Forest Management Plan for the joint holdings of Canadore College and Nipissing University 2024-2034

Prepared by Elliott Groen, R.P.F. in training with scope
May 10th 2024

Disclaimer

Some of the forest management recommendations made within this plan are general in nature and do not contain sufficient detail to be implemented without further refinement or investigation. The landowner remains responsible for ensuring the proper implementation of all forest management activities on their land, conducting further investigations where necessary, and retaining the help of a forest professional when needed.

Safety

Working in the forest comes with a unique set of safety risks. Landowners should ensure they are aware of safe work practices and seek the necessary training to conduct work safely.

Third Party Certification

This plan has been prepared to meet Forest Stewardship Council (FSC) and Sustainable Forestry Initiative (SFI) certification standards. The property will achieve FSC under the Eastern Ontario Model Forest (EOMF) Group FSC Certificate (FSC-C018800) and SFI under the EOMF group SFI certificate (PBN-SFI/FM-038025). These certifications provide enhanced standards for achieving ecological and socioeconomic sustainability through forest management.

Acknowledgements

Forestry and really any form of relating across space and time is both an art and a science. This relating is interwoven with the personal touch of the participating peoples. It feels fitting

for me to start the written portion of this plan by acknowledging where I have and continue to go to refine my knowledge.
I was introduced to the Lake Nipissing area by my friend, mentor and former boss, Steve Chenier. We worked together in the bush doing silviculture. It is through this lens that I learned about conducting business with a razor sharp compassion and how to communicate in clear ways that everyone can understand.
I would like to thank the foresters at Nipissing Resource Forest Management including Ric Hansel, Andree Morneault and Andy Straughan for the mentoring I received early in my professional career. The learning never ends and I have found great support within the general network of forestry professionals I have come in contact with.
Glen Prevost has directly supervised me during the development of this plan. Glen, I appreciate the timely, practical and in depth feedback you have provided me for this project and throughout our other shared work.
Thank you to Paul Renaud for helping me with the biomass modelling for the forest and your dedication to good science.
Some earlier experiences that have shaped my perspective are from the time I have spent both formally and informally with many people learning on and from the land. A few amongst many names to mention include Terrylynn, Sven, Terre, Dean, Marilyn, Duncan, Eric, Bree and the list goes on and on.
I would like to appreciate my family for how they have raised me, from early experiences to the present they figure into how I appreciate the world around me.
Of course there is the land and water itself. There is an honest efficiency I learned from working in the cold of winter and the heat of summer, a mindfulness from blackflies, mosquitos and ground wasps and a continual sense of awe that is best experienced rather than described.
Perry McLeod-Shabogesic spoke during the opening ceremony for the broader forest management project that this plan is a part of. My reflection on the words that he shared about two eyed seeing have provided pivotal grounding for my work. He spoke about how two eyed seeing is just as much about placing ourselves in the perspective/sensing of an ant, a whole forest, a lake or the whole world as it is about seeing things through multiple cultural lenses.
Finally I would like to thank everyone who has and will continue to be in relationship to the forest. I am grateful for the opportunity and would like to thank the good folks at Canadore College for making this plan and project happen.

Plan Author
Elliott Groen, R.P.F. in training with scope

Executive Summary

The area bounded by this plan is presented in figure 2. This area will be referred to as *the Forest* from here on in.
This plan runs 10 years and is intended to match the conditions on the ground with suitable activities that fit within broader objectives/strategies.

The forest has seen major changes over the last 150 years including clear cut logging and grazing. It contains diverse stands of conifers, mixedwoods and hardwoods. The main human activities in the forest are related to the extensive trail system which is used for curricular and extracurricular activities as well as by the public. The trail system includes the Duchesnay Falls trails which is a well known attraction in North Bay.

This plan covers history, general descriptions, data from inventories, objectives, strategies and management activities. It is supplemented by several annexes which provide further details.

This forest is in a unique position to model good practices and leading edge research and development for community forestry. This plan can help frame this process.

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1.0 Plan information

1.1 Plan Author Information

Name:	Elliott Groen, R.P.F. in training with limited scope
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1.2 Property Location

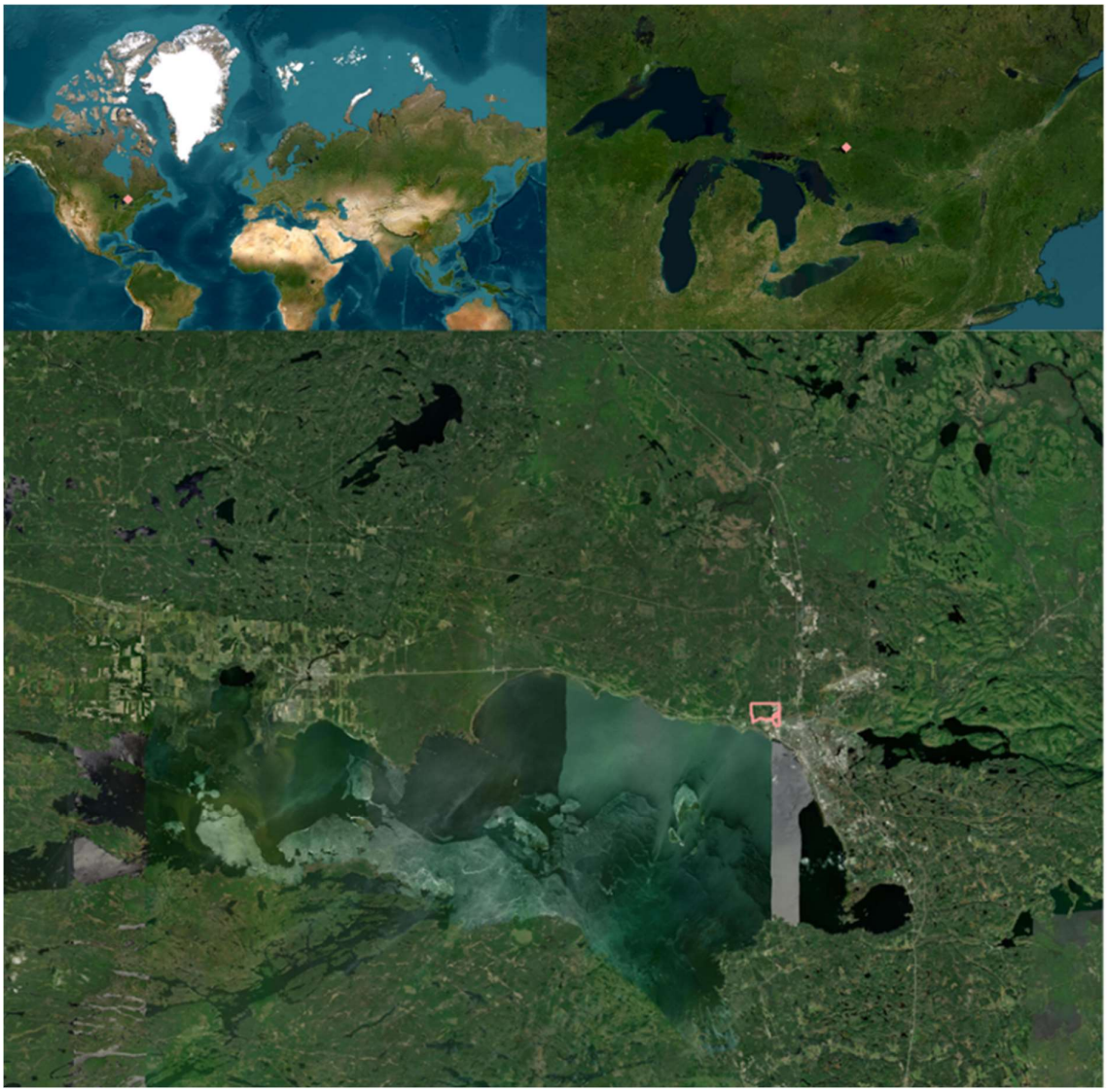


Figure 1: The property location at 100 College Drive, North Bay ON P1B 8L7 (bottom). The pink dots also show the properties location globally (top left), and on subcontinental (top right) on the shores of lake Nipissing which drains both west into the Great Lakes and east into the Ottawa River (left side).

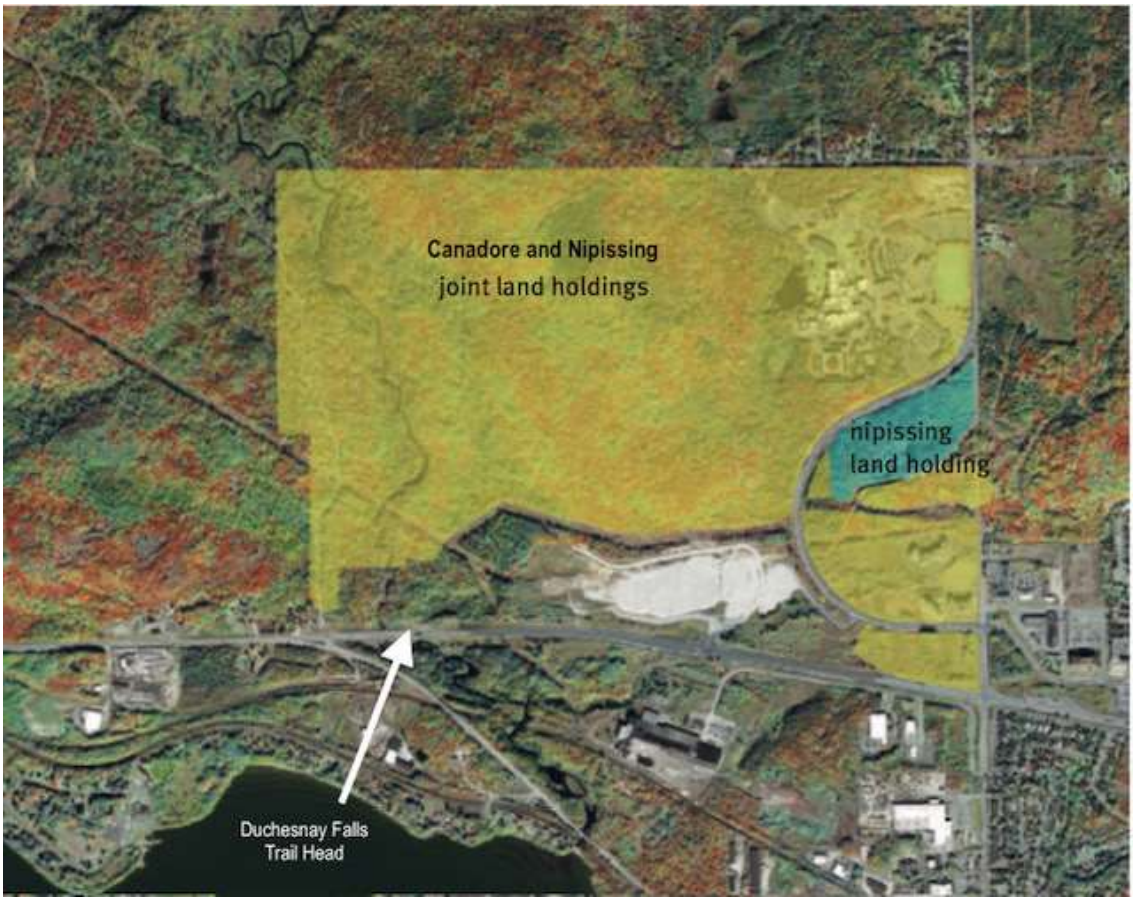


Figure 2: Approximate property boundaries[1]

1.3 Property ownership

The property is jointly owned by the Board of Governors of The Canadore College of Applied Arts and Technology (hereafter referred to as Canadore College) and Nipissing University. Up to date contact information is reflected in the tables below.

Canadore College

Names:	
Mailing Address:	
Municipality:	

[1] Obtained from personal communications with David Drenth and Jesse Russel, August 2023. Boundaries were determined based on a 2014 survey effort by Paul Goodridge.

Province:	
Postal Code:	
Phone:	
Email:	

Nipising University

Names:	
Mailing Address:	
Municipality:	
Province:	
Postal Code:	
Phone:	
Email:	

1.4 Plan Ownership and Governance

This plan has been commissioned and paid for by Canadore College and they hold the ownership of this plan. The plan covers the joint holdings of Canadore College and Nipissing University and governance of this land has been shared. This shared decision making has occurred on a case by case basis.
It is recommended that a shared decision making procedure is followed for the implementation of this plan with both parties assigning a delegate to communicate information and activities on the joint holdings.

Engagement with other people and groups using the forest may be necessary for decision making on certain activities. A list of forest users has been drafted and is provided in Annex A.

This can be continually updated over time.

Below is a brief personal reflection of the author on governance in relation to the evolution of this plan and the topic of governance.

This is recognizing that this plan is a living document with the intent of facilitating good decision making and communicating with the forest and how we as humans interact with it.

Good decision making and communicating with each other to me is the essence of governance.

This plan and the management of the forest will continue to evolve and this requires a multitude of perspectives represented and contributing. There is much that can build on the work that has been done in developing the plan. This will involve forest goers figuring out adaptable and complementary roles and responsibilities in taking care of the forest.

1.5 Plan development and community engagement

This plan has been developed between the period of July 2023 and March 2024. Several engagement sessions were held during this period, which are listed below. These engagements have provided input that has helped shape the objectives for this plan.

- **July 12th 2023:** Opening Ceremony in the Mshibizhiwgamig/Great Lynx Lodge
- **August 21st 2023:** Engagement session and measuring activity with community members as well as Canadore and Nipissing Staff.
- **August 24th 2023:** Meeting with Canadore Environmental Studies staff on curriculum integration
- **July and August:** Several tag along opportunities were provided to staff and students during the inventory work
- **September 20th 2023:** National Tree Day community planting at the College Drive Campus
- **December 13th 2023:** Forest Management Plan Engagement Session (Virtual)
- **January 30th and 31st:** 4 Themed Discussions on trails, governance and other use cases (virtual)
- **March 9th 2024:** Presentation on Carbon Analysis in the G-Wing Theatre
- **April 8th 2024:** Consultation with Norm Dokis and Perry McLeod-Shabogesic

2.0 Relevant Legislation and Policies

The following section provides an overview of some of the relevant legislation. This should not be considered exhaustive and is for information purposes only. It is the responsibility of

the landowners to ensure any management activities adhere to applicable policies and regulations.

2.1 Federal

Migratory Birds Conservation Act. This act provides protection for “migratory birds.” Migratory birds include most birds found in Canada. It is illegal to possess a migratory bird or damage, destroy, remove, or disturb migratory bird nests without authorization. For more information see: https://laws-lois.justice.gc.ca/eng/acts/m-7.01/.

Fisheries Act. Under this act the harmful alteration, disruption, or destruction of fish habitat is illegal. For more information see: https://laws-lois.justice.gc.ca/eng/acts/f-14/.

2.2 Provincial

Forestry Act. This Act sets out the definition of “good forestry practices”.
It defines “good forestry practices” as:
the proper implementation of harvest, renewal and maintenance activities known to be appropriate for the forest and environmental conditions under which they are being applied and that minimize detriments to forest values including significant ecosystems, important fish and wildlife habitat, soil and water quality and quantity, forest productivity and health and the aesthetics and recreational opportunities of the landscape.

For more information see: https://www.ontario.ca/laws/statute/90f26.

Professional Foresters Act. The practice of professional forestry is regulated by provincial law in Ontario. This means that the scope of practice and the governance of professional forestry to protect the public interest is set by law. This law provides the Ontario Professional Foresters Association (OPFA) the authority to regulate the practice of professional forestry in Ontario. This means that anyone practising professional forestry, as defined by law, must be a member in good standing of the Ontario Professional Foresters Association and is bound by the Code of Ethics as found in the Act.

For more information see: https://www.ontario.ca/laws/statute/00p18 and https://opfa.ca/

Endangered Species Act. Any species at risk found on the property and their habitat are regulated under this act. The purposes of this act are:

- To identify species at risk based on the best available scientific information, including information obtained from community knowledge and aboriginal traditional knowledge.
- To protect species that are at risk and their habitats, and to promote the recovery of species that are at risk.
- To promote stewardship activities to assist in the protection and recovery of species that are at risk.

For more information see: https://www.ontario.ca/laws/statute/07e06#BK2 and the SAR section of this plan

2.3 Municipal

There are no municipal by-laws that relate to tree cutting or forestry in the Corporation of the City of North Bay

2.4 Policies

Canadore College's policies are listed here:
Policies and Procedures - Canadore College
Nipissing University's policies are listed here:
Policies and Guidelines A-Z | Nipissing University

3.0 Overview

This section provides information on the natural and cultural history of the forest. The history of the property informs how we ended up with the current conditions and provides some clues on the possible trajectories through which the forest will change in the future. The forest is connected to the surrounding area. It is important to know both the local history and the context of surrounding landscapes when making decisions on management.

3.1 History

3.1.1 Recent History (1970's-present)

Canadore College and Nipissing University moved onto the College Drive Campus in 1972. The dam across the pond was also constructed during this time. Since then the forest has been used primarily for recreational and educational purposes.

Trails have been constructed for recreational uses. During the summer they are primarily for pedestrian use although there is also evidence of mountain bike use. The most recent addition to the trail network in the last five years was the upgrade to the cross country ski trails to conform with standards laid out in the FIS Homologation manual (see Annex B).

Separate tracks for snowshoeing and fat biking in the winter also exist within the trails.

Currently the trail system is being added to the Trans-Canada Trail network. This requires upgrades to the bridge over Duchesnay Creek.

Trails are also used by community members for personal use and in partnership with the Village and initiatives such as Living Fit, which engages women over 50 in maintaining health.

Maps of the trail network can be found in the maps section at the end of this plan.

Research occurs within the forest with plots dotted throughout. The forest is also used for educational purposes and is integrated into both curricular and extracurricular activities.

The major natural disturbance that has occurred in the forest over the last 50 years has been a spruce budworm infestation. This has caused mortality and decline in significant pockets of balsam fir and white spruce.

No large-scale logging has occurred. The main form of tree cutting has been to remove dead and dying trees off of the trails

Figure 3: Air photo of the forest and surrounding area in 1979[2].

[2] Aerial Imagery, 1979, CA ON00408 C019, National Air Photo Library, Nipissing University and Canadore College Archives and Special Collections, North Bay, Ontario.

3.1.2 Settler History (~1880's-1970)

North Bay was along the canoe route taken by Samuel de Champlain in 1615, however there was little European settlement until the area now known as North Bay was reached by train in 1881. In the late 1800s and early 1900s there was a lot of mining and lumbering in North Bay.

The historic forest condition of the Nipissing Forest Management Unit is described in NFRM FMP Supplementary Documentation 6.1.1[3]. This document refers to an unpublished study by Pinto et al. (2007).[4] The general findings from this study is that conifer cover has decreased; there is less Eastern Hemlock, White and Red Pine on the landscape and more Maples, Birches and Poplars. This is not only due to past lumbering practices but also due to fire suppression. In addition pre-settlement forests likely would have had a greater percentage of old growth structure and conditions.

Much of the Forest was cleared by J.R. Booth. He developed the Nosbonsing and Nipissing Railines in 1884 and it is likely that shortly after this the forest was largely clear cut. This is reflected in the age distribution of representative trees in each canopy class as can be seen in the figure below. There are very few trees older than 140. The older ones that do exist were likely too small to be of value or already misformed for lumbering purposes.

