



Kakabeka Falls Provincial Park

Emerald Ash Borer Response Strategy

2018 Update



Photo by Rob Stimpson

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Introduction and Background

Emerald Ash Borer *Agrilus planipennis* is an invasive beetle that is 8.5 to 14 mm long and 3.1 to 3.4 mm wide and as its name suggests, is a metallic emerald green colour. The Emerald Ash Borer is native to China and eastern Asia. It was first detected in North America in 2002 in the Windsor and Detroit area and has killed millions of ash trees in North America since its arrival (Forest Invasives Canada, 2015).

The Emerald Ash Borer attacks all true ash species (*Fraxinus spp.*). Emerald Ash Borer infestations kill 99% of trees that are affected (Forest Invasives Canada, 2015). Trees typically die within 1-4 years of the infestation unless they are treated with an insecticide either prior to initial attack or in the very early stages.

Detection of EAB in Thunder Bay

Emerald Ash Borer was detected on June 28th, 2016 in the city of Thunder Bay. In 2014, an Emerald Ash Borer Strategic Management Plan was developed for the City of Thunder Bay. The city of Thunder Bay is currently implementing the strategic plan to prevent the spread, determine the extent of the infestation, and to treat and remove trees. The City of Thunder Bay plans to treat 50% of eligible ash trees and remove and replace the other 50% of ash trees. Treatment injections will begin in full force in 2017. Kakabeka Falls Provincial Park is located approximately 30 km west of Thunder Bay. Due to park's close proximity, Kakabeka Falls Provincial Park's ash trees are at imminent risk of infestation.

Threats/Impacts of EAB on Kakabeka Falls Provincial Park

Kakabeka Falls Provincial Park occupies an area of 500 hectares. FRI imagery has identified that black ash stands comprise of 30 hectares (6%) of the park's forest cover (see Figure 1). These ash stands are threatened by the Emerald Ash Borer.

Currently there are no known infestations of the Emerald Ash Borer in Kakabeka Falls Provincial Park. Due to the close proximity to Thunder Bay, where Emerald Ash Borer was detected in June of 2016, it is probable that the Emerald Ash Borer will be detected within the park in the near future. The Emerald Ash Borer poses detrimental impacts on the economic, social, and ecological values of Kakabeka Falls Provincial Park.

Economic Impacts

The costs associated with the management of EAB including monitoring, education initiatives, removing trees, tree treatments, and conducting planting activities will have negative economic impacts on the park.

Social Impacts

The recreational and aesthetic value of Kakabeka Falls will be impacted by the effects of the Emerald Ash Borer. Trees provide many recreational and aesthetic benefits such as shade, scenery, and privacy. The removal of large, mature trees in picnic and campground areas may have impacts on these recreational values.

Trees killed by EAB become hazardous very quickly, and create a risk to visitor safety in recreational areas of the park. The activity and noise associated with tree removal may also have a negative impact on visitor experience.

The topic of Emerald Ash Borer and its impact on the park and the greater landscape provides an opportunity to increase visitor awareness about invasive species through education and outreach initiatives.

Ecological Impacts

The Emerald Ash Borer threatens the ecological integrity of Kakabeka Falls Provincial Park. The loss of ash trees will reduce the biodiversity of the park, change the forest structure, and impact species interactions and nutrient cycling within the ecosystem. The removal of mature ash trees will create openings in the canopy and natural regeneration will occur.

