Complex Stand Structures and Associated Dynamics

July 29 - August 2, 2007, Sault Ste. Marie, Ontario, Canada

Schedule: IUFRO Lab/Field Tour

Wednesday, 1 August 2007[1]

8:00 am	**Board buses at the Holiday Inn's Front Entrance**
8:20 am	**Bus 1 (Group A) arrives at the Great Lakes Forestry Centre (GLFC)** **Bus 2 (Group B) arrives at the Ontario Forest Research Institute(OFRI)**
8:20 am – 9:20 am	**Group A tours the GLFC** **Group B tours the OFRI**
9:20 am – 9:30 am	**Group A walks (200 m) to the OFRI** **Group B walks (200 m) to the GLFC**
9:30 am-10:50 am	**Group A tours OFRI with on-site Refreshment Break included** **Group B tours GLFC with on-site Refreshment Break included**
10:50 am-11:00 am	**Group A boards Bus 1** **Group B boards Bus 2**
11:00 am-12:00 pm	**Buses enroute to Pancake Bay Provincial Park**
12:00 pm-12:45 pm	**Picnic/Box Lunch (provided)**
12:45 pm-1:45 pm	**Buses enroute and Field Stop 1**
1:45 pm-4:45 pm	**Buses enroute and Field Stop 2 with Refreshment Break at Chippewa Falls Picnic Area**
4:45 pm-5:00 pm	**Buses enroute to Buttermilk Alpine Village**
5:00 pm-7:00 pm	**Dinner (provided)**
7:00 pm-8:00 pm	**Invited Presentation by Dr. Art Groot: "Transforming Newton's forest"**
8:00 pm-9:00 pm	**Board buses and return to the Holiday Inn's Front Entrance**

[1] Please note, all participants are advised to wear appropriate attire (e.g., jacket and rain wear) and footwear (e.g., hiking shoes or workboots) and be prepared for some trail walking (500 m) through variable terrain (e.g., maximum of 20-30 degree upward and downward slopes) and forest conditions (e.g., shrubs, saplings, around and over small diameter logs (<20 cm)), possibly in hot (25-30 C) or wet weather.

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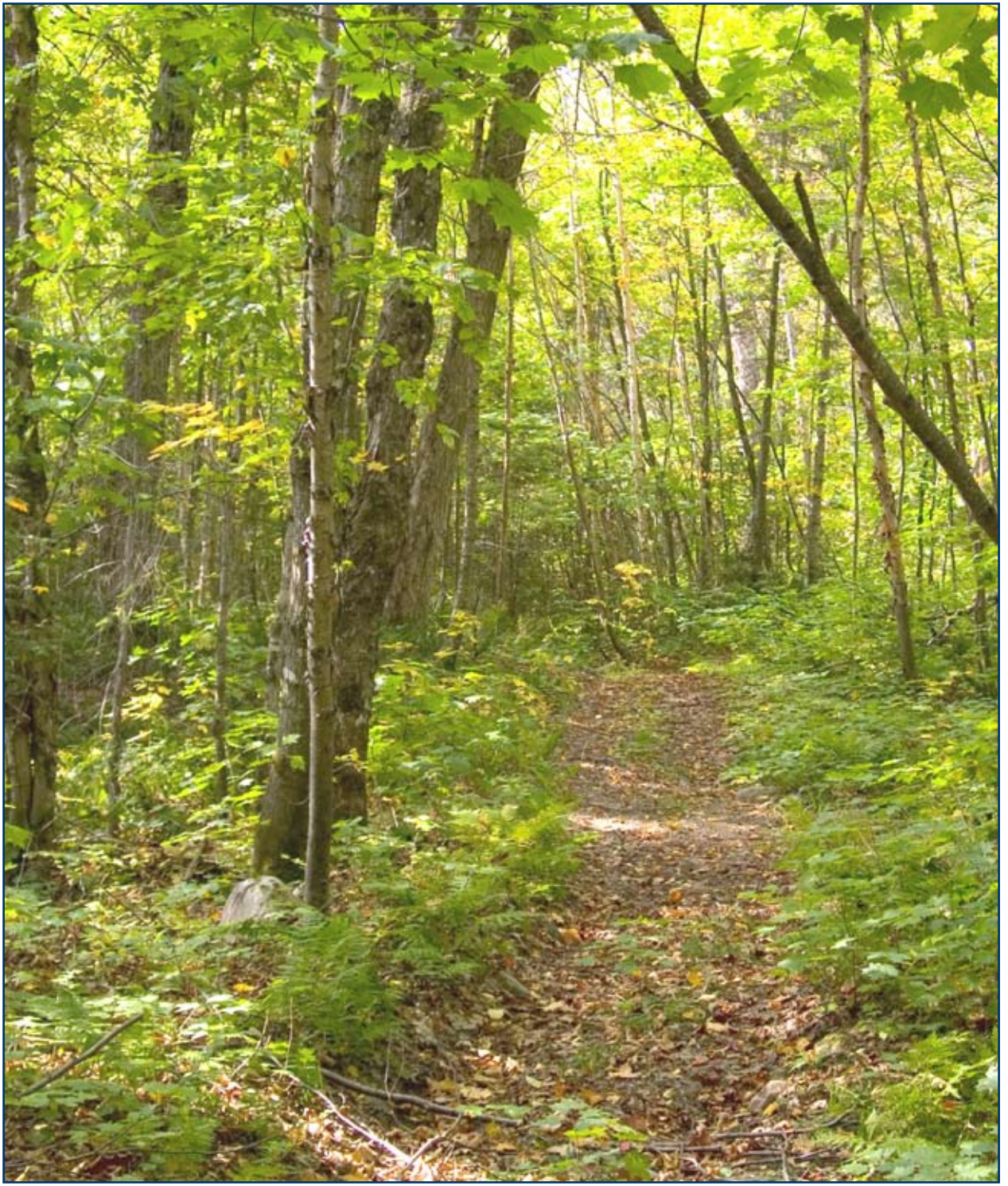


