore its ability to survive. However, some damage sustained to turtle shells may be repaired much like a broken bone. To find out more about appropriate and safe handling of turtles and on the rescue and treatment options for injured turtles, see Kawartha Turtle Trauma Centre or the Georgian Bay Turtle Hospital.

Turtles encountered on roads and while doing road works may be moved off the roads taking care of one's own safety from traffic, watching one's footing and by using proper handling techniques. Turtles should be directed in the direction they are heading, or they will simply turn around again and re-enter into harms way.

All turtles have the potential of carrying salmonella bacteria and care should be taken to wash hands thoroughly after direct contact with turtles or not to place gloves or other materials that have met with the turtle, in one's mouth.

Snapping Turtles

Snapping turtles were present in and have not evolved since the dinosaur age: They are living dinosaurs. These turtles are the only species that do not have a large plastron (under-shell) and therefore cannot "tuck-in" to protect themselves from predators on land. Instead, this turtle has a strong front tooth and snaps as a defense. Snapping turtles are gentle top-predators when in native waters and in fact, no record of injury to humans has ever been recorded from Snapping turtles when in water. Rather, Snapping turtles are comfortable and curious in water and may swim close to humans to investigate. They are great scavengers preferring smelly decaying matter and so are responsible for a lot of "clean-up" at lake bottoms. Living humans do not smell appetizing to Snapping turtles. Snapping turtles can be transported by grasping the back of the carapace behind the back legs and before the tail with one hand and with the other hand under the plastron to carry the weight (much like a pizza box) because Snapping turtles cannot reach behind their back legs or under their bodies. If this is intimidating or cumbersome, simply move the turtle by using car mats, because they may be encouraged onto car mats. Otherwise, they can be moved with shovels low to the ground to prevent falling injury to the turtles, or encouraged to bite wood branches and walked off roads much like a dog...or apply other safe direct handling techniques

Snakes

Snakes found throughout The Land Between region from Muskoka, Simcoe, and Southern Parry Sound to Lennox-Addington are non-venomous. The only venomous snakes found in the region are at the far western edge of Georgian Bay. Snakes, like turtles, are reptiles and exothermic, needing to bask and soak up heat for metabolic processes. Therefore, snakes are found on roads after 10am when the ambient temperature reaches above 24 degrees Celsius. On these warm days, snakes may be on roads throughout the day and into the night. Snakes have extremely poor eyesight, and sense predators and humans mainly through vibrations and through smelling through their tongues. Therefore snakes will rarely attack unless in direct way of harm. Many snakes of the region also have very small or no teeth at all. Scales do not absorb or retain bacteria, therefore unlike turtles, snakes can be handled without

fear of any contamination to humans. Moving snakes off roadways is therefore easily done and without risk beyond that posed by traffic.

EMERGENCY RECOVERY ACTIONS

Relocating a turtle nest

Under unusual and exceptional circumstances, when a new and uncharted nest site is discovered and disturbed during maintenance activities such as excavations and earth moving, the nest may be saved harmless through immediate relocation. A bucket containing the same substrate and holding the eggs or hatchlings at the approximate same depth can be used to transport the nest to a wildlife rehabilitation centre or to the Kawartha Turtle Trauma Centre. Experts at the OMNRF should be notified immediately in these circumstances and the nest location and recovery actions documented.

Injured live turtle and snake species

Turtles that have been hit on roads and are recoverable (alive and not obviously at threat of imminent death), hatchlings and or eggs that are uncovered during major works or earth movement, but also those recently deceased turtles that may be gravid and where eggs can be exhumed and incubated, should be brought to the Turtle Trauma Centre in Peterborough (705) 741-5000

<http://kawarthaturtle.org/blog/about/drop-off/>

A turtle taxi program exists where volunteers will retrieve the turtle and bring it to the centre by calling the contact number above.

In the near future, for turtles and snakes closer to Orillia, Georgian Bay and Muskoka, the Georgian Bay Turtle Hospital will receive injured turtles for rehabilitation. <http://www.gbth.ca/>

Injured snakes and other wildlife can be taken to a local wildlife rehabilitation unit such as:

- Woodlands Wildlife Sanctuary in Minden: <http://woodlandswildlifesanctuary.ca/>
- Aspen Valley Wildlife Sanctuary in Rosseau: <http://aspensvalley.ca/aspen/about-us/>
- And other centres as part of the network of Ontario Wildlife Rescuers: <http://www.ontariowildliferescue.ca/>

PREVENTATIVE MEASURES

Prevention is far more efficient and effective than applying mitigating measures or taking emergency recovery actions. To reduce the presence of turtle nests on road shoulders, the likelihood of turtle nesting must be reduced by eliminating the preferred nesting habitat, or by limiting access to the nesting habitat along with the creation of new and alternative nesting habitat in safer areas.