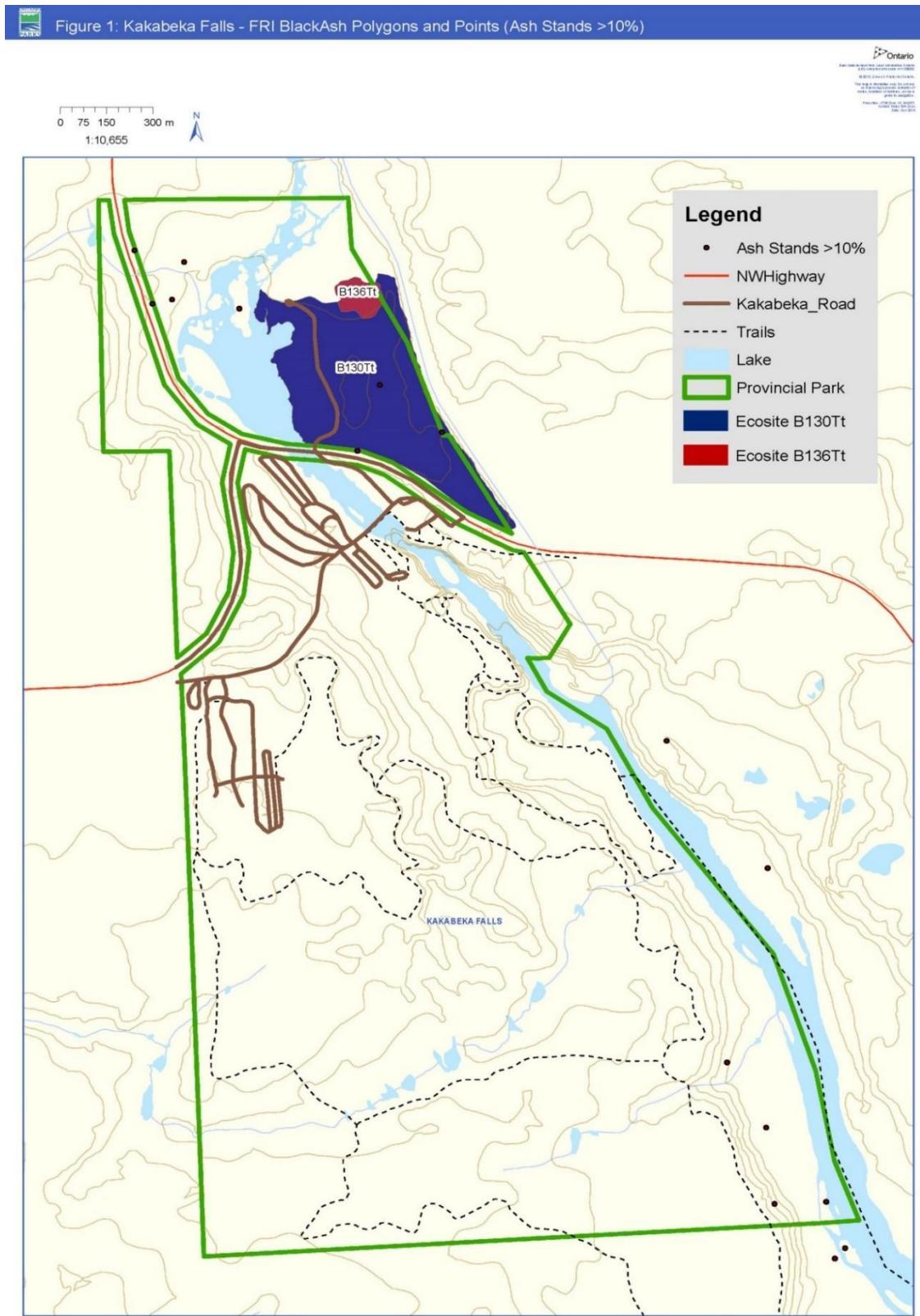


Figure 1: Kakabeka Falls - FRI Black Ash Polygons and Points (Ash Stands > 10%). Ecosite B130Tt (blue): Intolerant Hardwood Swamp, Ecosite B136Tt (red): Spare Treed Fen.

Purpose and Goal of EAB Response Strategy

Purpose

The purpose of this document is to outline a proactive Response Strategy to prevent and manage the arrival of the Emerald Ash Borer at Kakabeka Falls Provincial Park. The Kakabeka Falls Emerald Ash Borer Response Strategy may be used as a framework for other parks in the Northwest Zone that may face similar threats.

Goal of Response Strategy

To minimize the impacts of Emerald Ash Borer on the ecological, economic, recreational, and aesthetic values of Kakabeka Falls Provincial Park through prevention, education, detection, monitoring, and management techniques.

Response Strategy Objectives

1. Minimize the economic and social impacts of EAB in recreational areas of the park.
2. Minimize the ecological impacts of EAB and maintain ecological integrity of the park.
3. Protect tree diversity within the park and on the landscape.
4. Educate the public on the impacts of invasive species and the importance of preventing the spread of invasive species.
5. Develop a Response Strategy framework for other parks that may face similar threats.