Morning Tour of the Great Lakes Forestry Centre and the Ontario Forest Research Institute

Canadian Forest Service – Great Lakes Forestry Centre

The Canadian Forest Service (CFS) is a forest research and policy organization within Natural Resources Canada, a Government of Canada department that helps shape the important contributions of the natural resources sector to the Canadian economy, society and environment.

The CFS promotes the responsible and sustainable development of Canada's forests - development that meets current needs without compromising those of future generations. For more than a century, it has met this responsibility by developing and sharing knowledge about forests and bringing stakeholders together to address regional, national and global forest issues.

The CFS is made up of research scientists, technicians, economists, policy analysts and other dedicated professionals. Whether conducting research in the field, performing tests in the lab or analyzing information and data, CFS staff work to ensure a healthy forest and a strong forest sector for Canada.

As one of six CFS centres across Canada, the 120 staff members and researchers at the Great Lakes Forestry Centre (GLFC) in Sault Ste. Marie, ON, play a key role in supporting the CFS in its mandate as Canada's national forest research and policy coordination organization. The programs carried out by GLFC staff are categorized into five major areas: forest productivity; forest biotechnology and bioproducts; forest ecosystem processes; climate change and other disturbances; and national program areas. GLFC also houses staff of the CFS Canadian Wood Fibre Centre, a virtual establishment whose mandate is to increase the economic competitiveness of the forest sector. For over 60 years, GLFC has been a leader in delivering scientific knowledge to meet the needs of the forest sector. The scientific research conducted by GLFC researchers has helped forest managers both move toward sustainable forest management, and measure its progress toward this goal.