Provincial Standards/Paved shoulders

The provincial standard for road shoulders where shoulders are paved at 1.5 metres is an effective measure to eliminate cumbersome and continuing issues posed by nesting turtles at risk, and where sufficient substrate is left exposed for turtles to continue to nest adjacent to but off the road shoulder. In addition, paved road shoulders, are known to be safer for vehicles, and facilitate safer use, and

more use and enjoyment of roadways by residents and visitors engaged in sports such as running and cycling.

Underpass fencing

Turtle and wildlife underpasses and related fencing to direct turtles under roadways through culverts or through created tunnels, and including snake fencing, provide long-term solutions for reducing mortality of reptiles at risk and other herpetiles, but also restrict access by many turtles to road shoulders where they may nest¹². Underpass solutions are being explored by NGOs and experts such as The Land Between organization, Scales Nature Park and EcoKare International, in partnership with the Toronto Zoo and Ontario Nature, which are very inexpensive, safe and stable.

Nest Habitat Creation

Nest habitat creation is being tested by Ontario Parks and Parks Canada, including the Algonquin Research station, and has been shown to be effective, however only when the access to, or actual and preferred basking and nesting habitats of roadways are removed¹³. Nesting sites can be created adjacent to wetland areas and within fenced areas of underpasses to supply turtles with similar and viable nesting sites. When installing nesting habitat, it is important to consult with a qualified OMNRF biologist or recovery team expert.

Roadside awareness signs

Effectiveness of roadside crossing signs at mitigating harm to turtles and snakes on roads is unknown. Their ease of installation has spurred widespread application and they may limit road mortality indirectly by educating and informing drivers, but the attention span or memory of the sign is suggested to be short-lived. In the case of high risk nesting sites, specialized signs can be created that inform both maintenance workers and the motorist public.

Limitations to their application is sign theft as well as the possibility of deliberate harm to turtles by a small proportion of the motorist public. Consideration of a well-informed sign strategy that includes anti-theft precautions, informed sign placement, and that is combined with an education and awareness strategy are recommended.

OTHER CONSIDERATIONS FOR MAINTENANCE OF SPECIES AT RISK AND BIODIVERSITY IN ROAD MAINTENANCE

Flushing bars

During vegetation management, in areas that are mowed or cut, site reconnaissance cannot be entirely effective in determining species presence. Flushing bars, designed by Ducks Unlimited, are plastic bars placed on mowers, which forewarn animals especially grassland birds and nesting waterfowl, breeding birds and also turtles and snakes, of the presence of the mower.



Equipment cleaning

Often equipment used in other areas will transport seeds and invasive species to new sites, including such nuisances of *Phragmites australis*, Purple Loosestrife, and even aquatic animals of zebra mussels etc. Power washing vehicles and heavy equipment that have been transported to the site from distant areas, and generally, before bringing them to the site are highly recommended.

Erosion control seed mix

Erosion control spray seed mixes and cover materials are required to be fast colonizers in order to stabilize soils. Often provincially and non-registered locally invasive species will be included in mixes. Consult with the local OMNRF office or NGO environmental groups for better solutions and mixes that are native and non-invasive.

SCHEDULE A

MAPS- SPECIES ABATEMENT

Maps should be generated by GIS specialists under agreements with Land Information Ontario or Ontario Nature and special care should be taken to prevent the locations of threatened and endangered species entering the public domain.

Maps should highlight road segments where turtle occurrence reports indicate that turtles have been found within 15 metres of the road, and especially if occurrence reports include notations about nesting behaviour.

A colour gradation or hierarchy should be applied to indicate the levels of importance of road segments and therefore ranging from areas where 1 to many species have been found within the vicinity; and then to highlight Species at Risk status, ranging from Special Concern to areas where Endangered turtles have been found.

Contact the Land Between charity for guidance and mapping examples. www.thelandbetween.ca

SCHEDULE B

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TURTLE RESCUE SERVICES:

List any local rescue services in your area for field staff and road crews here.
However, the Ontario Turtle Conservation Centre, services all of Ontario: 705-741-5000

TURTLE SIGHTINGS AND REPORTING CARDS:

Place your municipal sighting forms here.

If none are available, simply ensure the following information is gathered:

- Name of Observer
- Date of Sighting
- Turtle Species: Blanding's/Stinkpot/Snapping/Spotted/Map/Painted/Wood
- Turtle Location (911 # and Road, Nearest Intersection, UTM or Google Map link)
- Activity of Turtle (basking, nesting, injured, dead, crossing, swimming, other)
- Roads: Turtle found on road/on road shoulder
- Habitat (Swamp/Bog/Fen/Marsh/River/Lake/rock barren/grassland/other)
- Other Notes
- Image Upload

TURTLE UNDERPASSES AND CROSSING SIGNS, RESOURCES AND THE LAND BETWEEN-HALIBURTON MOU:

The Land Between maintains a Memorandum of Understanding with municipalities to broker the placement of turtle crossing signs and ensure that signs are placed where they are most advantageous, where there are significant road mortality concerns, and in ways that ensure that there is no undue clutter of signage on roads.

For an example of this MOU, please contact the Land Between charity.

www.thelandbetween.ca