Management Direction

The Kakabeka Falls Provincial Park Management Plan states that, “infestations of forest insects and diseases will be monitored and assessed. Non-native species will be controlled, and native species may be controlled. If control measures are undertaken, they will be applied to minimize effects on the general park environment. Biological controls will be used wherever possible”. The Park Management Plan also outlines that the removal of hazard trees is permitted in zones where safety is a concern. Additionally, areas that experience adverse use impacts will be rehabilitated using species that are native to the park (Ontario Ministry of Natural Resources, 2001).

Response Strategies

The following section presents strategies for prevention and education, monitoring and detection, inventorying and mapping, administering prescriptions, disposing of ash wood, and ongoing monitoring. A jurisdictional scan of resources and other Emerald Ash Borer Response Strategys was conducted to create a tailored Response Strategy for Kakabeka Falls Provincial Park. The following strategies outline management actions to implement to minimize the

impacts of EAB. These actions will be implemented before the arrival of EAB, once EAB is detected, and some will be ongoing.

1. Implement Prevention and Education Strategies

Kakabeka Falls Provincial Park has previously implemented prevention and education strategies to help prevent the spread of the Emerald Ash Borer including signage, brochures, a display in the Gatehouse, and implementing firewood restrictions through screening visitors during their registration to the park. It is recommended that these prevention and education activities are continued by the park staff team and that additional activities are incorporated into park operations. It is also recommended that more stringent strategies are implemented to prevent further spread of EAB and other invasive species. Below outlines key messages and strategies to deliver these messages to the public.

a. Messages

- i. Prevent the spread of the Emerald Ash Borer; do not move firewood and buy local firewood.
- ii. Report Emerald Ash Borer and other invasive species sightings.
- iii. Invasive species such as the Emerald Ash Borer can have devastating impacts on native species and ecosystems.

b. Strategies

- i. Restrictions on firewood movement.

Options for Firewood Restrictions:

- a. Do nothing
- b. Continue pre-screening park visitors through the CAMIS filter.
- c. Pre-screening through CAMIS with added staff training regarding the new Canadian Food Inspection Agency quarantine regulations in the City of Thunder Bay.
- d. Voluntary Firewood Ban – note that it is difficult to distinguish the difference between ash wood and other species when cut and split, therefore, the most effective approach would be to ban all firewood from entering the park.

These recommendations are provided for consideration by park managers and appropriate zone staff. Park staff will require additional training to implement the chosen restrictions.

- ii. Information pamphlets and brochures provided by park staff to visitors (staff may require additional training during park orientation).
- iii. Signage: firewood signs and signs to inform visitors about management activities happening within the park.

- iv. Park publications: articles on EAB in park publications such as the Park Tabloid, Natural Heritage Education newsletters, etc.
 - v. Natural Heritage Education programs and displays: (Ask the naturalist sessions, guided hikes, interpretive roving, displays within Gatehouse and Visitor Centre, ribbon campaign; educational banners wrapped around ash trees). The Invasive Species Centre, EAB Taskforce for Northwestern Ontario, and the Invading Species Awareness Program (Ontario Federation of Anglers and Hunters) may have educational materials or displays to provide to the park.
 - vi. Local news releases for possible radio and TV interviews, newspaper articles, online webpages, and social media.
 - vii. Ontario Parks' website (messaging on the Kakabeka Falls page and other parks that are threatened by EAB?).
 - viii. Social media posts (from Ontario Parks, Ontario Parks Northwest, and Kakabeka Falls' accounts). Liaise with the other organizations on social media such as the Invasive Species Centre and the City of Thunder Bay to increase the reach of Kakabeka Falls' posts to spread the word.

2. Conduct Monitoring and Detection Surveys

A number of surveys and monitoring methods can be used to detect and monitor the presence of Emerald Ash Borer. The following surveys and sampling techniques should be used:

- a. Visual surveys - visual detection of infested trees. Visual detection of EAB includes loss of foliage in crown, coppice or suckering at the base of tree, and D-shaped exit holes in bark. Other detection strategies should also be conducted as visual surveys alone are not ideal.
- b. Green prism traps - used to indicate presence of or delimit range of EAB.
- c. Early detection branch sampling – this technique can be used to detect EAB before external signs or symptoms are apparent. This technique involves removing branch samples from different sections of a tree and then whittling the bark to detect presence of insect galleries.