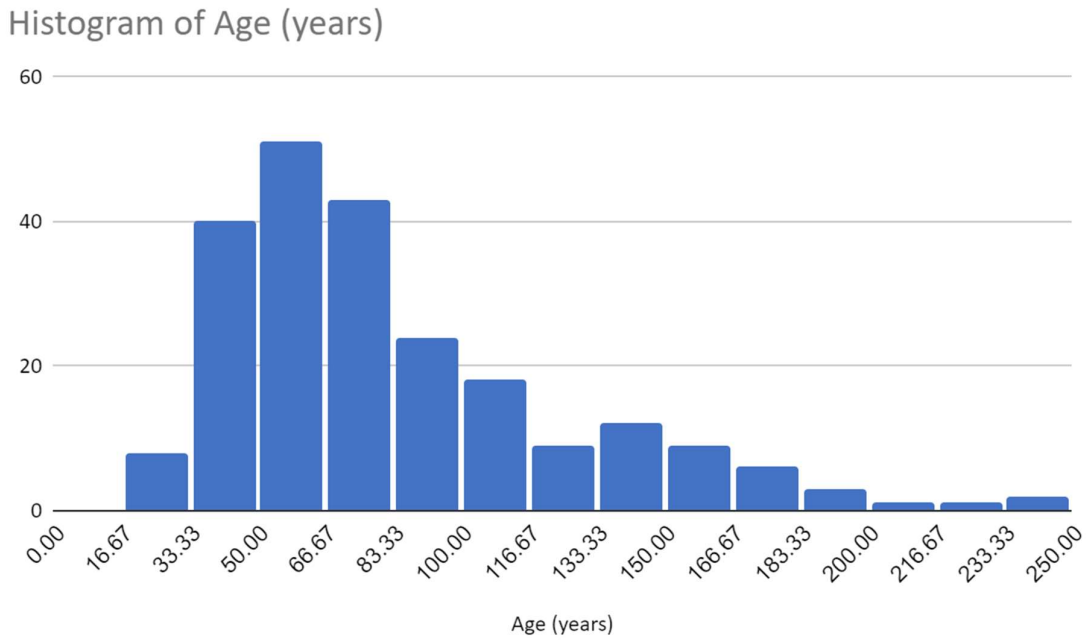


***Figure 4**-Ages of representative trees measured with an increment borer from each canopy class in individual plots during inventory work for the FMP in 2023. The y axis represents the numbers of sampled trees.*

[3] NFRM (2019). Supplementary Documentation 6.1. Retrieved from Published Submission Detail (gov.on.ca)

[4] Pinto, Fred, Stephen Romaniuk and Matt Ferguson. 2007. Pre-industrial forest composition of the Nipissing
Forest. 14pp. Unpublished.

Following the land clearing by J.R. Booth the land was sold to local residents including the Laroque family. Mr. Laroque recounts maple sugaring and firewood harvesting as well as the grazing of cattle in the forest (personal communications with Mr.Laroque, August 2023). The growth in trees aged 50 to 80 years likely coincided with the end of grazing combined with that first generation of intolerants following the Booth clearcutting dying back. The generation of tolerant hardwoods and balsam fir was likely released during this thirty year period 50 to 80 years ago.

Figure 5: Air photo from 1962[5].

[5] Aerial Imagery, 1962, CA ON00408 C019, National Air Photo Library, Nipissing University and Canadore College Archives and Special Collections, North Bay, Ontario.

3.1.3 Indigenous History and Values

The history of Indigenous peoples on these lands extends back at least 6000[6] to 8000 years ago[7]The Forest is situated in traditional Anishinabek territory, on lands occupied by the peoples of Nipissing and Dokis First Nations since time immemorial.

Aboriginal and treaty rights for the area of the forest are recognized by the Robinson Huron Treaty of September 9th, 1850 and affirmed by Section 35 (1) of the Constitution Act of Canada, 1982. It is through this treaty that European settlers were able to access the lands. The map below shows the territory covered by this treaty. There are many signatories to the Robinson Huron Treaty. The principal signatory for the British Crown was William Benjamin Robinson and for the Indigenous chiefs Shinguacouse is listed as the first signatory[8]. A full list of the signatories, the geographic bounds and the terms of the treaty can be found in the copy of the treaty by Roger Duhamel[9]. It should be noted that terms of the treaty have been contested, in particular the payout of annuities. A partial settlement was reached on February 26th 2024 in the Restoule v. Canada case[10].

[6] NFRM (Nipissing Forest Resource Management Inc.) (2019). *Forest management plan for the Nipissing Forest*. Accessed March 12th 2024 from https://nrip.mnr.gov.on.ca/s/fmp-online?language=en_US

[7] North Bay Mattawa Conservation Authority (n.d.). Laurentian Escarpment Conservation Area Trails Map. Accessed March 12th 2024 from laurentian-escarpment-conservation-area-trail-brochure.pdf (nbmca.ca)

[8] Surtees, Robert J. (1986). The Robinson Treaties (1850). Government of Canada, last modified on 2010-09-15. Accessed March 12th 2024 from The Robinson Treaties (1850) (rcaanc-cirnac.gc.ca)

[9] Duhamel, Roger. (1964). Copy of the Robinson Treaty made in the year 1850 with the Ojibewa Indians of Lake Huron Conveying Certain lands to the Crown. Queen's Printer and Controllor of Stationary, Ottawa, 1964. Accessed March 12th 2024 from Robinson Treaty - 1850 (canadiancrown.com)

[10] Citation: Mike Restoule v. The Attorney General of Canada 2024,ONSC 1127. Court File NOs: C-3512-14 and C-3512-14A. February 26th 2024. Ontario Superior Court of Justice. Accessed March 12th 2024 from eba29a_0ba4b1a5b2de42678e638a0170b88939.pdf (rht1850.ca)

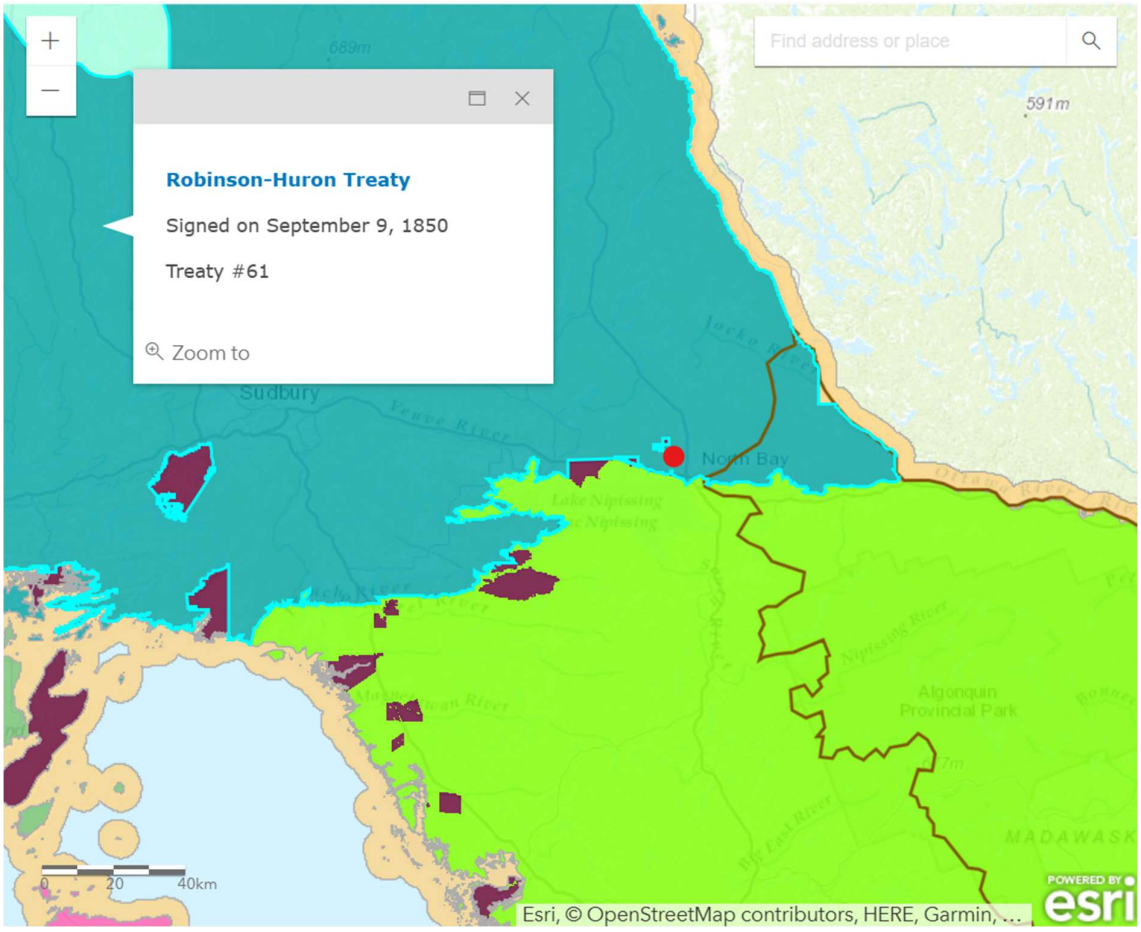


Figure 6-The approximate location of the forest is depicted by the red dot within the turquoise area covered by the 1850 Robinson Huron Treaty.[11]

Prior to the signing of the Robinson-Huron Treaty the land was governed for some time through the Great Lakes Confederacy, an alliance of Indigenous nations that negotiated peace with the British Crown at the Treaty of Niagara[12].

For Indigenous peoples across Turtle Island, the land provides all sustenance, fulfilling physical, cultural, and spiritual needs. The land and the connection to the land is incredibly important. Locally, land is used in many ways. Now and in the past, it was or is currently used for camps, hunting, ceremony, collecting foods, creating goods, and for trade routes. In the past, modification of the landscape was a common practice to improve local resources and livability. For example, cultural fire was used to improve habitat for deer, pine, oak, and other culturally important species. Pine and oak are adapted to fire and were abundant on the landscape before settlers arrived because of cultural fires. Areas with ample pine and oak today are often thanks to historical cultural fire practices. Waterways were important transportation routes but also provided essential needs for wildlife. Therefore, land closer to waterways was generally used more often for historical habitation, although over-land routes

[11] Adapted from the Government of Ontario's *Map of Ontario Treaties and Reserves*. (2018). Accessed March 12th 2024 from Map of Ontario treaties and reserves | ontario.ca
[12] Anishinabek Nation. (2020). *Anishinabek Nation.* Accessed March 12th 2024 from https://www.anishinabek.ca/who-we-are-and-what-we-do/

and inland camps did exist. Regardless of whether the forest was physically occupied by local First Nations in the past, it forms part of a landscape that currently provides for them.

The Forest has a unique opportunity to provide for the continuity of Indigenous values on their land and continue a rich legacy with a long history. Notes below are provided from a consultation with Norm Dokis and Perry McLeod-Shabogesic on April 8th 2024 where we started to speak about values and protocols. It is recommended to continue this process of speaking with local knowledge keepers and rights holders throughout and beyond the duration of this plan.

- Every tree, plant and species has equal importance.
- Forest management planning is trying to manage for 500 years in the future. This falls into 7 generations teachings.
- All plants are connected above and below ground.
- All plants have medicine - one tree has so many uses and gifts that it allows us to tap into.
- Spiritual connection to plants and animals is that they do magical things.
- Allowing trees and plants to grow where they want to. If we assist them, we do it in a way that is natural to them. Do not go against natural order.
- Stop thinking about our needs only and start thinking about how the forest feeds the animals who call it home.
- Managing diversity is crucial. Beaver ponds can help to create natural diversity. Fire has also been used in the past to open up the forest.
- Practice of **two-eyed seeing**. Seeing from the perspectives of the fish, pond, trees, and all others. Think about ourselves "WITH" everything. We are part of it, but not all of it. We must think with a broader sense.
    - Taking plants from their area of birth and moving them somewhere else, which is different from how plants find their way where they need to go.
- Don't dig it out, you will kill it. You take out what will come off easily with your hand - what it is willing to "give you".
    - Protocol: Take only what you need!
    - You must ASK for gift.
    - maple tree example: new tools that suck out the sap rather than just taking what the tree will give you in its' time.
- Some specific plants that were highlighted are
    - Chaga/Ishkitagaan harvesting (all about money and not harvested properly). Spiritual process is not being followed. Take off what it will give you, using your hand, not a knife to cut it out.
        - White Oak (Bur Oak) are important species to plant.
        - Service berry (underutilized), wild crab apple.
        - White birch is a pioneer species. Opportunity to plant white birch.
        - Golden thread needs protection.
        - Spruce tips can be eaten as fruit in the spring
        - Balsam is a powerful medicine and shade tree to other plants. Balsam tips aids with asthma

These living values are to be promoted and protected. Any special spiritual or cultural sites identified on the property will be protected with appropriate measures such as:

- Gathering with rights holders to discuss specific activities
- Taking only what is needed and asking for gift
- Following this management plan
- Mapping the values

- Using an RPF and certified tree markers for all harvests, who will identify cultural values as part of the harvest planning process and apply best practices to protect these values
- During operations, applying measures to protect cultural values, such as using buffers

A non-exhaustive list of further resources on the local history can be found below.

Culture & Heritage » Nipissing First Nation (nfn.ca)
Historical Documents » Nipissing First Nation (nfn.ca)
Our Land, Future, & People - Dokis First Nation

Canadore College houses the First People's Centre in the Village and has a specific policy B-16 on Indigenous Education and Training

4.0 General Description

This section provides a general description of the forest, the landscape it grows on and the disturbances that may affect it. The forest is characteristic of the mixed deciduous and coniferous cover of the Great Lakes St Lawrence region. More in depth descriptions of the forest are provided on stand level in section 6.

Area: Approximately 185 hectare/460 acres on the 600+ acre College Drive Campus

Species Diversity:

- 21 different tree species were inventoried. An additional 3 species were observed during the inventory. Overall the forest is characteristic of forests along the northern edge of the Great Lakes St. Lawrence Forest Region.
- In total 436 species have been identified through the Campus Biodiversity Network.[13] Some of these may require further identification to confirm down to species level
- The forest is connected to large areas of forest and wetland cover providing good opportunities for species to live and interact with the forest.

Water:

- The forest contains the lower part of the Duchesnay Creek watershed. This includes two anthropogenic ponds, the Duchesnay Creek Waterfalls and several wetlands ranging from treed swamps, to alder dominated wetlands and acidic fens. Some of the main features are depicted in Figure 7.

[13] See project details here: Campus Biodiversity Network - Canadore College

Figure 7: Water features noted during inventory work in July and August 2023. Additional water features exist within the forest. Many of the forested areas along the watercourses show riparian characteristics at varying distances from the water source. Vernal pools are dotted throughout the forest.

Figure 8 :Duchesnay Creek Waterfalls on November 1st 2023

Topography and Geology: The forest is growing on varying topography due to the presence of the Laurentian Escarpment. Generally it has a southern aspect, but sections of the Escarpment are also facing East and West. The Laurentian Escarpment was formed in the same seismic event a half billion years that also created the Ottawa Valley[14].

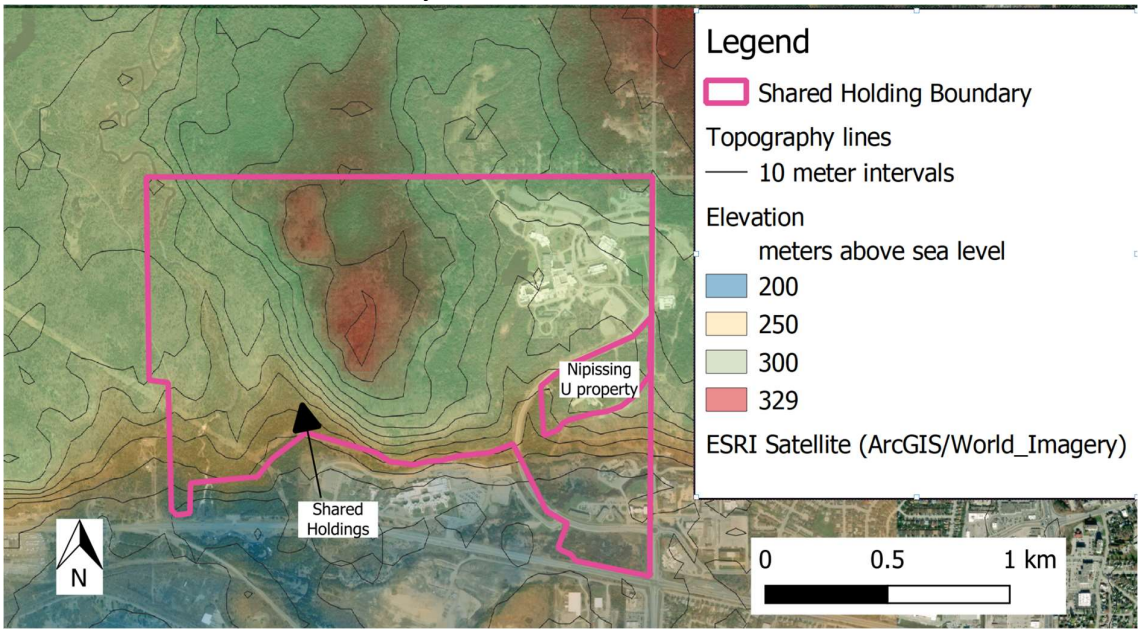


Figure 9: Elevation Map. The Laurentian Escarpment can be seen along the topography lines that are spaced closely together along the southern boundary of the forest.

[14] North Bay Mattawa Conservation Authority (n.d.).

Figure 10: View looking south on Lake Nipissing from the Lookout Tower

Soil: Based on the Ontario Soil Survey Complex obtained from Land Information Ontario there are two soils with records on the property, Monteagle Sandy Loam[15] and Wendigo Sany Loam[16]. General characteristics are described below and general boundaries are presented in Figure 5.

- Sandy Loam texture over granite bedrock
- Well Draining with some moisture retention in upper horizons
- Wendigo is Very Coarse and Monteagle is Moderately Course
- Both are derived from morainal till deposited by the glacier.
- The position of the forest also means that the soil deposition has also been influenced by its position around 11000 years ago within and at the edge of the post-glacial Lake Algonquin at its outlet into the Champlain Sea. See Figure 5.
- The soil chemistry is medium acidic to neutral (pH 5.6-7.4) with the neutrality of the soil increasing with soil depth
- Soil depths vary greatly on the property and there are also sections of exposed bedrock and rock barrens that are only covered in mosses and lichens.