In 2016, the Stewardship Youth Ranger (SYR) crews and Forest Health Specialists with the Biodiversity and Monitoring Section (BAMS), conducted monitoring and detection surveys. Branch sampling was conducted near the Visitor Centre and prism traps were set at the beach and Visitor Centre. The SYR crew and BAMS, Forest Health Specialists will be contacted to coordinate continued assistance with conducting monitoring and detection surveys.

In the event that EAB is detected, contact the Canadian Food Inspection Agency (CFIA) at **1.800.442.2342**.

Kakabeka Falls Prism Trap Locations

Site ID	Park	Zone	Easting	Northing	Site Description
EAB15	Kakabeka Falls	16U	305656	5364208	Near Visitor Centre
EAB15a	Kakabeka Falls	16U	305440	5364558	Campground 206
EAB15b	Kakabeka Falls	16U	305531	5364311	Parking lot (across bridge)
EAB16	Kakabeka Falls	16U	305443	5364937	Beach area
EAB16a	Kakabeka Falls	16U	305451	5365195	Turnaround area
EAB16b	Kakabeka Falls	16U	305489	5365063	Between beach and turnaround areas

In addition to park-level monitoring, landscape-level detection and monitoring efforts are on-going. Prism traps have been deployed in the region and in nearby provincial parks to monitor for the detection of EAB. Two traps were located at Pigeon River, one at Arrow Lake, and one at Sleeping Giant.

Refer to **APPENDIX I: Canadian Food Inspection Agency Surveillance Guidelines for Emerald Ash Borer, *Agrilus planipennis*** for guidelines on survey protocols.

3. Inventory and Assessment of Park's Ash Trees

- a. Generate maps of the ash trees and stands within the park.
- b. Conduct an ash tree inventory of the park.
 - i. Map, measure (height, DBH), and evaluate condition (visual assessment of tree health, vigor, etc.) and hazard potential of ash trees. Inventory results will determine the plan of action for the ash trees and ash stands within the park.
- c. Survey ecological attributes of the ash stands (flora, fauna, breeding bird habitat, rare species)
 - i. Conduct a tree marking program
 - ii. Classify sites using OPIAM protocols to determine flora and fauna species diversity, structure and composition as well as soil texture, depth, and drainage of the sites.

Refer to **Ontario Ministry of Natural Resources' Tree Marking Guide:** <https://dr6j45jk9xcmk.cloudfront.net/documents/2807/guide-treemarking.pdf> for guidelines on how to conduct a tree marking program.

4. Determine Stand Prescriptions

Prescriptions will be determined based on information gathered during the inventory and tree marking program. The following prescriptions have been identified as options. A combination of these prescriptions may be used. Decisions on prescriptions will be

made by the Park Superintendent and Zone Ecologists. Management prescriptions will be mapped for each area in the park with ash trees.

- a. **Tree Removal** – Remove or replace ash trees either before they die or as they become infected and die.
- b. **Insecticide Treatment** – Inject healthy trees with an insecticide treatment, such as TreeAzin to prevent the tree from succumbing to EAB. Treatments are more effective when injected before EAB infests the tree or at low levels of infestation. Trees require treatments every 2 years.
- c. **Planting/Advanced Regeneration** - Plant native, site tolerant tree species and plan for advanced regeneration before an infestation occurs or once EAB is detected.
- d. **No Action** – Leave forest to succeed naturally if early detection and eradication are not completed and there are advanced stages of EAB infestation. This is more likely to occur in natural forest stands than in campgrounds where trees may pose as safety hazards.
- e. **Monitoring** – Monitor natural ash stands to determine rate and extent of EAB infestation and to observe responses in forest structure and composition and the direct/indirect effects to the species community associated with the site.

5. Administer Stand Prescriptions

a. Tree Removal

Tree removal and disposal could slow the spread of EAB and will promote natural regeneration. Hazardous and diseased ash trees in recreational areas should be removed before they die or as they become infected and die to reduce safety hazards. If trees in recreational areas or natural stands are detected with EAB, they should be removed and chipped and/or burned in an attempt to eradicate EAB. If an infestation is advanced, tree removal may not be necessary depending on safety risks and potential impacts that the EAB population may have on the remaining trees.

The Ontario Parks' Hazard Trees & Ecological Integrity Best Management Practices document outlines the following guidelines around when to cut trees: "Avoid cutting trees when birds are nesting (April 15-August 15)...Cutting/trimming vegetation during this time may also promote problematic re-growth and disease. If species at risk bats are using the trees for roosting, avoid tree removal from May 1 to September 1".

Options for Whom Will Conduct Tree Removal:

1. Park Staff, with potential possibility to extend positions in the fall, if required.
*This is the preferred option
2. OMNRF Fire Ranger Crews
3. External Tree Removal Companies

Note that trees will be cut and removed manually versus mechanically.

Refer to **APPENDIX II: Ontario Parks' Hazard Trees & Ecological Integrity Best Management Practices.**

b. Insecticide Treatment

The recommended insecticide for controlling EAB is TreeAzin. Treatments have been found to have good success with limited environmental cost. Trees must be identified as 'healthy' for treatment to be effective. Treatments are more likely to be successful before EAB infests a tree or at low levels of infestation. Trees require repeated treatments every 2 years and should be applied between May and the end of August (BioForest Technologies Inc., no date). The cost for a 30 cm diameter tree is approximately \$180.00. Refer to **Costs and Funding on page 17** to review the costs of TreeAzin treatment over a ten-year period.

TreeAzin insecticide can only be applied by a professional licensed pesticide applicator or service provider. Ontario Parks has several licensed applicators across the province. Contact your Zone Ecologist to find out more information.

EAB Service Providers near Thunder Bay:

- Rutter Urban Forestry (Thunder Bay)
- Mackenzie Resource Services (Thunder Bay and Shuniah area)
- Wilderness Environmental Services (all of Ontario)

The number of trees to be treated will be dependent on the amount of funds available and the number of trees selected and prioritized for treatment. Larger, healthy trees that provide high recreation, education, and aesthetic value will be prioritized for treatment. Mature trees that could be used as a future seed source and provide high ecological value will also be prioritized for treatment. Trees prioritized for treatment will be identified during the inventory process. Treatment should start as soon as possible after the trees are selected and prioritized.

When selecting trees to treat, the tree should:

- Have a DBH of at least 20-25 cm
- Be free from wounds, decay, and large sections of dead branches
- Free from shoots growing from the trunk

- Have less than 20% loss of leaves
 - Not be leaning at a pronounced angle
- (Ryan, 2013)

For more information on **TreeAzin insecticide** visit:

<http://www.bioforest.ca/index.cfm?MenuID=19&PageID=1049#q07>

For more information on insecticide options visit:

http://invasiveinsects.ca/eab/insecticide_i.html

c. Planting/Advanced Regeneration

Planting and restoration may coincide with the arrival of EAB or happen before an infestation has occurred. Planting will occur in areas where advanced regeneration will be required to minimize the impact of tree loss. Replanting will focus on woody vegetation (trees and shrubs) which provides soil stability and plant structure faster than seeding. Natural seeding will occur during succession of tree and shrub growth. A combination of both nursery stock and transplant trees will be used to regenerate areas effected by EAB.

Transplant trees can be sourced from areas within the park to potentially reduce costs and increase survival success. Trees sourced from within the park are pre-exposed to similar environmental conditions, therefore may adapt better to the site. Areas such as roadsides and ditches, where ecological integrity will not be impacted should be chosen to source trees for transplant.

The species and number of trees to plant will be determined once the inventory and assessment of the trees/stands are completed. Soil sampling should be undertaken to determine texture, depth, and drainage to select the most suitable species to plant.

Below includes two charts of suitable tree and shrub species that are suitable for the associated ecosites located in the park (Ecosite B130 and B136).

Ecosite B130: Intolerant Hardwood Swamp

Species	Source	Nursery Availability
Trees		
Trembling Aspen (<i>Populus tremuloides</i>)	Transplant	N/A
Balsam Fir (<i>Abies balsamea</i>)	Nursery or Transplant	PRT Inc. Dryden