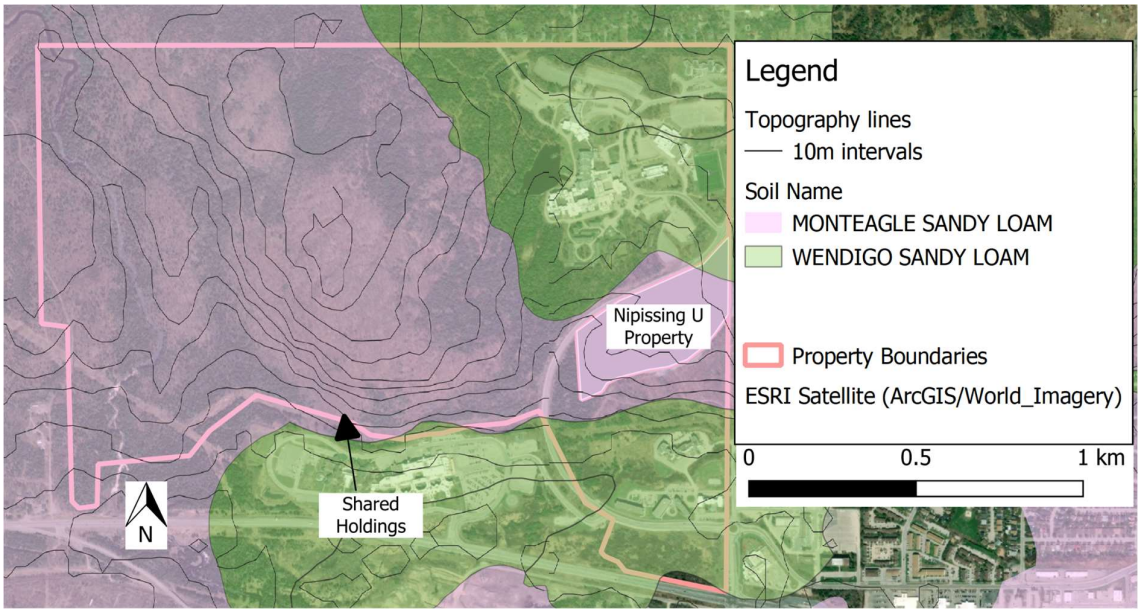


Figure 11:Soil map

[15] Government of Canada. (2019). Description of soil ONMGL~~~~~N (MONTEAGLE). Accessed March 12th from Soil Description for ONMGL~~~~~N - Agriculture and Agri-Food Canada (AAFC)

[16] Government of Canada. (2019). Description of soil ONWDG~~~~~N (WENDIGO). Accessed March 12th from Soil Description for ONWDG~~~~~N - Agriculture and Agri-Food Canada (AAFC)

Figure 12 : Example of soil texture from soil exposed by animal digging

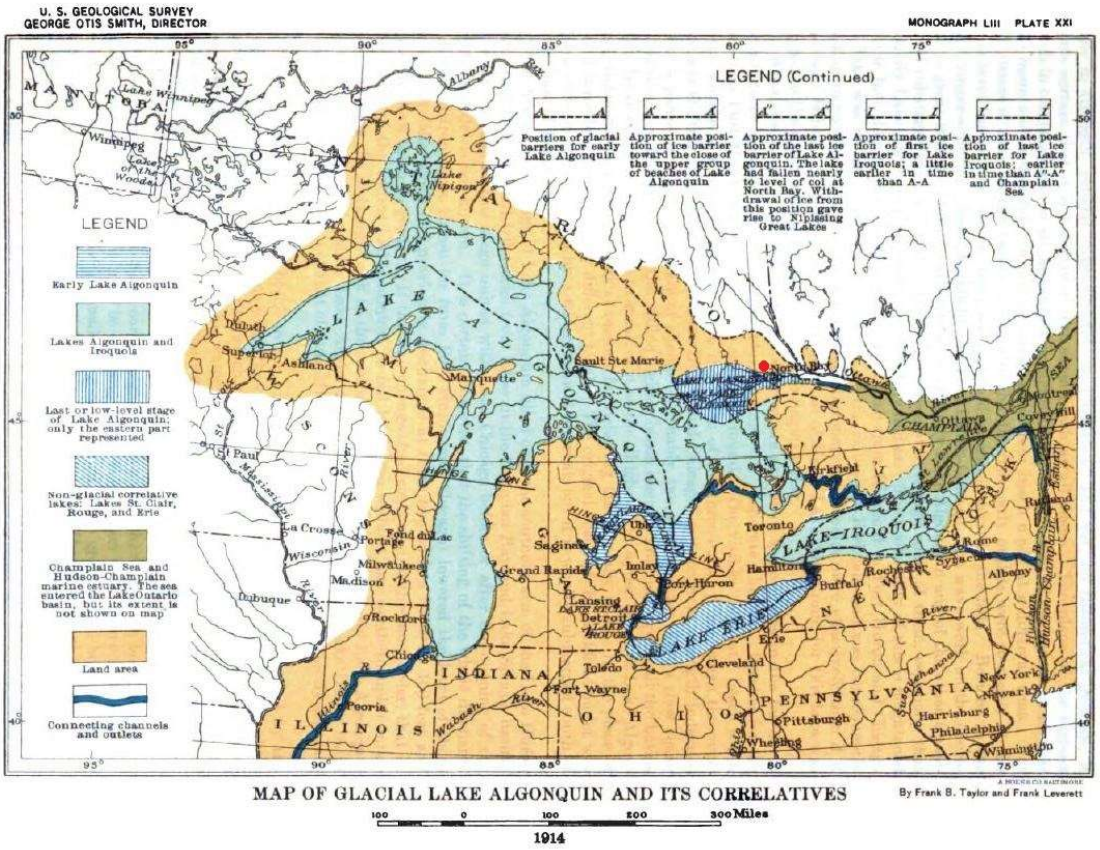


Figure 13: Location of the post glacial big waters.[17] Note how the forest (approximate location depicted by red dot) was at the outlet of the freshwater Lake Algonquin into the brackish Champlain Sea.

4.1 Local Landscape

Flowing from the general overview of the forest above this section looks at the local landscape.The forest exists at an interface of multiple landscapes including urban development and natural forest cover as well as private land, commercial areas and First Nations land.

On the **South** it is bordered by Ontario Highway 17 and the North Bay Memorial Hospital. It is less than a kilometre from this boundary to the shore of Lake Nipissing

To the **West** Nipissing First Nation owns a predominantly forested parcel along the southern section of the Western boundary of the forest. Forested crown land exists further to the north along this boundary. Most of the land going further west is forested, but there are also major hydro lines, a road paving company's yard and several larger lots with houses on them.

[17] Public Domain, sourced from Frank Leverett and Frank B. Taylor - The Pleistocene of Indiana and Michigan and the History of the Great Lakes; U.S. Geological Survey, Monograph, #53; Government Printing Office; Washington, D.C.; 1915. Accessed March 12th from Plate 21 - Glacial Lake Algonquin and its Correlatives (USGS 1915) - Lake Algonquin - Wikipedia

In the **North** the forest is bordered by some suburban private lots along the eastern section and a combination of more forested and wetland covered private and crown land. This forested condition extends north for many kilometres into the Temagami watershed. The first major road is highway 64 which runs between Marten River and Field.

Along the **Eastern** boundary there is forested private land on the northern section and the southern section is bound by Gormanville Road. A provincial police station and a commercial zone exists on the other side of Gormanville road as well as a residential neighbourhood.

Forest Resource Inventory (FRI) for the surrounding area was obtained from Nipissing Forest Resource Management to provide a high level overview of what the surrounding conditions are. The map below depicts the forest types that directly surround the joint holdings of Canadore College and Nipissing University. Full details of the FRI are available upon request. Overall the joint holdings contain a similar diversity of forest types to the surrounding area.

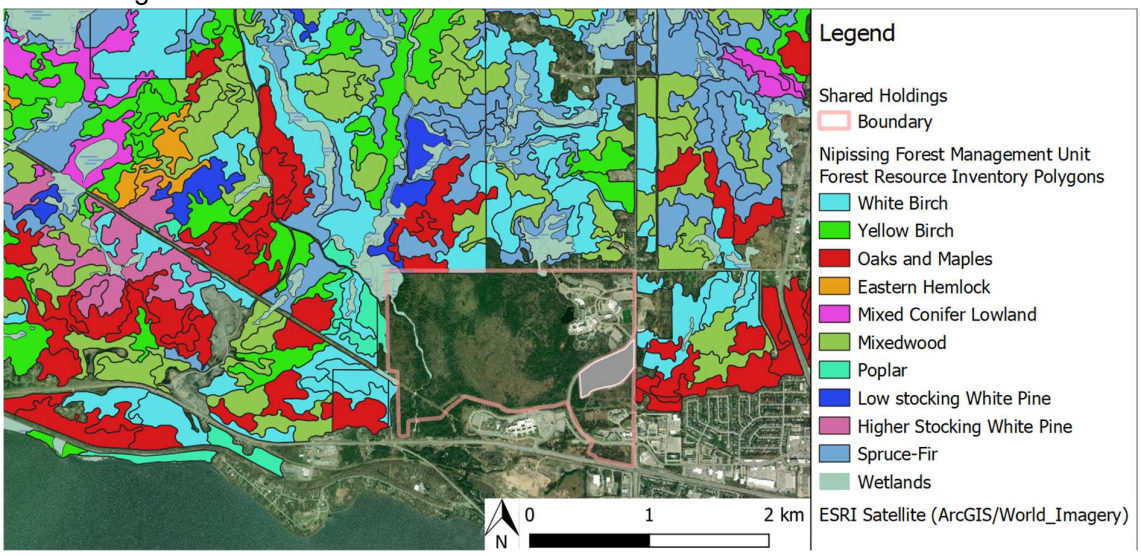


Figure 14: Forest types derived from the Nipissing Forest Management Unit FRI

4.2 Disturbances

Forests are always changing and it is through this changing that forest dynamics and succession plays out. Sustainable Forest Management mimics and works with disturbances to achieve objectives. It is for this reason that it is important to understand the basics of common disturbances and what the risk levels are of these occurring in the forest.

Disturbances can vary in intensity and frequency and in many cases can promote enhanced diversity and structure in the forest. For example White Pine forests can benefit from low intensity fires to create suitable canopy gaps and soil conditions for its seedlings to regenerate. Conversely disturbances can also bring in agents of change that degrade the ecological functioning and long term health of the forest. An example of this is the unchecked spread of invasive species through human activities.

Disturbances are a product not only of the internal dynamics of the forest but also a product of how the forest interacts with the surrounding landscape. A porcupine browsing on a conifer does not care what side of the property line they are on.

Landscape level analysis is presented in several figures below.

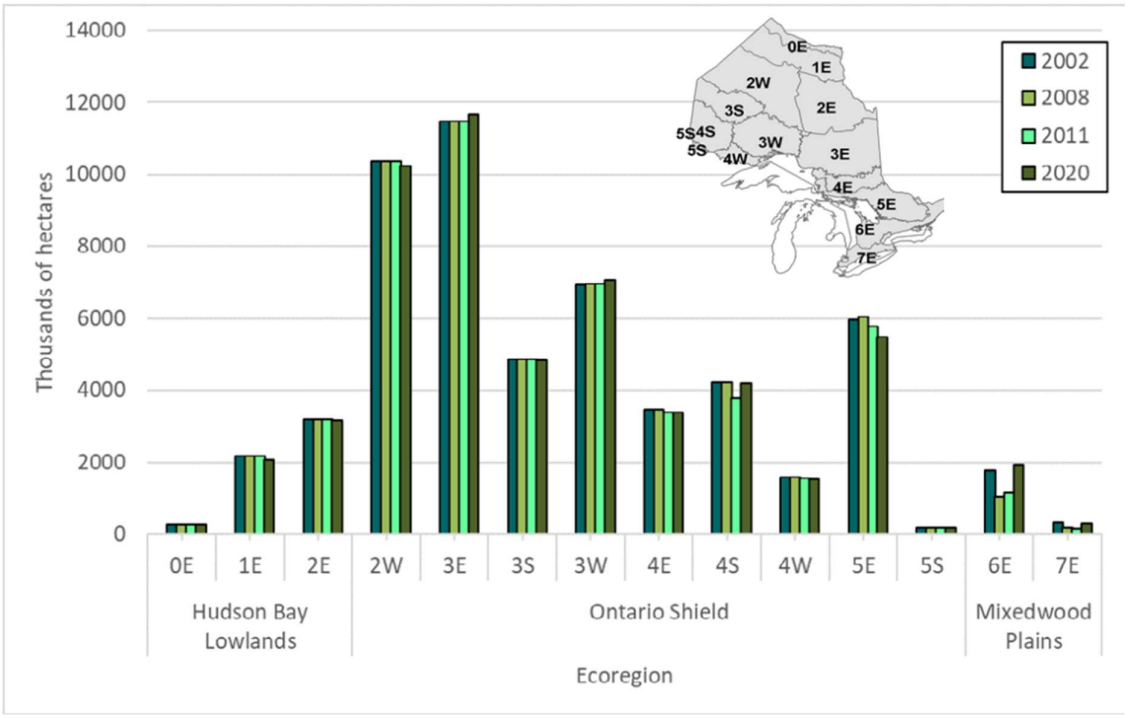


Figure 15: Forest Cover by ecodistrict. The forest is in ecodistrict 5E. Overall we can see that forest cover has decreased slightly over the last 20 years in this ecodistrict.[18]

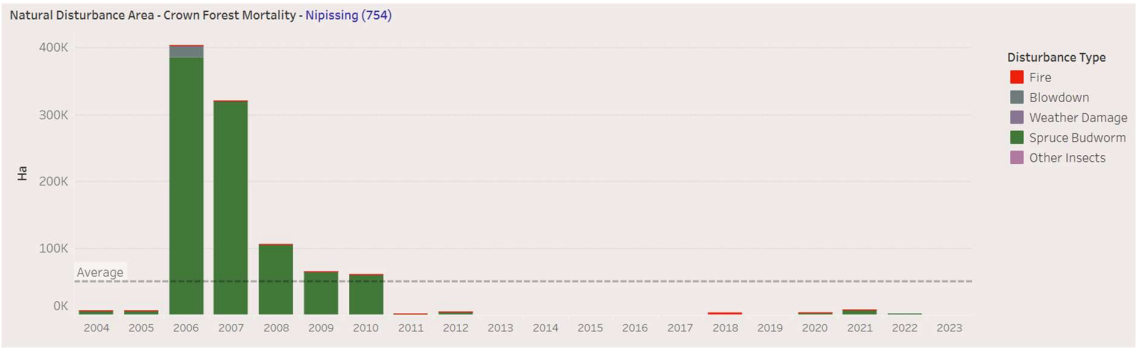


Figure 16: The amount of hectares on crown land affected by disturbance in the Nipissing Forest Management Unit. Spruce budworm is the largest form of disturbance followed by fire.[19]

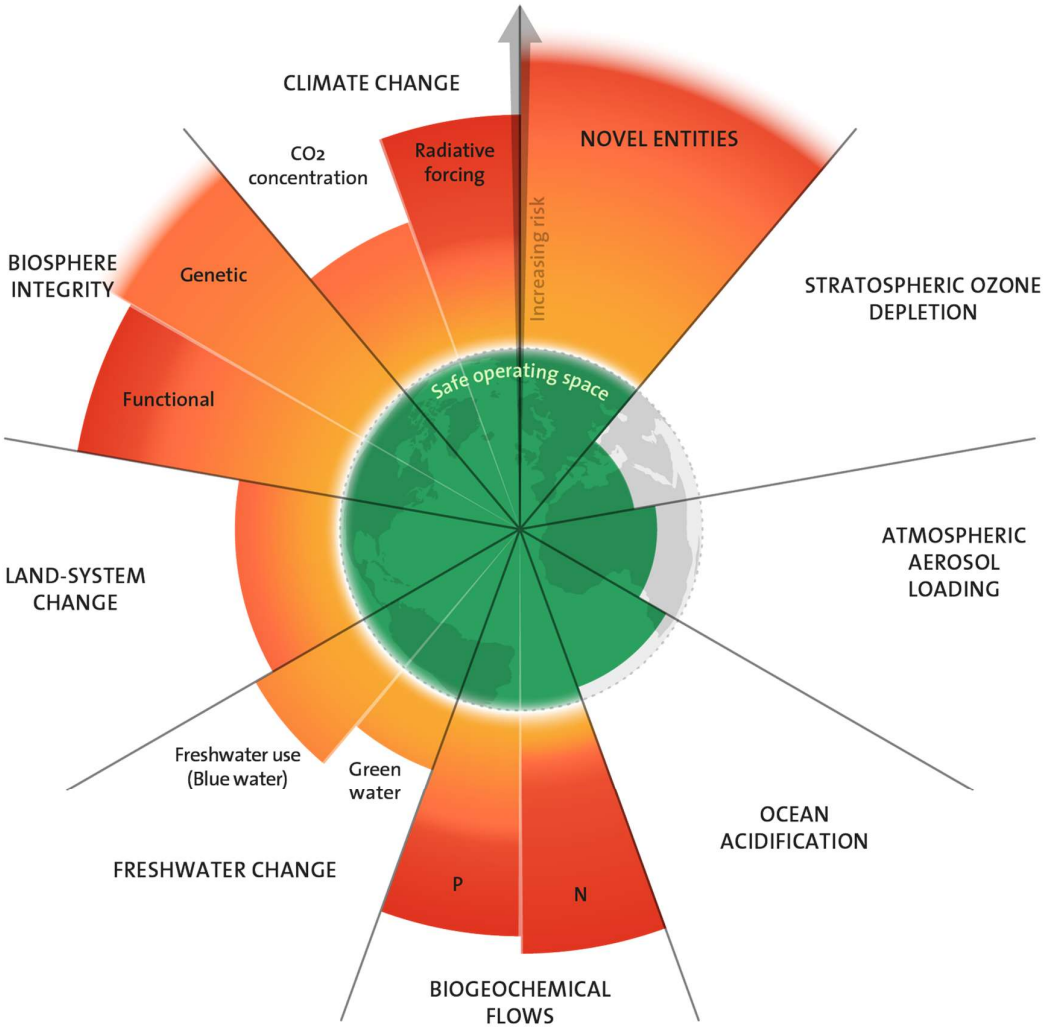
Some of the major disturbance types affecting the forest and surrounding areas are described below with a high level analysis of their intensity, frequency and associated risks.

[18] Ontario Biodiversity Council. (2021). State of Ontario's Biodiversity [web application]. Ontario Biodiversity Council, Peterborough, Ontario. Accessed March 14th 2024 from http://ontariobiodiversitycouncil.ca/sobr

[19] Forest Explorer.(2021). Ontario Forest Facts. Updated March 13th 2024. Retrieved on March 15th 2024 from OntariosForestFacts | Tableau Public

4.2.1 Climate Change

Disturbances are shaped by the broader climate in which they take place. Climate refers to the weather conditions that prevail in an area over longer periods of time. Climate and the weather conditions that shape it can also more broadly be interpreted to include novel species introduced to a habitat, biogeochemical flows and land systems change such as conversion of forests to annual agriculture. These and more are depicted in Figure below from Richardson et al. (2023)[20]. The boundaries referred to in this framework are the major systems that provide resiliency and stability on the planetary scale.



[20] Richardson, et al. (2023). Earth beyond six of nine planetary boundaries. *Science Advances* 9, 37. Retrieved March 16th 2024 from DOI: 10.1126/sciadv.adh2458

Figure 17: Planetary Boundaries 2023 Assessment[21]

This plan will not delve into the details of every boundary in the above framework. It is important to keep in mind the other factors that influence weather conditions and climate change.

Some off the bigger impacts and predicted impacts of climate change on forests in the region are:

- *changes in forest growth due to climate warming and changes in precipitation*
- *changes where tree species can grow*
- *extreme weather events, wildfires and other natural disturbances*[22]

Further details can be found in Chapter 3.5 of the Regional Perspectives Report[23]. An additional detailed analysis on potential indicators is provided in Gauthier et al. (2014)[24]. Examples are as varied as the bud burst, return of migratory birds to human activities.

What the impacts will be is hard to predict and may lead to an increase and frequency in disturbance. We have already witnessed this increase in frequency and intensity of ongoing boreal fires across Canada[25] as one example. Generally the impacts of climate change on forests is expected to be negative[26]. Detailed maps covering precipitation patterns,

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[21] Licensed under CC BY-NC-ND 3.0 "Azote for Stockholm Resilience Centre, based on analysis in Richardson et al 2023". Accessed March 15h 2024 from All planetary boundaries mapped out for the first time, six of nine crossed - Stockholm Resilience Centre

[22] OMNRF. (2016). Managed Forests and Climate Change. [Updated August 2nd 2022]. Accessed March 16th 2024 from Managed forests and climate change | ontario.ca

[23] Douglas, A.G. and Pearson, D. (2022). Ontario; Chapter 3 *in* Canada in a Changing Climate: Regional Perspectives Report, (ed.) F.J. Warren, N. Lulham, D.L. Dupuis and D.S. Lemmen; Government of Canada, Ottawa, Ontario. Retrieved from Chapter 3 — Regional Perspectives Report (changingclimate.ca)

[24] Gauthier, S.; Lorente, M.; Kremsater, L.; De Grandpré, L.; Burton, P.J.; Aubin, I.; Hogg, E.H.; Nadeau, S.; Nelson, E.A.; Taylor, A.R.; Ste-Marie, C. (2014). Tracking climate change effects: potential indicators for Canada's forests and forest sector. Natural Resources Canada, Canadian Forest Service, Ottawa, Ontario. 86 p. Accessed March 18th 2024 from Tracking climate change effects: potential indicators for Canada's forests and forest sector - Federal Open Science Repository of Canada

[25] International Society of Fire and Rescue Services. (2024). 2024 Wildfire Season: Canada fights against "zombie fires" that survived underground from 2023. Accessed March 16th 2024 from 2024 wildfire season: Canada fights against "zombie fires" that survived underground from 2023 | CTIF - International Association of Fire Services for Safer Citizens through Skilled Firefighters

[26] Edwards, J.E.; Pearce, C.; Ogden, A.E.; Williamson, T.B. 2015. Climate change and sustainable forest management in Canada: a guidebook for assessing vulnerability and mainstreaming adaptation into decision making. Canadian Council of Forest Ministers, Ottawa, Ontario. 160 p. Retrieved March 16th 2024 from Climate change and sustainable forest management in Canada: a guidebook for assessing vulnerability and mainstreaming adaptation into decision making. - Federal Open Science Repository of Canada

temperatures and agricultural metrics such as frost free days are available from the Climate Atlas of Canada[27]

Climate change is already impacting the forest and the risks associated with this are moderate.