White Birch (<i>Betula papyrifera</i>)	Nursery	Pine View Nursery, Landale Gardens
Black Spruce (<i>Picea mariana</i>)	Nursery or Transplant	PRT Inc. Dryden, Hills Nursery, Pineview Nursery
White Spruce (<i>Picea glauca</i>)	Nursery	Hills Nursery, LRC Estates Ltd.
*Balsam Poplar (<i>Populus balsamifera</i>)	Transplant	N/A
Jack Pine (<i>Pinus banksiana</i>)	Nursery	Landale Gardens, Hills Nursery
Shrubs		
Dwarf Red Raspberry (<i>Rubus pubescens</i>), Mountain Maple (<i>Acer spicatum</i>), Swamp redcurrent (<i>Ribes triste</i>), Speckled Alder *(<i>Alnus incana</i>), Black Gooseberry (<i>Ribes lacustre</i>), Prickly Wild Rose *(<i>Rosa acicularis</i>), Red Osier Dogwood (<i>Cornus stolonifera</i>)		

Ecosite B136: Sparse Treed Fen

Species	Source	Nursery Availability
Trees		
Black Spruce (<i>Picea mariana</i>)	Nursery or Transplant	PRT Inc. Dryden, Hills Nursery, Pineview Nursery
Tamarack (<i>Larix laricina</i>)	Nursery	LRC Estates Ltd.
Shrubs		
Labrador Tea (<i>Rhododendron groenlandicum</i>), Creeping Snowberry (<i>Gaultheria hispida</i>), Speckled Alder *(<i>Alnus incana</i>), Dwarf Red Raspberry (<i>Rubus pubescens</i>), Cranberry (<i>Vaccinium macrocarpon</i>), Leatherleaf (<i>Chamaedaphne calyculata</i>), Honeysuckle (<i>Lonicera villosa</i> , Twinflower *(<i>Linnaea borealis</i>), Bog-rosemary *(<i>Andromeda polifolia</i>)		

Local Nurseries

Nursery	Location	Contact Person	Contact Number	Species Available
Hills Nursery	Thunder Bay	Kevin Van Deuyn	807.935.2626	2 yr and potted Sw, Sb
Pine View Nursery	Thunder Bay	Bob	807.628.9005	Bw, Sb, Ce, Lt
Landale Gardens	Thunder Bay	Nancy	807.577.5807	Bw, Pj
LRC Estates Ltd.	Thunder Bay	Kathy Ross	807.935.2667	Lt, Sw,
PRT Inc. Dryden	Dryden	Mike Wood	807.937.8360	Sb, Pj, Sw

Tree Species Codes: Sw - White Spruce, Sb - Black Spruce, Ce - Eastern White Cedar, Lt - Tamarack, Bw - White Birch, Pj - Jack Pine

Planting Considerations

- Transplanting and planting of nursery stock should be done in the spring or fall when the trees are not in active growth.
- Planted in a random fashion (avoiding ‘row’ plants).
- Plant at least 2yr old stock in order for the trees to escape competition from grasses/other vegetation.
- Where possible, trees should be planted with a ‘ball’ of earth around the roots. Wood chips, if available, can be used to prevent compaction around the planted tree as well as conserve moisture.
- Plant at tight spacing originally to allow for some natural attrition and die back.
- Plant a diversity of tree ages/heights to provide visual diversity and reduce the need to plant large numbers of replacements in the future.
- Place rotting logs or brush on rehabilitation sites to control traffic, provide ongoing source of soil nutrients, and to provide wildlife habitat.
- Propogated plants may be preferred because they establish themselves more rapidly to the site and increase likelyhood of survival.
- Eliminate trampling of rehabilitated sites by placing appropriate barriers and signs.
- Herbivory can be a major constraint in establishing vegetation (e.g. Deer, Snowshoe Hare). Exclusionary fencing has shown to help trees establish in areas of heavy deer browse. Woven wire fence that is 8ft high is recommended to protect trees in multiple seasons.

Natural Plugs/Transplanted Trees

- Natural transplants from nearby sites provide an instant root mass to stabilize the site. In addition, as a local ecotype they are already adapted to the site and are likely more hardy than species brought in from elsewhere.
- Plant transplanted trees at the same depth at which they were originally growing and tamp down to eliminate air pockets.

Maintenance and Monitoring of Planted Trees

- Make a commitment to monitor success of planting efforts. Sites may require additional plantings over time.
- Newly planted and transplanted trees will benefit by watering to help root establishment and to buffer dry periods in the initial growing season.