Tree species specific analysis of vulnerabilities to climate change have been obtained from the USDA Forest Service Tree Atlas[28] and Natural Resources Canada's Species Specific Models and Maps[29]. An example of each of these resources is presented below.

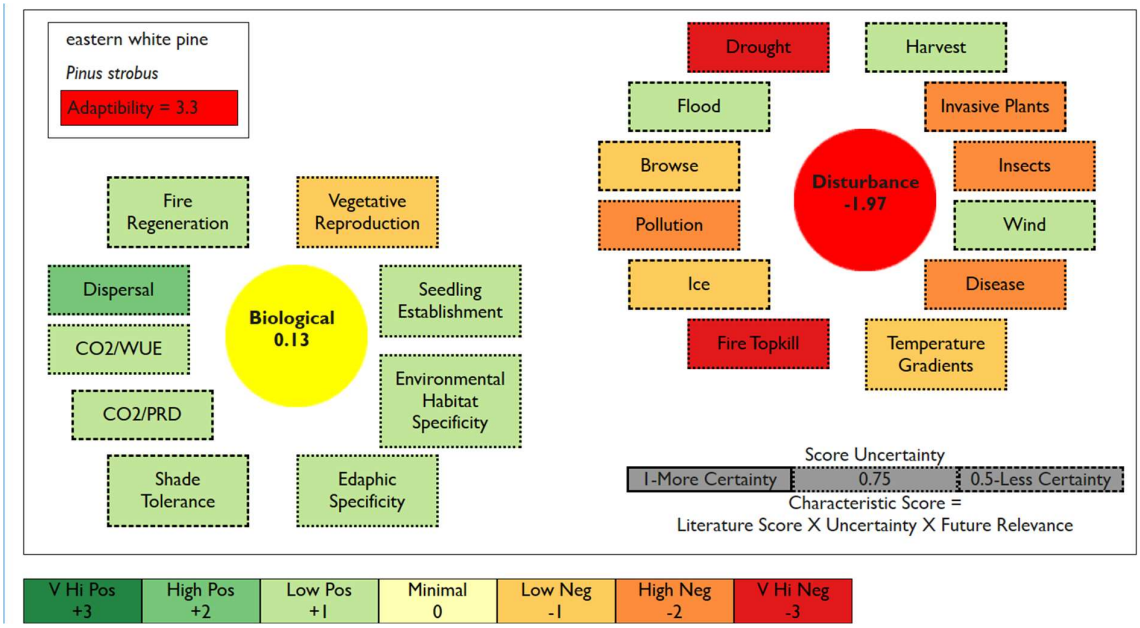


Figure 18: Example of climate vulnerability analysis for White Pine from the USDA Forest Service Tree Atlas version 4.

[27] Climate Atlas of Canada. (2019). Climate Maps for Forests. Accessed March 18th 2024 from Climate Maps for Forests | Climate Atlas of Canada
[28] USDA Forest Service. (n.d.) Tree Atlas Version 4. Accessed March 18th 2024 from Tree Atlas - Climate Change Atlas - Northern Research Station, USDA Forest Service
[29] Natural Resources Canada. (2022). Species Specific Models and Maps. Accessed March 18th from Canada's Plant Hardiness Site

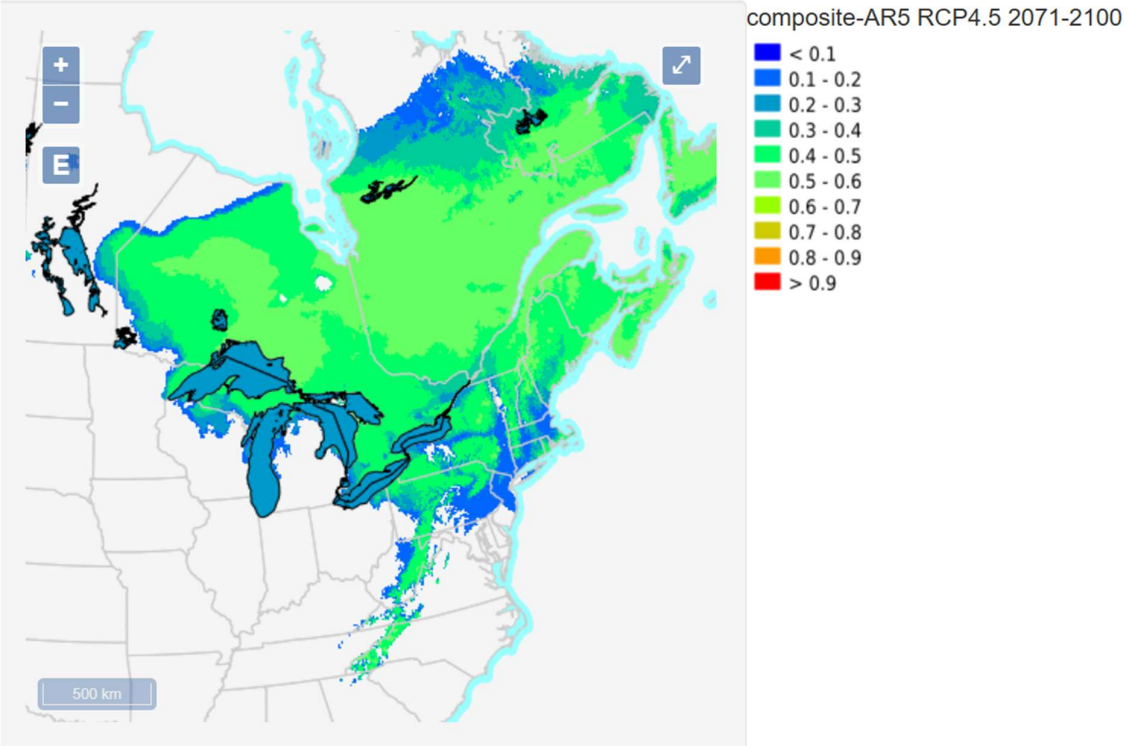


Figure 19: Predicted Climate Envelope for White pine under the RCP 4.5 emission scenario for the years 2071-2100 from Natural Resources Canada.

Further comments on climate change vulnerabilities and impacts on the forest are provided in section 6.1.2.

A climate adaptability assessment by tree species is provided in Annex C.

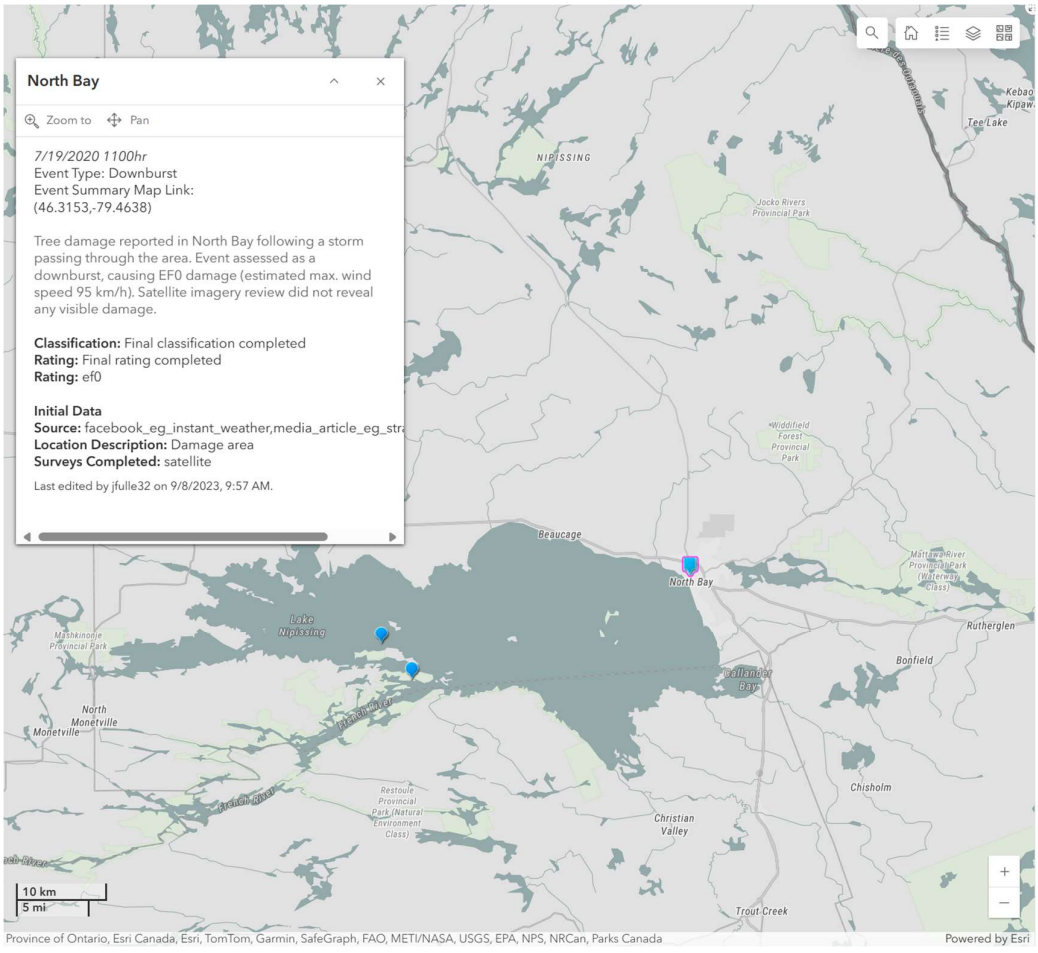
4.2.2 Weather

The most common forms of weather based disturbance for the forest are wind, drought and ice storms. Additionally temperature and precipitation have already increased and are expected to increase[30] throughout the duration of this plan and beyond. The most common disturbance observed during the inventories that informed this plan was wind damage. A lot of the wind damage affected stands with balsam fir that have likely previously been weakened by spruce budworm. The wind damage observed was typical for the gap phase dynamics of the Great Lakes St Lawrence forest types and was limited to single trees or small sections of blowdown no bigger in diameter than the height of surrounding trees.

[30] Bush, E. and Lemmen, D.S. (Eds.) (2019). Canada's Changing Climate Report. Government of Canada, Ottawa, Ontario. Retrieved March 16th from https://doi.org/10.4095/314614

Wind: Wind storms cause various intensities of disturbance in the forest ranging from single tree blowdowns to large scale events such as downbursts and tornadoes that may impact larger swaths of forest. Single tree and blowdowns affecting small groups of trees favour shade tolerant species and the development of a multi-aged forest. Larger blowdowns favour intolerant tree species or even a period in time where the forest cover can be dominated by herbaceous plants and shrubs such as raspberries.

From observations and inventories of the forest for this plan the main form of wind damage is on a single tree level. Figure 20 below maps some of the more recent high wind events. Vaswani et al. (2011) provide evidence for an increase in wind speeds from 1980 to 2010[31] while Shah et al. (2022) report a declining occurrence of high wind speeds in a study that uses data from the North Bay weather station as well as 5 others across Southern and Central Ontario[32]. Regardless of the increase or decrease in high speed winds these types of storms are usually highly localised in Ontario. Wind will continue to impact the forest through this plan with single tree blowdowns being the most likely form of disturbance. Overall the risk to forest health is low.



[31] Vaswani, M., Higuchi, K. and R. Bello (2011). Climatological and Extreme Winds over Ontario 1980-2010 using the NARR Data. Department of Geography York University. Retrieved March 16th 2024 from Climatological Winds Over Ontario 1979-2010

[32] Shah, Lamees & Arnillas, Carlos & Arhonditsis, George. (2022). Characterizing temporal trends of meteorological extremes in Southern and Central Ontario, Canada. Weather and Climate Extremes. 35. 100411. Retrieved March 16th 2024 from 10.1016/j.wace.2022.100411.

Figure 20: Observation of wind storms reported to the Northern Tornado Project with the most recent wind event near North Bay highlighted in red[33]

Drought: Droughts have occurred over the last century in the Great Lakes Basin, but without any long term trends[34] Historically drought has not been a major influence on forests in northeastern Ontario[35]. The NFRM FMP of 2019-2029 only mentions drought affecting 5% of the areas that they reforest through tree planting[36]. Droughts are expected to increase in the Great Lakes Basin. The general pattern is predicted to feature surplus water in the winter, with surface water deficit becoming more common in the spring and fall[37]. Droughts can cause dieback, stress and reduced growth in trees making them more vulnerable to other disturbances[38].
The risk of solely drought impacting the forest is low. Generally there will be a higher risk for certain tree species with lower drought tolerance or if drought creates stress that exacerbates other disturbances.

Ice storms: Ice storms that significantly damage trees and swaths of forests are uncommon in the area of the forest. For the wider landscape occurrences of major ice storms are reported to be between 20 and 100 years[39] and up to a millenium[40]. Damage and mortality to trees in the forest occurs immediately as well as playing out of the next several years.[41] The intensity is low with ice storm damage causing single tree and small group mortality that is in line with regular mortality levels in mixed deciduous forests[42]. In terms of forest health the risk of ice storms is considered low.

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[33]Northern Tornado Project. (2024). NTP Investigated Events: Interactive Dashboard Retrieved March 16th 2024 from Northern Tornadoes Project - Event Dashboard (arcgis.com)
[34] Yusa A, Berry P, J Cheng J, Ogden N, Bonsal B, Stewart R, Waldick R. Climate Change, Drought and Human Health in Canada. Int J Environ Res Public Health. 2015 Jul 17;12(7):8359-412. doi: 10.3390/ijerph120708359. PMID: 26193300; PMCID: PMC4515727.
[35] Girardin, Martin & Tardif, J. & Flannigan, Mike & Wotton, Mike & Bergeron, Yves. (2004). Trends and periodicities in the Canadian Drought Code and their Relationships with atmospheric circulation for the southern Canadian boreal forest. Canadian Journal of Forest Research. 34. 103-119. 10.1139/x03-195.
[36] NFRM. (2019).
[37] Tam, Benita & Szeto, Kit & Bonsal, Barrie & Flato, Gregory & Cannon, Alex & Rong, Robin. (2018). CMIP5 drought projections in Canada based on the Standardized Precipitation Evapotranspiration Index. Canadian Water Resources Journal / Revue canadienne des ressources hydriques. 44. 1-18. 10.1080/07011784.2018.1537812.
[38] Douglas and Pearson. (2022).
[39] Pasher, J., King, D.J. Landscape Fragmentation and Ice Storm Damage in Eastern Ontario Forests. *Landscape Ecol* **21**, 477–483 (2006). https://doi.org/10.1007/s10980-005-5244-x
[40] Deschênes, Élise & Brice, Marie-Helene & Brisson, Jacques. (2019). Long-term impact of a major ice storm on tree mortality in an old-growth forest. Forest Ecology and Management. 448. 386-394. 10.1016/j.foreco.2019.06.018.
[41] Deschênes et al. (2019) and Hopkin et al. (2003).Ice storm damage to eastern Ontario forests: 1998-2001. The Forestry Chronicle Vol 79 No.1. Accessed March 16th 2024 from Ice storm damage to eastern Ontario forests: 19982001 (cif-ifc.org)
[42] Deschênes et al. (2019

4.2.3 Fire

Forest fire incidences are low on the Nipissing Forest[43] as can be seen in comparison to the rest of Canada in the figure below.

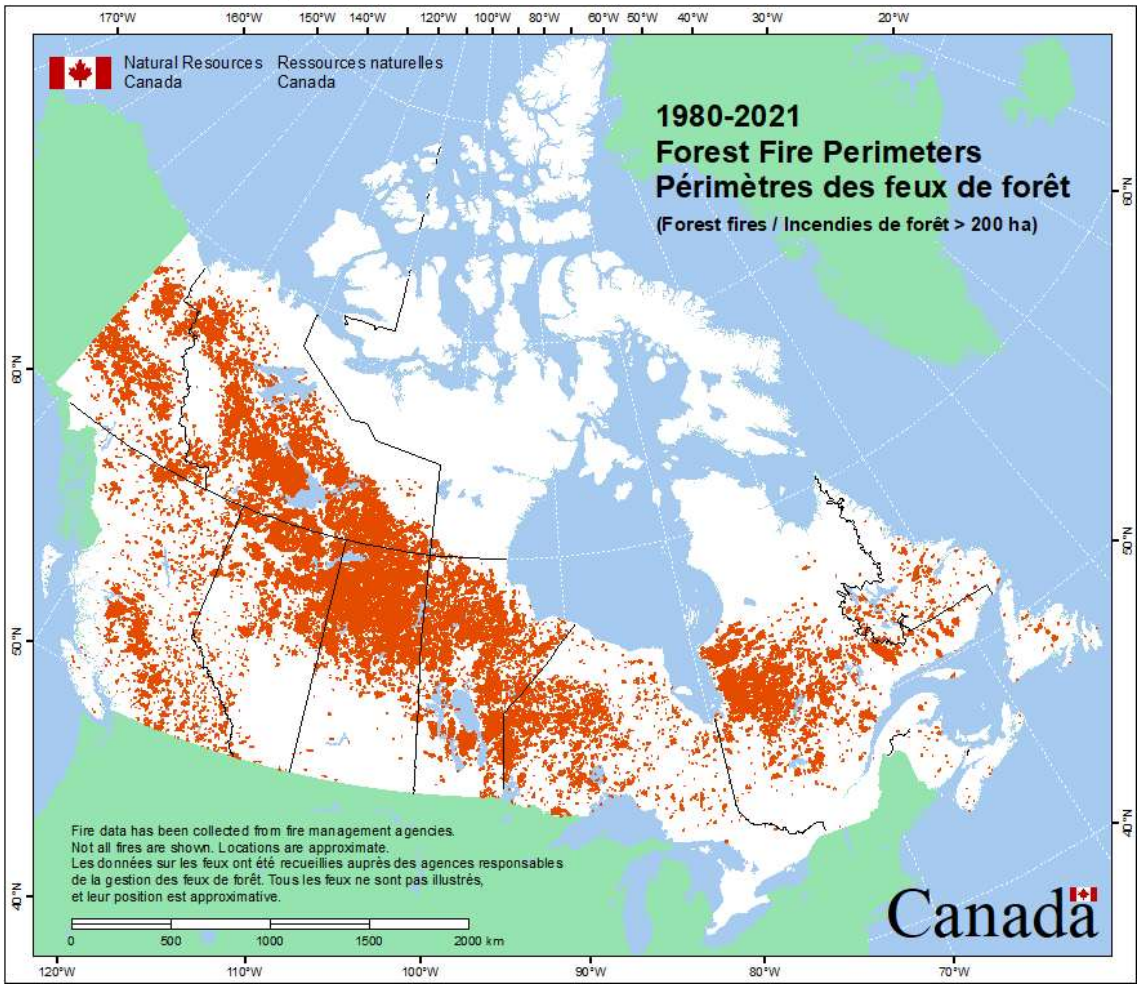

Figure 21: Fire perimeters reported by the Canadian National Fire Database[44]

There are three basic types of forest fires that range in intensity[45]. Crown fires consume whole trees and can create their own fire weather conditions to further fuel themselves, whereas, surface fires burn surface litter and damage young and fire intolerant trees. There are also ground fires which burn and even overwinter in layers of humus, peat and other subsurface layers.

Generally dense conifer forests with ladder fuels (dead branches that extend close to ground level) are the most vulnerable to forest fires. There is also a window of opportunity when spruce budworm killed trees are more vulnerable to fire[46]

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[43] NFRM. (2019).

[44] Natural Resources Canada. (n.d.) Canadian National Fire Database. Retrieved March 16th 2024 from Canadian Wildland Fire Information System | Canadian National Fire Database (CNFDB) (nrcan.gc.ca)

[45] Government of Canada. (2021). Fire Behaviour. Accessed March 16th 2024 from Fire behaviour (canada.ca)

[46] Candau J-N, Fleming RA, Wang X. (2018). Ecoregional Patterns of Spruce Budworm—Wildfire Interactions in Central Canada's Forests. *Forests*.9(3):137. https://doi.org/10.3390/f9030137

Fires are caused by lightning strikes and more commonly by human lit fires. The forest's location near North Bay means that there has likely been a history of fire suppression should any fires have started in the forest.
The risk of forest fires in the forest can be considered low, although there are areas that are more prone to fires than others. This risk level may change with increased summer droughts as a result of the changing climate.The forests location near a populated centre means there is higher risk for fires to be started by humans but also more capacity to put out the fire should it start.