*Planting Considerations, Natural Plugs/Transplanted Trees, and Maintenance and Monitoring of Planted Trees were derived from the **Sleeping Giant Cabin Landscape Rehabilitation Plan (Ontario Parks, 2015)**.

d. No Action

Select areas will be left to succeed naturally. A monitoring plot may be established in one of these areas to compare the effectiveness of response actions. Hazard trees will be removed as outlined in the Ontario Parks' Hazard Trees & Ecological Integrity Best Management Practices document. The do nothing strategy should be prescribed in natural forest stands rather than in campgrounds where trees may pose as safety hazards.

e. Monitor

Two OPIAM plots will be established in ash stands to monitor and observe the responses in forest structure and compositions and the direct/indirect effects to the species community associated with the site. One OPIAM plot is already established (bird & frog/toad monitoring plot) within an ash stand and another plot will be established. Within one plot, selected trees may be treated whereas the other site may be prescribed as 'do nothing'. These plots will be monitored over time to observe changes and will be compared to monitor the effectiveness of response actions.

An additional monitoring activity could be to conduct photo monitoring to show changes in crown canopy and rates of change. A trail camera or a time-lapse camera could be deployed to observe and document the effects of EAB on an area within the park.

There may also be opportunities to liaise with Lakehead University (potentially a Master's student) or Confederation College to assist with additional research initiatives.

6. Dispose and/or Remove Ash Wood

Cut trees can either be chipped or burned to kill the larvae. Wood must be ground/chipped to less than 2.5 cm in two dimensions to be effective at destroying EAB larvae (Canadian Food Inspection Agency, 2015). Wood chips can be used for trails or new plantings as mulch. Additional considerations would be required for use of wood chips as hog fuel for local mill/public use (note that the movement of ash wood chips may be restricted, depending on quarantine areas). Trees could potentially be milled, however considerations regarding quarantine areas and moving wood will need to be reviewed. Non-infested, downed trees are beneficial for forest structure and wildlife

habitat.

7. Ongoing Monitoring

Continued monitoring for Emerald Ash Borer and monitoring stand and tree health will be conducted. The responses of the ash stands to the prescribed management activities will be monitored and documented.

As suggested previously in this document, there may be opportunities to liaise with Lakehead University and/or Confederation College to assist with monitoring initiatives.

Management Strategies Outline

The following chart will be completed through a discussion with Ontario Parks staff to choose actions to implement and to identify the person responsible for leading the management activity.

Management Activity	Chosen Action	Action Lead	Timelines
Prevention Initiatives			
Education Initiatives			
Monitoring and Detection Surveys			
Inventory and Assessment of Park's Ash Trees			
Determining Stand Prescriptions			
Administering Stand Prescriptions			
Tree Removal			
Insecticide Treatment			
Planting / Advanced Regeneration			
Monitoring			
Disposal of Ash Wood			
Ongoing Monitoring Initiatives			

Management Effort Update

An update of the 2017 efforts to manage EAB and suggestions for the upcoming 2018 season can be found in **Appendix III**.

Implementation & Timeline

The Park Superintendent of Kakabeka Falls will be responsible for overseeing and implementing the Emerald Ash Borer Response Strategy. The NWZ Ecology team will assist with conducting management activities. Park staff will also be required to assist with management activities such as tree removal and education and outreach.

Gantt Chart

A Gantt chart will be developed to guide the implementation of the Response Strategy.

Costs & Funding

The EAB Response Strategy budget and costs are undetermined. Once the trees are inventoried and mapped, estimated costs can be calculated.

Costs Associated with Kakabeka Falls EAB Response Strategy:

- Potential contracts for park staff or an external company to conduct tree removal
- Hiring an insecticide service provider to provide TreeAzin treatments*
- Purchasing nursery stock for regeneration efforts
- Renting or purchasing a wood chipper to remove ash wood and destroy EAB larvae
- Purchasing monitoring equipment such as prism traps
- Developing signs and displays for educational initiatives

*The cost to treat a tree with TreeAzin systemic insecticide is approximately \$6/cm dbh (cost varies depending on size, health, and location of the tree). A tree with a diameter of 30 cm would cost approximately \$180.00. This estimate was confirmed by Rutter Urban Forestry of Thunder Bay in 2017.

Cost of TreeAzin Treatments over a Ten Year Period

Number of Trees for Treatment	Reasoning for Treatment	Estimated Cost/Year (\$)	Estimated Cost Over Ten Years (\$)
1	To use for educational purposes	\$180.00	\$900.00
5	To protect trees within campground and day-use areas that provide high recreation and aesthetic value	\$900.00	\$4500.00
10	To protect a combination of campground/day-use trees and trees that provide high ecological value (function as a seed bank/source for).	\$1800.00	\$9000.00

Note: estimates are based on a tree with a dbh of 30 cm.