4.2.4 Development and trails

Conversion of forested landscapes for development purposes is one of the major threats to forests near populated centres. Exact data for North Bay and the Nipissing District is not readily available. Generally the risk of forest loss is lower in Northern Ontario and the primary cause of deforestation in Northern Ontario is forest access roads.

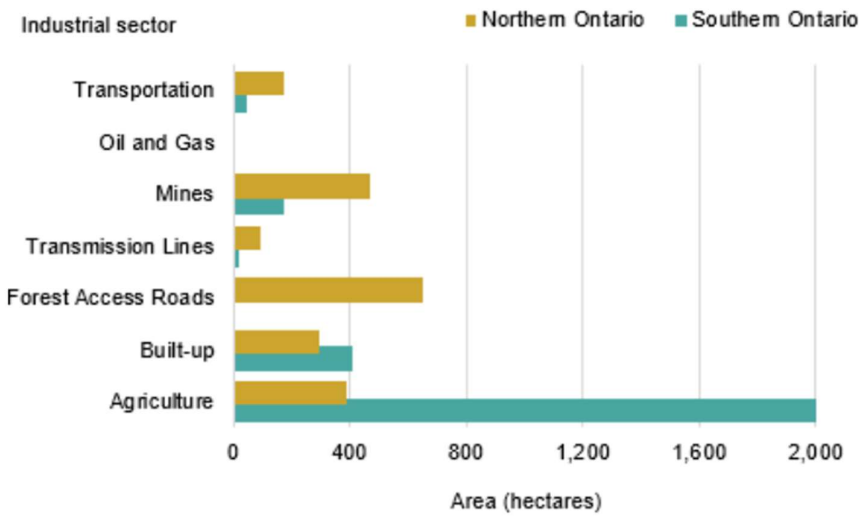

Figure 22: Human based causes of deforestation[47].

The risk of development of the forest is unlikely considering the value placed upon its natural condition by the landowners.
Development of neighbouring areas is also unlikely in the upcoming years. The City of North Bay has several target areas for development. The only one currently eligible for financial incentives that directly borders the forest is the Industrial Target Area[48]. As can be seen from the figure below the closest eligible area is south of Highway 17 and development here could affect neighbouring forest cover along the bottom reaches of Duchesnay Creek. Other land within the City of North Bay limits that borders on the forest is zoned as residential.

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[47] Ontario Biodiversity Council. (2021). Indicator: Afforestation and Deforestation. Accessed March 14th from State of Ontario's Biodiversity | Afforestation and Deforestation - State of Ontario's Biodiversity (sobr.ca)

[48] City of North Bay. (2020). Target Areas. Accessed March 16th 2024 from Target Areas | City of North Bay

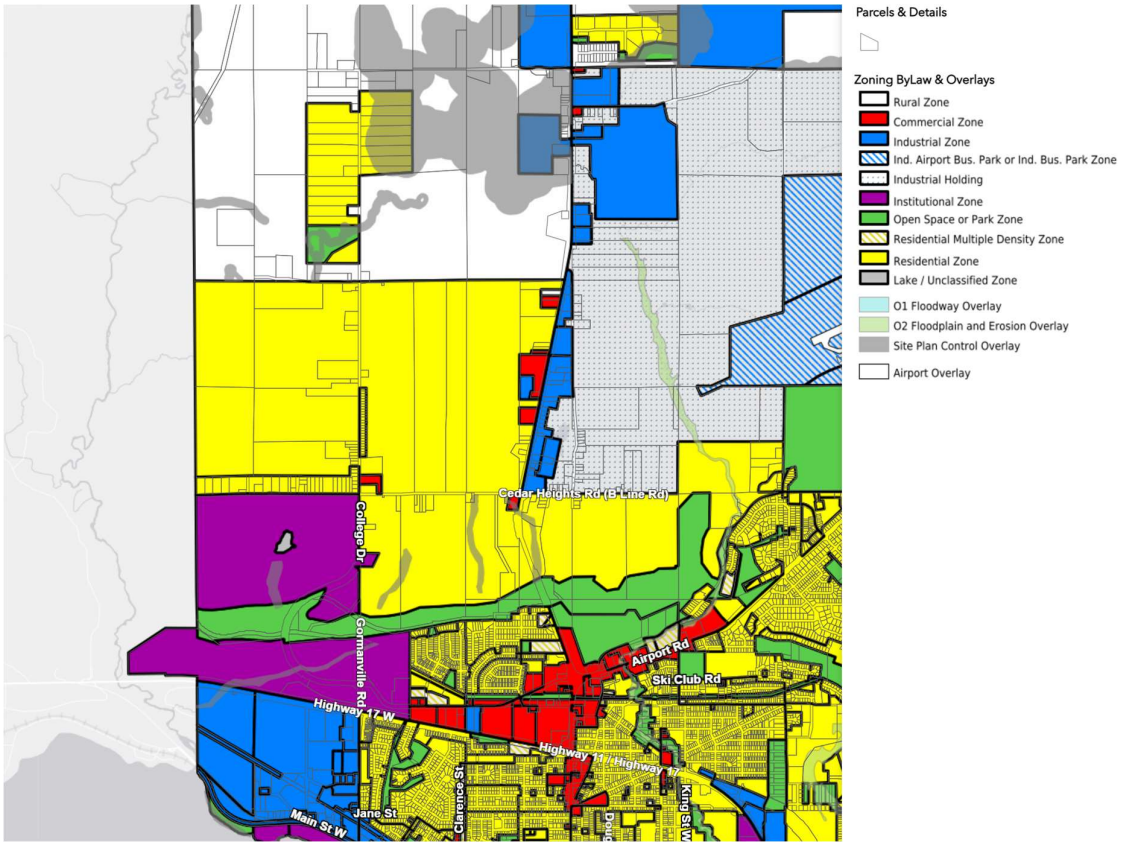

Figure 23: City of North Bay Zoning[49]. The forest is largely situated within the purple polygons on this map. Zoning Portal Web App (arcgis.com)

Smaller forms of development such as trails and structures in the forest can also impact the forest. Trails if improperly built, distributed and used can cause erosion, excess water runoff, sedimentation in waterways and impact biodiversity.

Current trail coverage is reported at 11.6 km with several smaller sections of unauthorised trails existing throughout the estimated 1.86km2 of forested land. Using metrics developed by the Minnesota Department of Natural Resources and Forestry the trail coverage in the forest falls in the high density rating.

11.6km trails divided by 1.86km2= 6.2km/km2

Density Rating	Trail Density
Low	0 - 3 km/km^2
Moderate	3 - 6 km/km^2
High	6 – 9 km/km^2
Excessive	Greater than 9 km/km^2

Table 1: Trail Density Rating System[50]

[49] City of North Bay. (n.d.) Zoning Portal Web App. Accessed March 16th 2024 from Zoning Portal Web App (arcgis.com

[50] North Bay Mattawa Conservation Authority. (2017). Laurentian Escarpment Conservation Area Trails Proposal. [Revised May 30 2018]. Retrieved March 16th 2024 from Laurentian Escarpment Conservation Area Trails Proposal (nbmca.ca)

This high rating is typical of public accessible areas where recreation is a major objective[51] as is the case for this forest. This high rating is not a cause for concern as long as good management practices are followed for maintaining, updating and adding in any new trails.

Generally the risk of large-scale development of the forest is low. The risk of trails impacting the forest is high and the development of a trail master plan is one of the major recommended activities to be completed during the period of this forest management plan.

4.2.5 Insects and Disease

Several native insects and diseases have potential to impact the forest. These insects and diseases are cyclical and a part of natural dynamics and succession in the forest. They vary in intensity and generally do not cause excessive mortality. However if the forest is stressed due to other reasons such as drought, insects and diseases may have a bigger impact.

Some of the most relevant insects and diseases for the conditions of the forest are described below. A more comprehensive database is available from Natural Resources Canada[52].

As can be seen from Figure 16 above in section 4.2. **spruce budworm** is the largest form of disturbance in the Nipissing Forest Management area. This holds true for the joint holdings of Canadore College and Nipissing University as well, where many of the balsam fir trees and some of the white spruce trees have budworm damage or are now standing dead trees after being killed by the spruce budworm defoliation. Impacts are biggest in the spruce-fir stands (approximately 5% of the forest cover) and mixedwood stands (approximately 35% of the forest cover). Heavy spruce budworm infestations generally occur on a 30 year cycle[53]. As mentioned in section 4.3.5 spruce budworm can create higher risk for fires in a multi-year window following defoliation and mortality. The risk of spruce budworm is high.

White Pine Weevil is a native insect that preys upon white pines. Larvae feed on the central leader of young white pine. This rarely causes mortality but does affect the form of the tree. Rather than having a single stem, trees will develop with branchier architecture. This affects timber quality and may make some branches more prone to breaking off in high winds. The adult weevil can only fly 5 metres high so the risk is highest in young trees grown without an overstory to protect them. Many of the mature pine trees in the forest show signs of being affected by white pine weevil. This is likely due to full sun conditions they regenerated in following the harvesting at the turn of the 19th to 20th century. For further information on control methods see the Government of Canada factsheet[54].

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[51] North Bay Mattawa Conservation Authority. (2017).
[52] Government of Canada. (2015). Trees, Insects and Disease of Canada's Forests. Accessed March 17th 2024 from Trees, insects and diseases of Canada's forests (nrcan.gc.ca)
[53] Government of Canada (2012). Spruce Budworm. Accessed March 16th 2024 from Spruce budworm (nrcan.gc.ca)
[54] Government of Canada (2011). White Pine Weevil. Accessed March 16th 2024 from White pine weevil (nrcan.gc.ca)

Forest Tent Caterpillar[55] and Fall Webworm[56] are two native defoliators with multiple host trees including cherries and poplars. Forest Tent Caterpillar larvae defoliate trees earlier in the growing season and large infestations can occur. Fall Webworm feeds on trees towards the end of the growing season and rarely defoliates trees completely. The forests exists towards the northern extent of its range. The risk of these species significantly impacting the forest is low.

White Pine Blister Rust[57] is a non-native fungal disease that alternates its life cycle between five needled pines including white pine and species from the currant family (*Ribes spp).* It infects the stem of white pine trees and mostly affects young pine growing densely in plantations without an overstory, often leading to mortality. No blister rust was observed on the white pines within the forest. Prickly gooseberry, a member of the *Ribes* genus, is present in the forest. The risk of white pine blister rust is low.

Nectria[58] and Eutypella[59] also known as target and cobra canker respectively are fungal infections that affect the trunks of trees. They cause large open wounds which do not kill the tree directly but often weaken it to the point of breakage or provide an entry site for other decay fungi to access the tree tissue. These diseases are most common on maples in the forest.

A variety of **fungi** can cause decline in trees. The risk of this negatively impacting the forest is low. Many of these fungi are perennial, members of the polypore family, and feed off the heartwood of trees. While this may gradually cause decline in individual trees these fungi provide an important role in the overall health of the forest, by softening the wood, creating habitat for insects, which in turn attracts woodpeckers who create feeding and nesting cavities which in turn are used by multitudes of other species.

[55] Government of Canada (2023). Forest Tent Caterpillar. Accessed March 16th 2024 from Forest tent caterpillar (nrcan.gc.ca)
[56] Government of Canada (2011b). Fall Webworm. Accessed March 16th 2024 from Fall webworm (nrcan.gc.ca)
[57] Government of Canada (2015b). White Pine Blister Rust. Accessed March 17th 2024 from White pine blister rust (nrcan.gc.ca)
[58] Government of Canada (2015c). Nectria canker. Accessed March 17th 2024 from Nectria canker (nrcan.gc.ca)
[59] Government of Canada (2015d). Eutypella canker. Accessed March 17th 2024 from Eutypella canker (nrcan.gc.ca)

Figure 24: Top row left to right shows 1) False tinder fungus (*Phellinus ignarius)* 2) Pileated woodpecker 3) Nesting and roosting cavities. Bottom row left to right show 1) feeding cavity and hoof fungus (*Fomes fomentarius)* 2) Downed woody debris returning to the forest floor as habitat for forest floor dwellers as well as completing nutrient cycling 3) eastern red squirrel, one of the many species that will also inhabit and use cavities.

Armillaria, Sugar Maple Borer, Black Bark are other insects and diseases which can cause decline in trees. Other common diseases are described in the Ontario Tree Markers Guide on pages 44-62 [60]. Overall the risk of these negatively impacting the forest is low as there is enough healthy growing stock. The health of the forest can be improved through silvicultural harvesting and other operations.

4.2.6 Invasive Species

Invasive species are generally considered to be non-native species that threaten the ecological integrity and diversity of the areas they are introduced to. Some basic information is provided below. More detailed information can be found in the Natural Resources Canada database[61] and best management practice guides are available from the Invasive Species Centre[62]. Recommended management activities for some of these invasive species will be covered in Section

[60] OMNR. (2004). Ontario Tree Marking Guide Version 1.1. Queen's Printer for Ontario. Toronto, 252 p.
[61] Government of Canada. (2015).
[62] Invasive Species Centre (2024). Best Management Practices Database.

Emerald Ash Borer (EAB)[63] is a beetle from Asia that kills almost every single ash (*Fraxinus* spp.) that it infests. Adult beetles feed on foliage before laying their eggs in bark crevices. The larvae produce s-shaped feeding galleries that interrupt the flow of nutrients and water up and down the tree, usually killing the tree within a few years. It is gradually spreading northward and with warmer winter temperatures is expected to infect most of the native range of ash trees in Ontario. The forest contains both White Ash and Black Ash. No EAB was observed but there have been infestations and tree removals in the City of North Bay[64]. Adult EAB can fly within 15km and therefore the risk is high to the Ash trees in the forest.

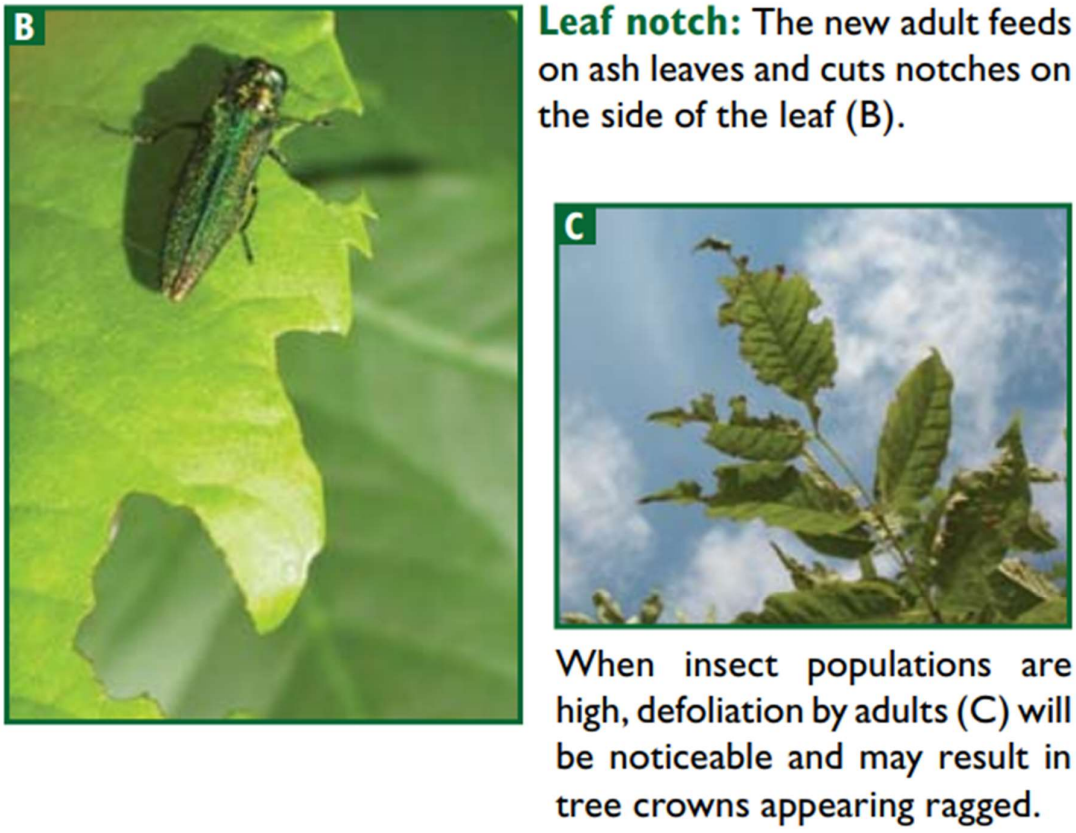

Figure 25: Signs of early EAB infestation from *A visual guide to detecting Emerald Ash Borer Damage*[65]

Spongy Moth[66] is a defoliating insect from Europe that has over 300 hosts; oak and maple trees are some of the more vulnerable trees in the forest. The caterpillars can rapidly

[63] Invasive Species Centre (2024b). Emerald Ash Borer. Accessed March 17th 2024 from Emerald Ash Borer - Profile | Invasive Species Centre
[64] City of North Bay. (2023). City Removing and Replacing Infected Ash Trees. Accessed March 17th 2024 from City Removing and Replacing Infected Ash Trees | City of North Bay

[65] De Groot, P. et al. (2006). A visual guide to detecting Emerald Ash Borer Damage. Accessed March 17th 2024 from 26856.pdf (nrcan.gc.ca)
[66] Invasive Species Centre (2024c). Spongy Moth. Accessed March 17th from Spongy Moth – Profile and Resource | Invasive Species Centre

defoliate a tree. Chance of mortality increases with defoliation in multiple years or when the infested trees are stressed by other factors such as drought. The major infestation in recent years occurred in southern and eastern Ontario, but there were some reports of spongy moth in the City of North Bay[67]. The risk of spongy moth infesting trees in the forest is low to moderate. The average cycle for spongy moth is 7-10 years and the intensity of defoliation can be forecast by inventorying egg masses per hectare[68].

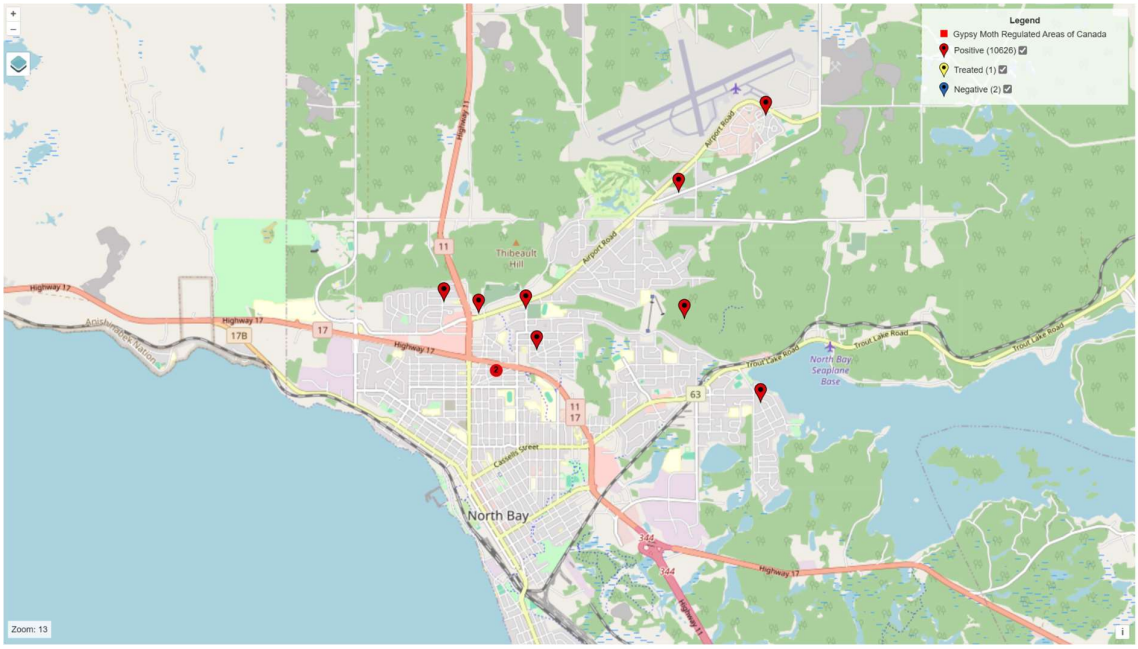

Figure 26: EDDMaps reporting on Spongy Moth[69]. Most of the positive observations are from the year 2020.

Defoliation intensity of the forested stand	Egg masses per hectare
Severe (>75%)	6175
Moderate (40-75%)	1236-6175
Light (1-40%)	1-1235
Nil (0%)	0

Table 2: Adapted from OMNR (2014).

[67] EDDMapS. 2024. Early Detection & Distribution Mapping System. The University of Georgia - Center for Invasive Species and Ecosystem Health. Available online at http://www.eddmaps.org/; last accessed March 16, 2024.
[68] OMNR. (2014). Spingy Moth. [Last updated August 8 2023]. Retrieved March 17th 2024 from Spongy moth | ontario.ca
[69] EDDMapS. (2024).

Hemlock Wooly Adelgid (HWA)[70]is another non-native insect introduced from Asia. It is an aphid like insect with a complex life cycle involving two generations and three different forms. It feeds on the base of Eastern Hemlock needles where they meet the twigs and can be seen as tiny white masses. It kills trees within a few years and has been detected in several locations in Southern Ontario in recent years. Its rate of natural spread is between 12.5 to 20 kilometres per year. Based on this the risk is low of it affecting the forest within the duration of this plan, but it is a major threat moving forward or if other closer populations are detected.

Garlic Mustard[71] was brought by European settlers as a pot herb. Garlic mustard can outcompete native spring ephemerals and understory herbs. It also changes the mycorrhizal composition and decay rates of leaf litter in forests. Additionally garlic mustard poses a threat to virginia white butterflies[72]. These butterflies confuse it for toothworts and when they lay their eggs on garlic mustard instead of toothwort the larvae cannot feed on it and die. A small population of garlic mustard is being actively managed within the forest. Additional populations exist just to the East of the forest boundaries[73]. The risk level is moderate.

Non-native Honeysuckle[74] is present along the southern part of the Forest, near the lower residences. It can impact the forest by outcompeting native shrubs, partially due to earlier leafing out and allelopathic chemicals. The observed population is still small enough that its impact could be mitigated and there are plenty of native shrubs nearby to infill the gaps left by removed non-native honeysuckles.

Japanese Knotweed[75] can form dense thickets that outcompete native vegetation. It is incredibly difficult to get rid of and often needs to be excavated out of the area, as even small fragments of the roots can resprout. It is known to damage infrastructure such as foundations and roads. A stand exists along the trail between the lower residences and Monastatery Road.

Dutch Elm Disease[76] has affected elm trees within the Nipissing Forest Management Unit and the City of North Bay. Elm trees are present within the forest, mostly as stems smaller than 24 cm DBH. The risk level is moderate to high, but due to the minor role elm trees play int he forest the overall impact is low. Early monitoring and detection followed by removal of infested trees is the recommended course of action.

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[70] Invasive Species Centre. (2024d). Hemlock Wooly Adelgid. Accessed March 17th 2024 from Hemlock Woolly Adelgid – Invasive Species Centre
[71] Invasive Species Centre (2024e). Garlic Mustard. Accessed March 17th 2024 from Garlic Mustard – Profile and Resources | Invasive Species Centre
[72]MECP. (2014). West Virginia White. [Updated March 9th 2023]. Accessed March 17th 2024 from West Virginia White | ontario.ca
[73] EDDMapS. (2024)
[74] Invasive Species Centre. (2024h). Honeysuckles. Accessed March 21st from Honeysuckles – Invasive Species Centre
[75] Invasive species Centre (2024i). Japanese Knotweed. Accessed March 21st from Japanese Knotweed – Profile and Resources | Invasive Species Centre
[76] Invasive Species Centre (2024f). Dutch Elm Disease. Accessed March 17th 2024 from Dutch Elm Disease – Invasive Species Centre

Beech Bark Disease is present within the Nipissing Forest Management Unit, but there are little to no American Beech trees within the forest. Therefore the risk level is low.

Oak Wilt[77] was detected in Ontario for the first time in 2023. Its rate of spread is slow and it is unlikely to be a significant risk to the forest during this plan. The red oak led stands are very vulnerable to this disease and should be monitored for signs and symptoms. Additionally any pruning or cutting of trees should be limited to winter months.

Spotted Lanternfly and Asian Long Horned Beetle are two other invasive insects that do not currently have any active populations in Ontario, but are worth noting for early monitoring and detecting efforts.

Purple Loosestrife, Phragmites and Wild Parsnip are present within the joint holdings of Canadore College and Nipissing University. These species exist within non-treed wetlands and ditches. While they are threats to diversity they are not expected to pose a risk level for the forest.

5.0 Objectives and Strategies

This section lays out the broad objectives and strategies that inform the activities of this management plan. These objectives are not mutually exclusive and often heavily interrelated. The objectives are paired with a high level analysis of the shared objectives and values of Nipissing University and Canadore College obtained from their respective strategic plans *Pathways: Our Commitments to Water, Land, and People* and *The Path to Canadore 2026.*

- Commitment to Truth and Reconciliation
    - Both institutions are committed to implementing TRC recommendations
- Student Centric Approach
    - Both institutions prioritise student success and experience
- Community and Nature
    - Both institutions emphasise nurturing relationships with nature and community
- Innovation and growth
    - Both institutions highlight the importance of innovation, growth and entrepreneurship
- Sustainability
    - Both institutions have a strong focus on sustainability, with Canadore College aiming to be carbon neutral by 2031 and Nipissing University emphasising building sustainable futures.
- Investment in People

[77] Invasive Species Centre (2024g). Oak wilt. Accessed March 17th 2024 from Oak Wilt – Invasive Species Centre

- Both institutions highlight the importance of investing in people, whether it's for capacity building or for fostering a harmonious environment.

This plan is also written to conform with Forest Stewardship Council and Sustainable Forestry Initiative standards.

This plan also meets several of the United Nations Sustainable Development Goals (UNSDGS). These are depicted below. Embedding the UN SDGs is one of the core principles of Canadore College's Sustainability Plan

Figure 27: **United Nations SDGs**

With the above in mind the following broad objectives and strategies will inform the activities in this plan.

5.1 Silviculture Objective

Silviculture is the art and science of tending to forests.

The silvicultural objective is to maintain and enhance the health and diversity of the forest. This happens through understanding the overall conditions within the forest and conducting management activities that are appropriate to those conditions.

5.2 Social

Provide recreational and well being opportunities. This happens as part of the curriculum, through extra-curricular activities and in ways that benefit community partners at the Village as well as the wider community who interact with the forest.

5.3 Economic

Where feasible within ecological bounds generate revenue from the forest that can be reinvested in its maintenance and enhancement. Innovate and test value generating systems that can provide working examples for regional and global economies.

5.4 Education

Integrate activities from the above objectives into the curriculum in ways that generate knowledge and skills for student excellence and community benefits. In addition, conduct research that addresses immediate and important challenges in ways that add value to society.

6.0 Existing Conditions

This section will highlights the various conditions in the forest

6.1 Forested Stands

6.1.1 Inventory Methods

The forest was inventoried between July 2023 and November 2023. Data was collected from 101 plots which were randomly distributed throughout the forest to achieve a sampling intensity of roughly 1 plot per 2 hectares.

Tallied trees were determined through a prism sweep using a basal area factor 2 prism. This variable radius method of sampling trees yields a representation of the density of trees per hectare. This can be visualised as the surface area occupied by cross sections of trees per hectare.

All trees ≥9.1cm were tallied and their diameter at breast height (DBH) was measured and rounded down to 2 cm diameter classes.

In addition to diameter, each tree was assessed as Acceptable Growing Stock (AGS) or Unacceptable Growing Stock (UGS) following standards laid out in the Ontario Tree Marking Guide[78]. AGS and UGS refers to the quality of the tree and if it is expected to maintain or improve in quality or decline in quality over the next 20 years. This quality refers to the ability of the tree to maintain health. UGS trees may decline in vigour from a growing perspective but still yield other qualities for the overall health of the forest. For example trees with heart rot fungi are classified as UGS but these trees in many cases have or develop cavities which provides habitat for wildlife.

Tree heights from a representative tree in each canopy class was collected using a Suunto clinometer. Similarly ages of representative trees were collected in each plot using an increment borer.

[78] OMNR (2004).

Canopy closure and live crown ratio were assessed visually at each plot.

Tree regeneration was assessed in two height classes 0-2 metres and 2+ metres and classified as early and advanced regeneration respectively. This was assessed using an ocular sweep totalling a circular area of roughly 100 m2 (5.64 metre radius) around the plot centre. In addition to counting stems within this 100 m2 assessment the surrounding area was visually assessed to determine how representative the 100m2 around the plot centre was of the surrounding area. This is expressed as a percentage, with higher percentages indicating similar conditions.

Herbaceous plants and shrubs were noted within the plot and the surrounding areas within the stand.

Additionally notes were made on any additional features within the plot.

The collected data was also used to model the carbon storage and sequestration of the forest by IPCC-Recommended Carbon Pools per ISO 14064 GHG Inventory.

6.1.2. Summary of Forested Conditions

A general summary of the forested condition is presented below.

Average Basal Area (m2/ha): 22.4
Average SPH: 769
Average Age of trees: 73 years
Average DBH: 19.3 cm
Average AGS%: 65

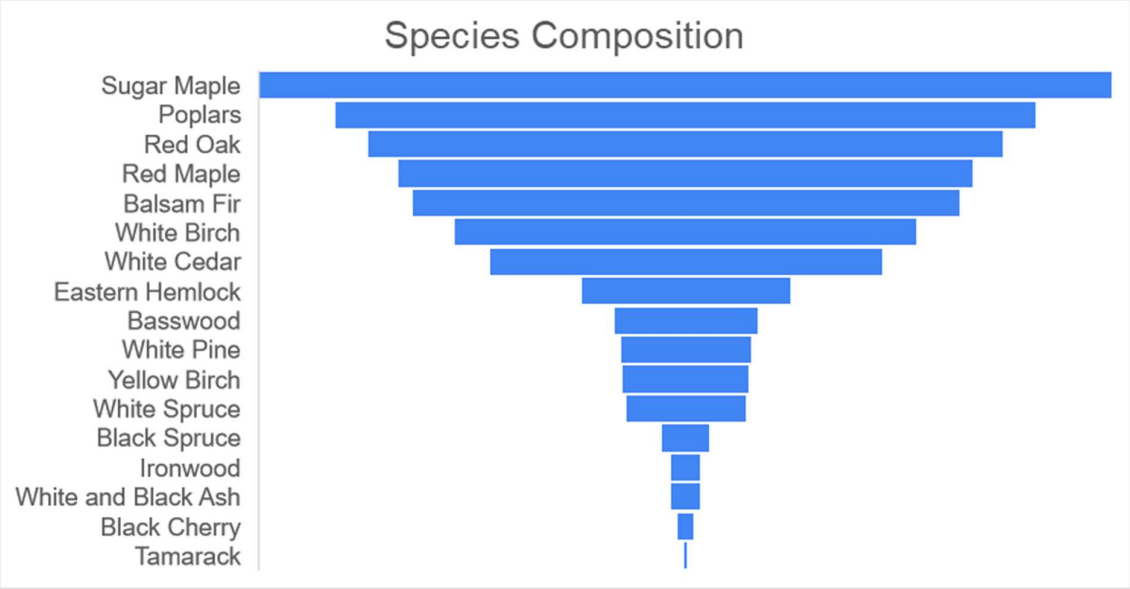

Figure 28: Species composition by percentage of tallied trees. Sugar Maple is the most common tree comprising ~17% of the total trees. Red Pine and White Elm were also observed in the forest but not captured in any of the plots.

Figure 29: This figure shows the size class distribution of the forest, which provides insight on its structure in terms of the diameter classes displayed on the x axis. Additionally each diameter class distinguishes between AGS and UGS trees to provide an insight on the growing vigour of the forest. Generally the forest has more younger, smaller trees and the larger size classes have a larger percentage of UGS trees.

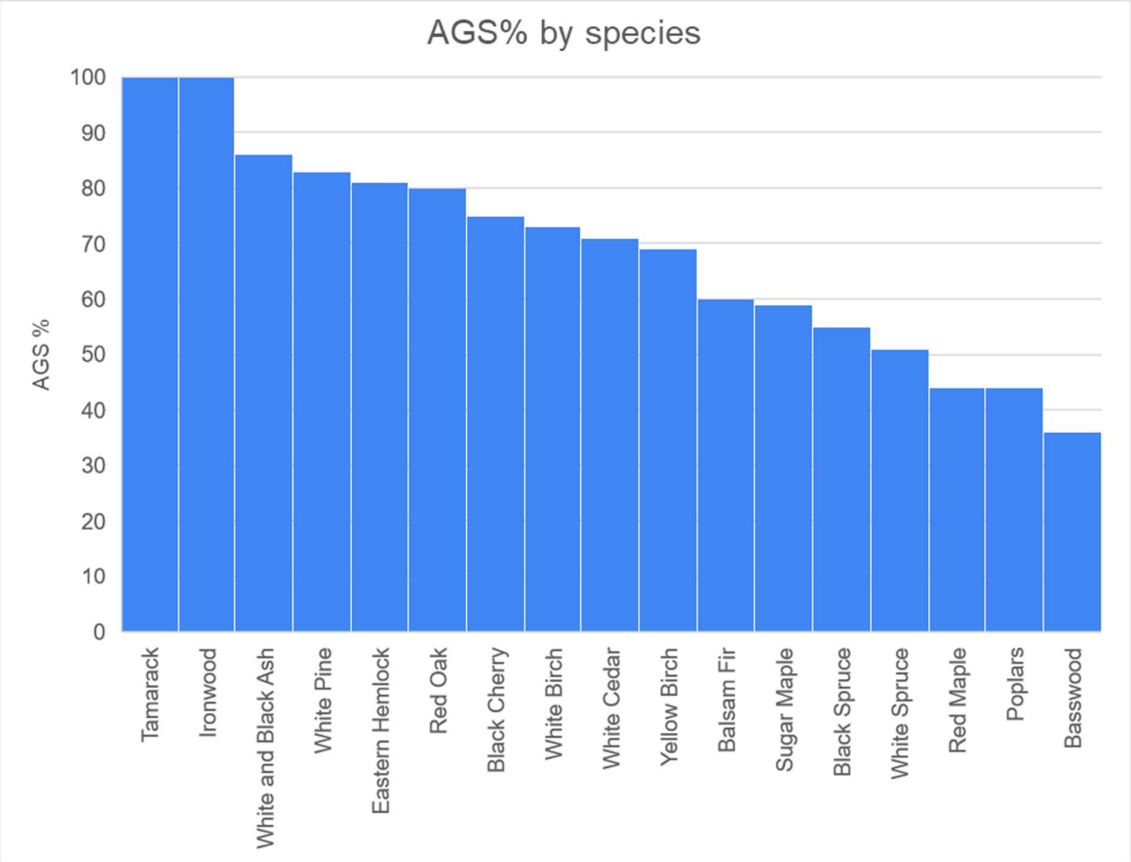

Figure 30: This figure displays the AGS percentage by species. The overall AGS% of the forest is 65%

6.1.2 Detailed Stand Descriptions

This section provides a detailed description of each stand. Stands were classified according to the standard forest units as laid out in Table 2 of Drever and Snider (2010).[79] A map of the forested stands is presented below in Figure 31.

[79] Drever, Charles & Snider, James & Drever, Mark. (2010). Rare forest types in northeastern Ontario: A classification and analysis of representation in protected areas. Canadian Journal of Forest Research. 40. 423-435. 10.1139/X09-203.

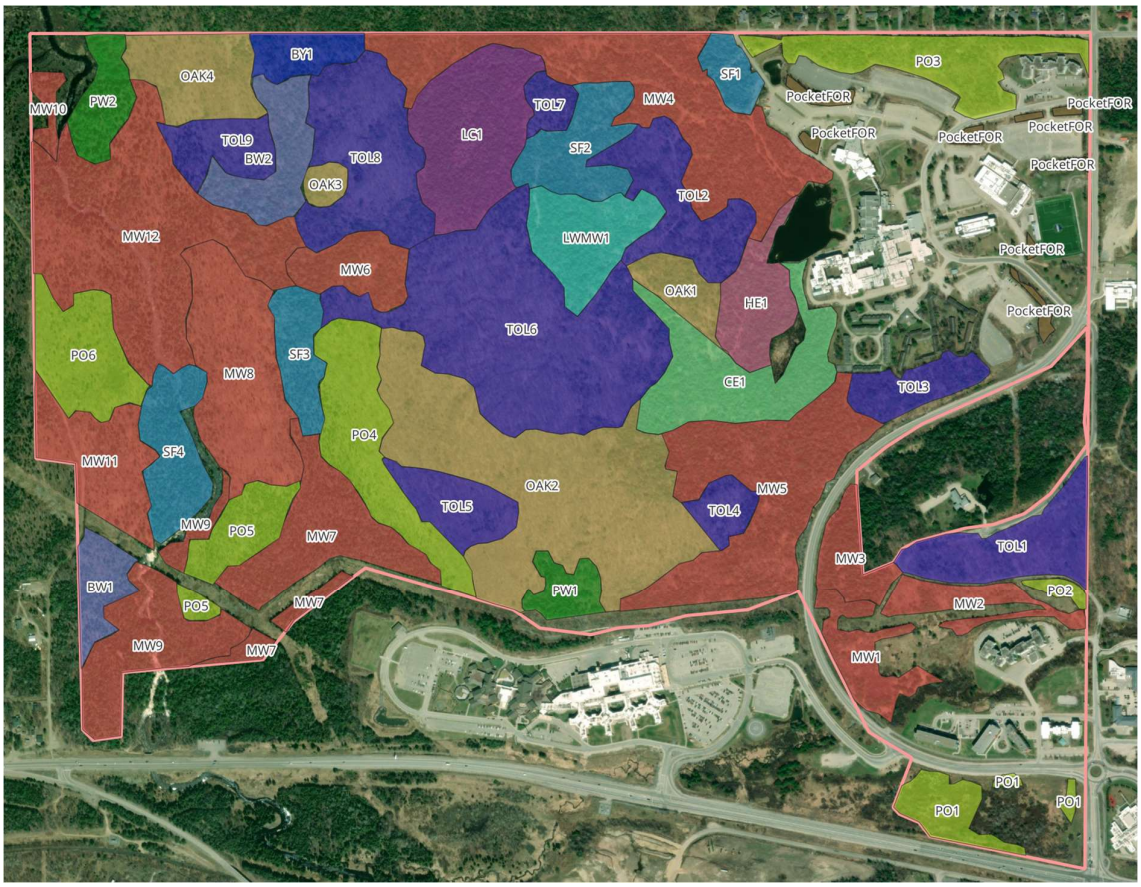

Figure 31: Locations of forested stands.

Full inventory sheets as well as plot locations are available in Annex D
It is recommended to retain a Registered Professional Forester and any other relevant professionals before implementing any actions such as harvesting.
General recommendations for all stands are:

- Monitor for invasive species
- Inventory after 10 years of major disturbances

The following tree codes are used to describe the species composition by percentage of basal area (m2/ha)

Common Name	Species Name	Abbreviation
Balsam Fir	Abies balsam	Bf
Balsam Poplar	Populus balsam	Pb
Basswood	Tilia americana	Bd

Black Ash	Fraxinus nigra	Ab
Black Cherry	Prunus serotina	Cb
Black Spruce	Picea mariana	Sb
Eastern Hemlock	Tsuga canadensis	He
Eastern White Cedar	Thuja Occidentals	Cw
Ironwood	Ostrya Virginian	Iw
Laregtooth Aspen	Populus grandidentata	Al
Pin Cherry	Prunus pensylvanica	Cp
Poplar	Populus spp.	Po
Red Maple	Acer rubrum	Mr
Red Oak	Quercus rubra	Or
Red Pine	Pinus resinosa	Pr
Red Maple	Acer rubru,	Mr
Sugar Maple	Acer saccharum	Mh
Tamarack	Larix laricina	La
Trembling Aspen	Populus tremuloides	At
White Ash	Fraxinus americana	Aw
White Birch	Betula papyrifera	Bw

White Elm	Ulmus americana	Ew
White Pine	Pinus strobus	Pw
White Spruce	Picea glauca	Sw
Yellow Birch	Betula alleghaniensis	Yb

Table 3: Tree species and codes

The table below provides some of the details for each stand.