Potential funding sources for the management of EAB within Kakabeka Falls Provincial Park include park capital money or funding for a zone special project. Other funding options may

include, but are not limited to Invasive Species Centre grants and fundraising through a “friends” organization.

Potential Partners

EAB Task Force for Northwestern Ontario

The EAB Task Force for Northwestern Ontario could potentially provide support and resources for prevention and education activities. The Task Force hosted an EAB conference on March 28th, 2017 at Lakehead University.

Invasive Species Center

The Invasive Species Centre provided an aquatic invasive species workshop for Ontario Parks staff in the fall of 2016 in Thunder Bay. A similar training session on EAB may be valuable for NWZ Ontario Parks staff.

Ontario Federation of Anglers and Hunters - EDDMapS

The Ontario Federation of Anglers and Hunters (OFAH) has developed EDDMapS as a tool for tracking and reporting invasive species. OFAH is also a valuable contact for educational pamphlets, brochures, specimen displays, posters, etc.

Lakehead University

Lakehead University could be a potential partner to liaise with for assistance with developing and/or conducting monitoring initiatives.

Confederation College

Confederation College could also be a potential partner to liaise with for assistance with developing and/or conducting monitoring initiatives.

Northwest Zone Resource Stewardship Crew (Internal)

The NWZ Resource Stewardship Crew could identify ash stands and monitor for EAB infestations in nearby non-operating parks.

MNRF (Other)

MNRF programs such as the Stewardship Youth Ranger (SYR) program and the Biodiversity and Monitoring Section are potential partners to assist with detection and monitoring, tree marking, and planting activities.

Supporting Documents and Additional Information

Canadian Food Inspection Agency: *Agrilus planipennis* (Emerald ash borer) - Fact Sheet

<http://www.inspection.gc.ca/plants/plant-pests-invasive-species/insects/emerald-ash-borer/fact-sheet/eng/1337368130250/1337368224454>

City of Thunder Bay: Emerald Ash Borer Strategic Management Plan

<http://www.thunderbay.ca/Assets/Living/Urban+Forest/docs/City+of+Thunder+Bay+Emerald+Ash+Borer+Strategic+Management+Plan+2014.pdf>

Invasive Species Centre: Emerald Ash Borer Information (sign and symptoms, impacts, and management)

<http://www.forestinvasives.ca/Meet-the-Species/Insects/Emerald-Ash-Borer#70124-manage>

Ministry of Natural Resources and Forestry: Invasive Species in Ontario

<https://www.ontario.ca/page/invasive-species-ontario>

Ontario Parks NW Zone E.I. Information Bulletin on Firewood, January 2015 – (Internal Document)

TreeAzin Frequently Asked Questions

<http://www.bioforest.ca/index.cfm?MenulID=19&PageID=1049#q07>

Information for Land Managers on the Emerald Ash Borer

http://invasiveinsects.ca/eab/institution_landmgr.html

REFERENCES

BioForest Technologies Inc. No date. TreeAzin systemic insecticide. Available online at:

<http://www.bioforest.ca/index.cfm?fuseaction=content&menuid=12&pageid=1012>.

Canadian Food Inspection Agency. 2015. QSM-08: Quality management system manual for Canadian food inspection agency auditors to administer the emerald ash borer approved facility compliance program. Available online at:

<http://www.inspection.gc.ca/plants/plant-pests-invasive-species/directives/forestry/d-03-08/qsm-08/eng/1348676167779/1355879198291>.

Forest Invasives Canada. 2015. Emerald ash borer. Available online at:

<http://www.forestinvasives.ca/Meet-the-Species/Insects/Emerald-Ash-Borer#70124-manage>.

Ontario Ministry of Natural Resources. 2001. Kakabeka Falls Provincial Park management plan. Queen's Printer for Ontario: Toronto.

Ontario Parks. 2015. Cabin landscape rehabilitation plan – Sleeping Giant Provincial Park. (Internal Document).

Ryan, K. 2013. Emerald ash borer is here, what do I do? Tools for forest managers and landowners. Available online at: http://invasiveinsects.ca/eab/institution_landmgr.html.