Stand Name	Area (ha)	BA (m2/ha)	AGS%	Composition	Volume (m3/ha)
BW1	1.7	18	89	Bw78Pl11Pw11	155
BW2	3.1	28	43	Bw64Bf14Bd7 Mh7Sw7	259
BY1	1.6	24	67	By50Mh25Bf17 Mr8	213
CE1	5.7	35	69	Cw63Bw12Bf6 Mr6He4Sw4Mh 2Or2Pl2	197
HE1	2.9	42	69	He39Bw20Cw1 4Nr9Mh7Pw5Bf 2By2Sw2	333
LWMW1	3.8	31	70	He37Sb37Cw1 3Bf3By3Pw3La 3	259
LC1	6.5	30	68	Cw35Mr26He1 6Or13By6Mh3	205
MW1	2.3	36	44	Cw56By11He1 1Sw11Bd6Bw6	263
MW2	1.9	20	100	Pw50Bw50	165
MW3	1.8	20	80	Pt40Bw20Mr20 Bf10Or10	152
MW4	10.6	29	69	Mr30Bf17Bw14 Pl12Pt7By5Sw 5Pw4Mh3Cw1 He1	228
MW5	9.5	31	40	Bw40Cw30By2 0Bd10	246

MW6	2.4	32	80	Bf30Bw30Sw20Cw10Mr10	310
MW7	6	22	56	Bf29Mr26Bw18Cw8By6Pl5Sw5Cb1He1Mh1	182
MW8	7.3	15	58	Mr19Pl18Mh15Bf13Cw10Vw8He6Sw6By2Iw2Or2	182
MW9	5.2	19	56	Bd43Pl21Bf14Bw14By7	152
MW10	0.6	4	14	Pl41Bf36Mr18Mh5	16
MW11	4	20	55	Pl36Bw32Mh9Mr9Pt9Bf5	182
MW12	13.5	19	79	Pw32Bw26Bf16Cw11Mr11Pt5	150
OAK1	1.7	20	90	Or50Bf10Cw10He10Mh10Mr10	182
OAK2	15.9	20	69	Or80Mh8Mr8Bf1He1Pw1Sw1	190
OAK3	0.6	22	82	Or45Pw27Pl18Mh9	173
OAK4	3.7	9	56	Or78Mh22	80
PO1	2.1	6	67	PtBw33	56
PO2	0.4	8	100	Pb100	74
PO3	4.6	36	39	Pl72Mr17Bw11	337
PO4	5.4	22	56	Pl63Or14Mh9Bd7Bw2Iw2Mr2	199
PO5	2.7	26	46	Pl62Bf15Mh15Sw8	232
PO6	3.9	16	75	Pt75Mr25	135
PW1	1.4	28	86	Pw50Mh14Or14Iw7Pl7Sw7	186
PW2	2.1	10	100	Pw60Mr20Sw20	65
SF1	1.2	20	40	Bf80Bw10By10	130
SF2	3.3	28	43	Bf54Mr32He7Mh4Or4	223
SF3	2.2	18	67	Bf78Bw11Pl11	124
SF4	3.3	34	53	Bf71Pw12Bw6Cw6Pt6	232

TOL1	4.1	16	54	Mh42Bd17Bw13Cb13Or8By4Iw4	150
TOL2	4.3	21	62	Mr38Mh29Pl19Bd5Cw5Or5	46
TOL3	2.1	26	85	Mh54Bw38Pw8	246
TOL4	1.2	20	67	Mh70Or20Iw10	173
TOL5	2.5	17	65	Mh41Mr24Or12Pl12Bd6Bw6	151
TOL6	15.7	25	63	Mh70Or10Bd7Aw5Bf3Mr3By1Iw1Pl1	229
TOL7	0.9	20	70	Mr40Mh20Bf10Bw10By10Pl10	193
TOL8	6.8	29	68	Mh56Or18Bd12Pl7Bf4He2Iw2	263
TOL9	2.2	14	71	Mh57Or29Bw14	129
PocketFOR	1.2	23	51	Sw30Or20Mr19Cw16Bw15	186

Table 4: *High level overview of stand details.*

6. 2 Wildlife and Habitat Assessment

6.2.1 General

Wildlife was not systematically inventoried during the development of this plan. Incidental observations as well as observations shared during the community engagement process are recorded in table 4. Additional wildlife observations can be found on the iNaturalist project page for the Campus Biodiversity Network.[80]
Additionally habitat features are noted in table 5

Species observed	
Ebony jewelwing	Eastern Wood Pewee
White ermine	Evening Grosbeak
Evening grosbeak	Winter Wren
Pileated Woodpecker	Hermit Thrush
Snapping turtle	Racoons

[80] See stats on species observed here: Canadore College - Campus Biodiversity Network · iNaturalist Canada

Yellow bellied sapsucker	Foxes
Monarch butterflies	Broadwing Hawk
Black Capped Chickadees	Ravens
Red eyed vireos	Crows
American woodcock	Moose
Cedar Waxwings	
White TailedDeer	
Black Bear	
Groundhogs	
Wood Thrush	

Table 5: Wildlife observations

Habitat Feature	Presence:	Notes and Comments
Standing Dead Trees (Snags)	Varying levels across all stands in the forest	Snags are important habitat features for bird perches and as habitat and shelter for many species. They are also an indicator of eventual downed woody debris.
Cavity Trees	Cavity trees are present in most stands across the forest.	Cavity trees are important for wildlife nesting, shelter and feeding. Generally the forest is well supplied with a variety of cavity trees. A guide to classify cavity trees is provided by the Government of Canada (2023)[81] and a non-exhaustive list of species that use cavities is provided by MacDonald (1992)[82]
Stick Nests	Broadwing Hawk Nest in TOL8	Stick Nests are built by raptors, crows, ravens and great blue herons and are used by other species such as owls. They are important habitat features as these large birds are at the top of the food chain and can act as an indicator of overall

[81] Government of Canada 2023. Pileated Woodpecker Cavity Identification guideAccessed March 21 2024 from Pileated Woodpecker Cavity Identification Guide - Canada.ca

[82] MacDonald, Christy. (1992).Ontario's Cavity Nesting Birds. Ontario Birds Volume 10 Number 3. Accessed March 21st 2024 from 93-100 OB Vol10#3 Dec1992.pdf (unm.edu)

		ecosystem health. A guide for identifying stick nests is provided in Szuba and Naylor (1998)[83]
Downed Woody Debris (DWD	Varying levels across all stands in the forest	DWD is important for habitat, nutrient cycling and soil stability. Generally the forest has ample DWD. A field protocol for estimating DWD is provided by Taylor (1997)[84]. Different stand types have different averages, a high level study on this is provided by Ter-Mikaelian et al. (2008)[85]
Mast Trees	Red Oak, Black Cherry, Basswood, Ironwood	Mast are the nuts and fruits produced by trees. trees will begin to produce high volumes of mast in 10 to 20 years. Red Oak is the most prominent mast tree across the forest
Super-Canopy Trees	Pw and He super canopy trees are present in several compartment	There are ample super canopy trees for wildlife needs in the forest. Bears, eagles, ravens, crows, and other birds use super canopy trees.
Conifer Thickets	Highest quality conifer thickets are found in CE1, HE1, MW5, and LWMW1	Balsam fir, pine, white cedar and groups of hemlock provide thickets with year-round foliage to provide cover for wildlife. There are several conifer thickets distributed across the forest
Other Food Sources	Distributed across the forest but most prominent along trail edges and near built infrastructure	There are some berry-producing understory plants including choke cherry, pin cherry, rowan berries, amelanchier and red elderberry. Other food sources include hazelnuts as well as seeds and catkins from species such as alder, white birch, white elm.

[83] Szuba and Naylor. (1998). Forest raptors and their nests in central Ontario. OMNR SCSS Field Guide FG-03. Available online here: Hawk Guide Final (lrconline.com)
[84] Taylor, S.W. (1997). A Field Estimation Procedure for Downed Coarse Woody Debris. Natural Resources Canada. Technology Transfer Notes, Forest Research Applications, Pacific Forestry Centre. Accessed March 21st from 4821.pdf (nrcan.gc.ca)
[85] Ter-Mikaelian, Michael & Colombo, Steve & Chen, Jiaxin. (2008). Amount of downed woody debris and its prediction using stand characteristics in boreal and mixedwood forests of Ontario, Canada. Canadian Journal of Forest Research. 38. 2189-2197. 10.1139/X08-067.

Surface Water	Present across the forest	See Figure 4 for location of some of the water features. Vernal pools are also prominent across the forest.
Dens or Dug Holes	SF1	Dens have been observed in SF1. Hollow trees exist across the stand as well.

Table 6: Habitat features

6.2.2 Species at Risk

Species at Risk (SAR) are provided special protection under Ontario's Endangered Species Act. This section only identifies SAR that are likely to interact with the Forest and surrounding areas. Responsibilities and management activities are presented in the Management Section.

Ontario's Natural Heritage Information Centre's mapping tool was used to identify SAR or their habitats that have been documented to overlap with the Forest.[86] Identified SAR are presented in the table below. Some SAR are listed as "restricted" to help protect them from poaching and collection. Wild ginseng is an example of this type of species. No restricted species were found by the mapping tool.

Some SAR have been identified on the property and others are likely to live in the area. Except for the Blanding's Turtle all are relatively common and will likely interact with the Forest or local water bodies on a regular basis.

English name	**Binomial nomenclature**	**Ontario Status**[87]	**General habitat**[88]	When observed in the stand listed below this is noted in **BOLD.** Where suitable habitat exists this is noted in *ITALICS*:
Birds				
Evening Grosbeak	*Coccothraustes vespertinus*	Special Concern	Mature and second-growth conifer forests	**Auditory observation in LWMW1**

[86] The area assessed with this tool is shown on the SAR Assessment Map in the Maps section.
[87] From the Species at Risk in Ontario List under Regulation 230/08 of the Endangered Species Act, 2007. O. Reg. 230/08: SPECIES AT RISK IN ONTARIO LIST
[88] General habitat information is sourced from COSEWIC reports and/or COSSARO reports unless otherwise noted.

				Likely to use all stands and most likely to inhabit PW1, HE1, CE1, LC1, LWMW1, SF2, SF4.
Canada Warbler	*Cardellina canadensis*	Special Concern	Wet mixed deciduous-coniferous forest types with a dense shrub layer	*May be found anywhere in the forest, more likely to nest in LC1,LWMW1, MW6, MW9, MW7, BY1, MW3, MW1*
Eastern Wood-Pewee	*Contopus virens*	Special Concern	Deciduous forests with an open understory	**Auditory observation in TOL6** *May be found anywhere in the forest, most likely to nest in TOL and OAK stands*
Wood Thrush	*Hylocichla mustelina*	Special Concern	Moist deciduous or mixed forests with a moderately dense shrub layer	**Auditory observation in MW6** *May be found anywhere in the forest, most likely to nest in LWMW1, MW9, MW7, BY1, MW3, and MW1*
Insects				
Yellow Banded Bumblebee	*Bombus terricola*	Special Concern	Generalist, nests underground in loose soils or rotten logs	*May be found anywhere in the forest*
Harpoon Clubtail	*Phanogomphus descriptus*	Not listed	Clear, cold streams with intermittent sections of rocks and rapids[89]	*Most likely to be found in MW1, MW3, MW5, CE1, HE1, MW4,SF1,MW9,SF4,MW8,MW12,MW10 and PW2*

[89] Massachusetts Division of Fisheries and Wildlife(2019). Harpoon Clubtail. Accessed March 16th from Harpoon Clubtail, Phanogomphus descriptus (mass.gov)

Reptiles				
Snapping Turtle	*Chelydra serpentina*	Special Concern	Slow moving water with a mud bottom and dense aquatic vegetation	**Observed in HE1 and MW4** *Likely to use CE1, and SF1* as well
Midland Painted Turtle	*Chrysemes picta marginata*	Special Concern	Slow moving, relatively shallow and well vegetated wetlands with basking sites, and canopy openings for nesting	*Most likely to be found in HE1, CE1, SF1 and MW4*
Blanding's Turtle	*Emydoidea blandingii*	Threatened	Wetlands with shallow water, an organic substrate and a high density of aquatic vegetation. Will move across land and are occasionally found in upland wooded areas	*Most likely to be found in HE1, CE1, SF1 and MW4*
Plants				
Black Ash	*Fraxnius nigra*	Endangered	Swamps and in isolated pockets in upland forests	**Observed in MW4, SF2, TOL4, MW6, MW7, TOL 8, BW2 and BY1.**

Table 7: SAR habitat and observations within the forest.

6. 3 High Conservation Values

FSC certification requires forests with high conservation values to be noted. This assessment is provided in Annex E.

A brief overview is provided in the table below:

High Conservation Value Code	Description	Stands	Hectares
HCV1	Forests containing endangered species	BY1, MW4, MW6, MW7, TOL4, TOL8, BW2,SF2	26

HCV4	Forests providing watershed protection	MW9, SF4, MW12, PW2, MW10, MW8, LC1	25

Table 8: High Conservation Values

6. 4 Trails

The trail network is the primary way in which people interact with the forest. Trails are used for curricular and extracurricular activities. Additionally trails are used formally and informally by community members. Activities include walking, skiing, snowshoeing, mountain and fat biking, foraging, fire lighting and guided walks. The following figures display where the trails are located and some of their features. Further information on trail management is provided in Section 7.6.

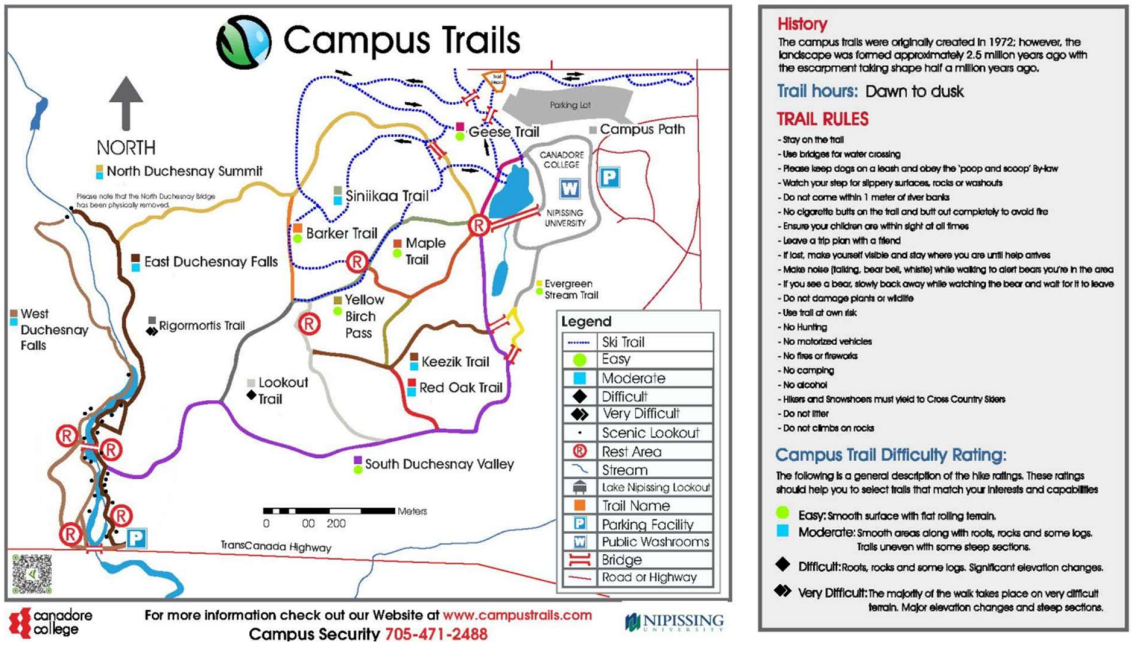

Figure 32: Campus trail map with rules on the right.

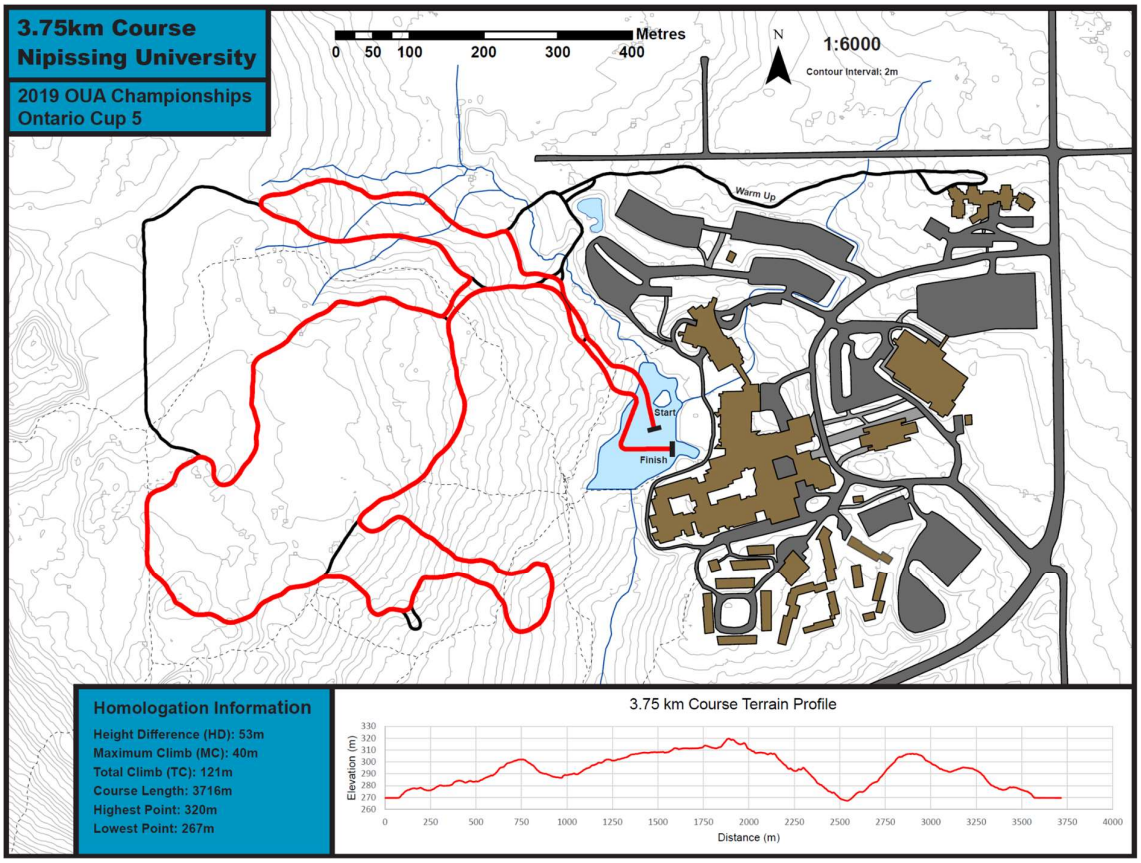

Figure 33: Ski trail map

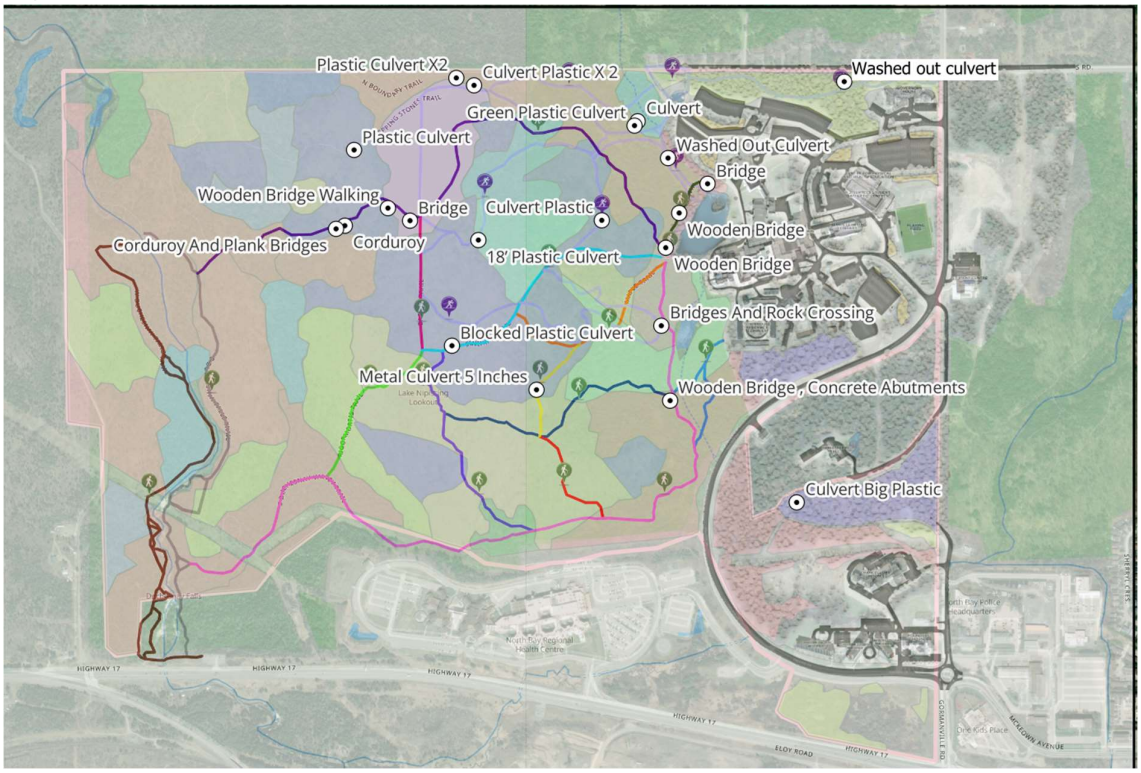

Figure 34: Observed culverts, bridges and corduroy trails within the forest, superimposed on the trail network and forested stand polygons.

6.5 NTFP

Non timber forest products (NTFPs) include all other forest products besides the wood. This can include barks for medicines or building materials, foliage for teas or oil extracts and individual species and their parts that are commonly used. Some of the observed species during the inventory are displayed in the map below. Further details on developing operating procedures for interacting with and harvesting NTFPs is provided in section 7.5.

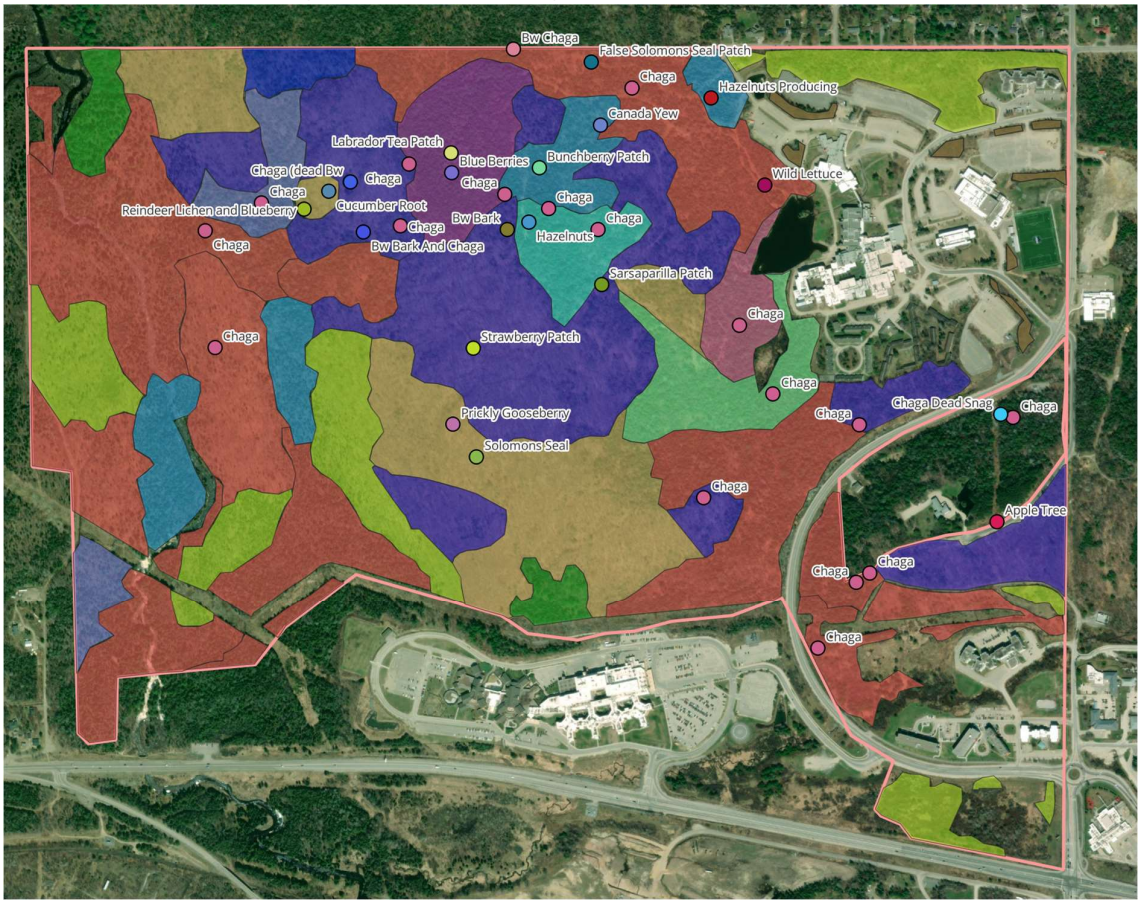

Figure 35: *Locations of observed NTFPs*

Figure 36: Chaga/Ishkitigaan on a white birch tree.

7.0 Management Strategies

This section details recommended management strategies and associated activities. Activities are detailed further in Section 8. The broad purpose of these strategies is to lead to policies or operational frameworks that determine the responsibilities of forest users in management of the forest in addition to what funds and governs this work. An example is provided below

Objective	Policy	Activities	Responsibilities	Rules	Resources	Stands	Monitoring	Reporting
Silviculture	Invasive Species Management	Garlic Mustard Removal	Summer student ground crew	BMP	Sustainability Budget	*TOL1*	Annually in all stands	Section 9.0

Table 9: Example of components included in operational frameworks.

7.1Communication and Governance

It is recommended to assign a delegate from Canadore College and Nipissing University to coordinate information and activities on the joint holdings. The proposed responsibilities are to act as the point person for collecting information and planned activities from within their own institutions and facilitate decision making.
Several tools can be employed for this.

- A community calendar and/or shared web portal
    - Through this encourage contributions to the good management of the forest
        - For example migratory bird observation
    - Maintain a single place to transparently communicate on activities taking place in the forest and what the rules are.
        - For example communicating rules for trail usage
- Developing operational frameworks as detailed in the rest of Section 7 that include who is responsible for the work, who is funding it and where the information is recorded and kept.
- Regular roundtables to check in on, update and coordinate operational frameworks with forest users. Annex A provides an overview of forest users and rights holders that can be updated as necessary.

7.2 Invasive Species Management

It is recommended to develop an operational framework for invasive species management. This operation framework should cover 1)monitoring and early detection, 2)management and 3) evaluating and documenting results. This can be integrated with existing efforts of students from the work study program and the School of Environmental Studies of Canadore College.
Specifically it is recommended to monitor for invasive species with the following priorities

- High traffic areas along entry points to the forest and trails.
    - This can be combined with monitoring and maintenance activities recommended as part of the operational framework for the trail system
- Targeted monitoring for vulnerable species
        - White and Black Ash for EAB
        - Eastern Hemlock for HWA
        - Red Oak for Oak Wilt and Spongy Moth
- Species with known occurrences on the property including

    - Garlic mustard, non-native honeysuckle, purple loosestrife, phragmites and japanese knotweed

Management of invasive species should follow best management practices and be conducted with professional expertise.

- Record management techniques and activities in Section 9 of this plan
    - Garlic mustard, honeysuckle and japanese knotweed are the primary species which can negatively impact the forest.
    - Observed locations are depicted in the figure below and can be updated with local knowledge and dedicated inventories as needed.
- Following management follow up monitoring is recommended to document and evaluate results.

Figure 37: Observed invasive and non-native plant species within the forest.

7.3 Wildlife Habitat and SAR

It is recommended that the forest owners maintain records of wildlife sightings, habitat features and SAR found within the forest. Options for collecting and updating these records can be through specific activities in curricula, through community partnerships, dedicated surveys and through citizen science initiatives.

SAR should be protected using appropriate areas of concern (AOC). These are most relevant during forest harvesting operations. Nipissing Resource Forest Management has developed AOCs which can be requested and adapted for the forest.

Additionally the forest can be evaluated for areas where SAR and general wildlife habitat can be improved. This can be done in balance with other management strategies including timber harvesting and invasive species management and in accordance with species at risk recovery strategies developed by the Ministry of Environment, Conservation and Parks. These can be found here: https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry/recovery-strategies.html

Specific activities that can be conducted under this strategy include:

- Additional wildlife sightings can be recorded in table 4 of this document. If more information is desired, for example specific locations or interactions with specific plants, a table or reporting form can be developed and referenced in the reporting table of section 9.
- Record any additional habitat features observed table 5.
- Check SAR listings every year for any updates
- Monitor health of and risks to SAR plant species.
- Conduct surveys for (breeding) presence of birds, insects and reptiles.
- Implement protections as needed for SAR and assess opportunities for habitat improvements and implement recommendations from the recovery strategies.

7.4 Silviculture and timber harvesting

It is recommended to develop an operational framework for conducting silvicultural operations including harvesting timber from the forest. Silvicultural operations can also involve tree planting, tending around desired trees and determining desired future conditions of the forest.
The primary use of wood products at the time of writing this plan is firewood. Currently several groups use firewood, some cutting it from deadfall and blowdown over trails, others buying it in from external sources. The framework for harvesting timber including firewood from the forest should include

- how much (fire)wood is needed by each group and how much is needed in total.
- determine how much and from where this can be sustainable harvested from the forest using the existing inventory with additional inventory work included as necessary.
    - In the case of dead trees that have fallen on the trail these can be recovered in trail maintenance operations, but it should be clearly defined who does this work and who gets to use the wood.
- In the case of living trees these should be harvested under prescription developed by a registered professional forester and marked by a certified tree marker.
    - Other silvicultural activities conducted within the scope of practice of registered professional foresters as defined in section 3 of the Professional Foresters Act, 2000 should also have a prescription developed, unless this work is done under one of the exemptions as listed in section 4 of this same act
- Any harvesting activity should be conducted under good forestry practices and avoid rutting, damage to residual trees and other practices that degrade the condition of the forest.

Other strategies to guide silviculture and timber harvesting include:

- Determining the long term direction of the forest
    - For example if carbon sequestration is an objective see where stands can be improved through conversion of short lived tree species to long lived tree species with high sequestration rates. This could take the form of converting some areas that have poor quality balsam fir growing in them now to white pine stands.
- Harvesting operations that can be considered are
    - improvement cuts in hardwood stands where maple syrup is tapped as part of the curriculum
    - Cutting declining trees to release desirable regeneration based on the long term direction of the forest and site specific structure and diversity.
    - Cleaning operations where species such as balsam fir are thinned out around other desirable regeneration such as white pine to maintain diversity in the forest.
- Seed collection of desired species for local nurseries
    - Forest Gene Conservation Association offers a Certified Seed Collector course that trains people in good practices for seed collection
- Infill planting in areas with low stocking and little regeneration. Less common species could be considered for this to further diversify the forest such as bur oak.

7.5 Non-Timber Forest Products

It is recommended to develop an operational framework for non-timber forest products. This will need to include similar steps to the framework for harvesting timber species above.

- How much of which products are needed by individuals, forest users and rights holders
    - Some of the NTFPs that can be initially targeted are
        - Sugar maple stands for syrup
        - Trail side clusters of hazelnuts
        - Chaga/Ishkitigaan
        - Chokecherries and rowan berries in the hedgerows in the southern section of the forest
        - Conifer tips in the spring
        - Sarsaparilla, false solomon’s seal, cucumber root and other understory plants
- Determine how much can be sustainably harvested and what methods ensure a sustainable harvest.
    - This may need to include cultivation through seed dispersal or growing out plants, overstory manipulation for light levels or other practices such as coppicing and burning.
- NTFPs are a lot easier to harvest and carry out compared to timber products so education on the significance of certain NTFPs and the harvesting protocols should also be considered as an activity within the NTFP framework

7.6 Trail Maintenance

It is recommended to develop an operation framework for trail maintenance. Currently several departments from both owners are involved with trail maintenance. The framework for trail maintenance will need to be integrated with the timber harvesting framework as several groups source firewood from fallen trees over the trail system.
The following components are recommended within the trail maintenance framework:

- Determine who is responsible for what portions of the trail maintenance and costs
- Map unofficial trails and assess for negative impacts and safety risk
- Remediate erosion issues at the base of the East Duchesnay Falls Trail. This will likely require a rerouting of the trail
- Ensure consistent messaging between all sources that mention the trail system
  Trail access - Canadore College (canadorepanthers.ca)
  Education Center Trails (Duchesnay Falls) -Discovery Routes
  Nipissing University :: Campus Trails & Wayfinding
  Canadore College and Nipissing University trails - Trail - user reviews : 4.5 out of 5 - 2 reviews - MTBR.com
  www.friendsofduchesnayfalls.com
- Conduct hazard tree assessment along trails.
- Assess locations and viability of upgrading a portion of the trail to accessible standards
- Assess locations and viability of designating a portion of the trail for forestry therapy

7.7 Curriculum and Research Activities

It is recommended to develop a full list of curriculum and research activities that take place in the forest. This list should include locations and potential impacts to the forest as well as any protection measures that are needed around these sites. Moving forward assess opportunities for curricula and research to contribute to inventories, monitoring and activities in this plan.

8.0 Planned Management Activities 2024-2033

The table below can be used to plan management activities. Where specific stands are mentioned this only includes the in depth analysis of stand BW1 through to OAK1 from table 4.

Activity	Stands	Objectives	Schedule	Quantifiable measure	Notes
Communication and Governance					
Assign delegates from both institutions to determine governance	all	all	Assigned by September 1st 2024	Governance framework or policy for the forest	
Establish Shared Information Ecology	all	all	Complete by end of 2024	Establish operational frameworks recommended in Section 7	
Establish Community Calendar and/or web portal	all	all	Implement in 2024 and maintain throughout duration of the plan	Events and activities posted	Initial website design has been completed by Mi6 Agency

Roundtable	all	all	Complete by the end of 2024	Host at least 1 engagement session to update and receive feedback on operational frameworks and completed activities from forest users and rights holders	
Additional engagements and round tables	all	all	As needed	Record engagement sessions that were held to inform any additional activities that arise throughout the duration of the plan	
Silviculture					
Inventory forested conditions	all	all	2033 or after major disturbances	Updated forest resource inventory	
Determine long term direction of the forest	all	all	Complete by March 2025	target future conditions established for each stand	work with RPF
Assess for timber harvest	BW2, CE1, HE1, LWMW 1, MW1, MW5	silviculture, economic	2025-2028	Go or no go decision made on harvest	work with RPF
Conduct timber harvests	all stand determined through above activity	silviculture, economic	2025-2033	wood harvested in m3/cords/tonnes and what it was used for	include estimates on dead wood and fallen trees removed from trails
Seed collection	all		annual	Quanitfy nursery needs and amount of seed collected by species and weight/volume	work with certified seed collectors
Identify opportunities to release desirable regeneration	BW1, BY1, MW2, MW9	silviculture	2025-2028	Release opportunities identified in hectare	Work with a RPF

Assess for cleaning operation	LWMW 1, MW5	silviculture	2025-2028	Area netted down for cleaning operations in hectare	Work with a RPF
Conduct cleaning operations	all stand determined through above activity	silviculture	2025-2033	amount of hectare treated	
Assess area for infill planting	MW8, MW10	silviculture	2025-2028	Determine areas and appropriate species for infill planting.	work with RPF
Conduct infill planting	all stand determined through above activity	silviculture	2025-2033	trees planted and survival rates	
Invasive species					
Monitor for invasive species	all	silvicultural and social	Annual	Inspection completed and findings reported	
Manage Garlic mustard	TOL 1	silviculture	Annual until eradicated	Area covered by species	
Manage Japanese Knotweed	TOL1	silviculture	Annual until eradicated	Area covered by species	
Manage non-native honeysuckle	PO2	silviculture	Annual until eradicated	Area covered by species	
Research and curriculum					
Identify and map active research plots	all	education	2024	map and shared document of all research plots and any specific protections needed	
Take down flagging of non-active research plots	all	social	2025	Inactive research plots removed	

Assess for opportunities to conduct research	all	education	2025-2033	new research opportuntiies identified and implemented	
Assess for opportunities to integrate forest management activities into curriculum	all	education, social, silviculture	2025-2033	activities contributed to through curriculum integration	
Trails					
Trail remediation	MW9	silviculture	2024	length of trail remediated	
Hazard tree assesment	all stands with trails	silviculture, social	2025&2029	length of trails assessed	
Harvesting of hazard trees	all stands with trails	silviculture, economic	2025-2033	hazard trees removed, also record estimates of wood harvested and what it was used for	
Mapping of unofficial trails	all	silviculture	2025-2026	length of unofficial trails mapped	
Determine and implement actions for unofficial trails	all	silviculture	2026-2033	length of trails closed and restored vs. integrated into the trail network	
Assess locations and viability of upgrading a portion of the trail to accessible standards	HE1, CE1, MW4	social, education	2025-2026	go or no go decision made on accessible trail	
Assess locations and viability of designating a portion of the trail for forestry therapy	all	social, education	2025-2026	go or go decision made on forest therapy trail	
NTFPs					

Assess NTFP needs of forest users and rights holders	all	all	2025-2026	Needs quantified and operationalized in framework	
Conduct education on NTFP harvesting	all	all	2025-2033	workshops hosted, signage created, media produced	
NTFPs harvested	all	all	2025-2033	provide a list and estimate of NTFPs harvested	
Wildlife and SAR					
Record wildlife sightings	all	all	2025-2033	species recorded and added to table 5 or other suitable reporting platform	
Record habitat features	all	all	2025-2033	habitat features recorded in table 6	
Check SAR listing	all	education	annually	updates to the SAR listings	
Monitor health of Black Ash	BY1, MW4, MW6, MW7, TOL4, TOL8, BW2,SF2	silviculture	annually	EAB detected yes or no	
Conduct surveys for (breeding) presence of SAR birds, insects and reptiles.	all	silviculture, education	annually	quantity of SAR observed	
Assess opportunitiies for habitat improvements and recovery strategy recommendations imlpemented	all	silviculture, education	2025-2033	recovery strategy recommendations implemented	

Implement protections as needed for SAR	all	silvicult ure	as needed	protections applied	

Table 10: Planned management activities

Trail remediation
Establish operating frameworks
Conduct assessments for harvesting of wood products
Conducts assessments for silvicultural improvements including tree planting,
Conduct assessments for harvesting and cultivating of non-timber forest products

Specific direction

- Additional wildlife sightings can be recorded in table 4 of this document. If more information is desired, for example specific locations or interactions with specific plants, a table or reporting form can be developed and referenced in the reporting table of section 9.
- Record any additional habitat features observed table 5.
- Check SAR listings every year for any updates
- Monitor health and populations of SAR plant species and conduct surveys for (breeding) presence of birds, insects and reptiles.

9.0Reporting

This section provides a table to track and record all management activities taken within the forest. Any activity relevant to the management of the forest should be recorded here. These activities can be sourced from sections 7 and 8 of this plan and any operational frameworks that arise out of those activities. If an information portal is created for forest management that can be used to track activities instead. In that case reference to it can be included here.

Year	Stands	Activity	Quantifiable Measure	Comments/Details
2024	All	Forest Management prepared	Plan Prepared and submitted	Plan prepared by Elliott Groen and approved by Glen Prevost

	All	FSC certification	Certification achieved	
	All	SFI certification	Certification achieved	

Table 11: Reporting form