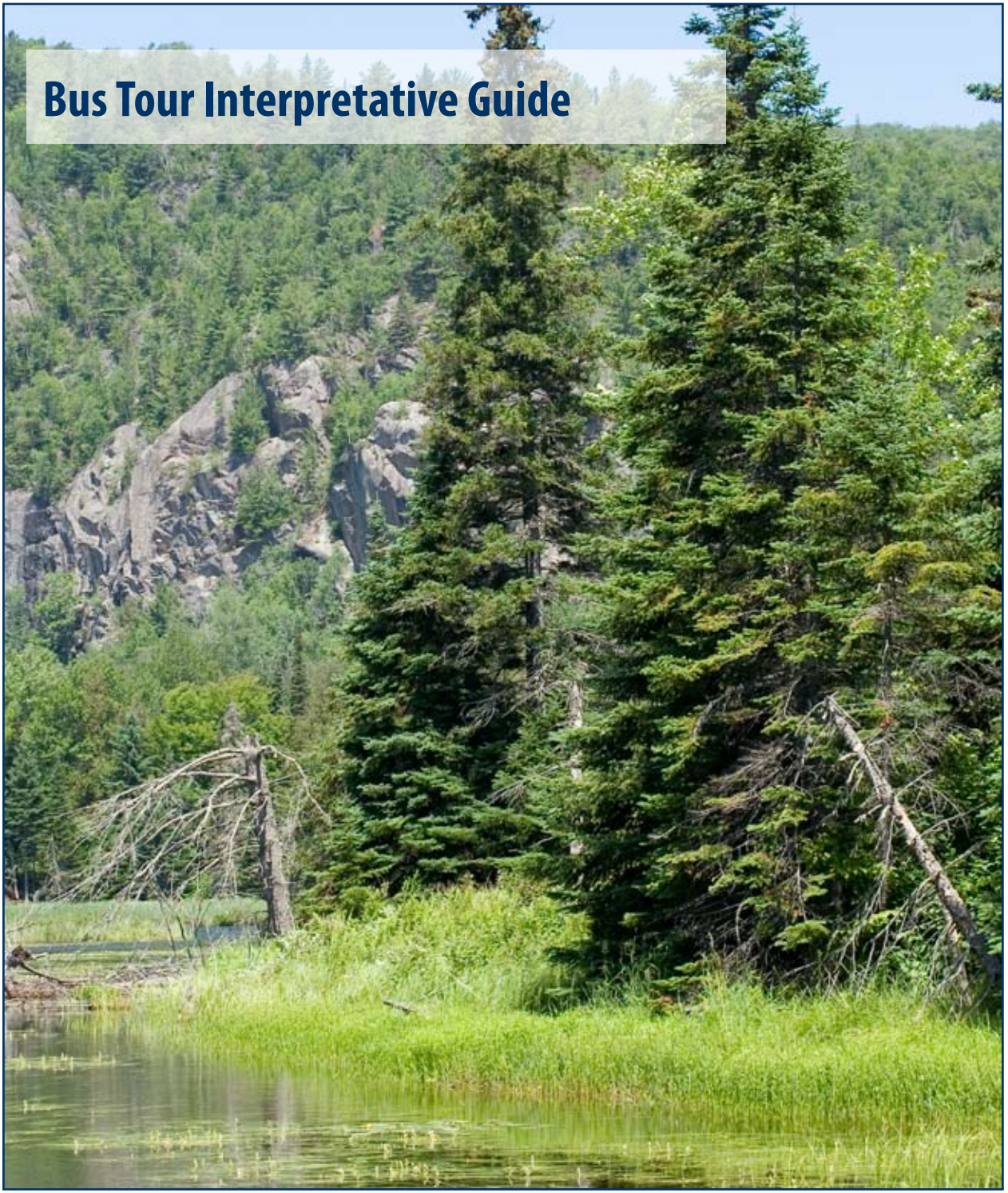
Ontario Ministry of Natural Resources – Ontario Forest Research Institute

At the Ontario Forest Research Institute (OFRI) in Sault Ste. Marie, ON, researchers pursue new scientific insights into the sustainable management of Ontario's forests. Working with a range of partners, not only in Sault Ste. Marie but also in hundreds of field sites across the province, their research is focused on developing more effective ways to manage forests to ensure a healthy forest environment for the people of Ontario.

OFRI's researchers are investigating how Ontario's trees and forests grow and change due to human activities and natural disturbances and are ensuring that this new scientific knowledge is transferred to ministry program, policy and field staff, as well as other clients such as Ontario's forest industry. The effective transfer of OFRI research helps to provide a sound scientific foundation for Ontario's forest management policies, planning, and practices and helps to sustain all forest values: timber production, wildlife habitat, recreation, biodiversity, and more.

OFRI has about 50 staff, including research scientists, science specialists, statisticians, lab and field technicians, technology transfer specialists, managers, and administrative staff. Staff expertise and projects relate to a variety of forestry disciplines, such as ecology, silviculture, soils and hydrology, biochemistry, pathology, physiology, genetics, modelling, remote sensing, landscape ecology, non-timber forest products, and climate change.

Bus Tour Interpretative Guide



1→ Sault Ste. Marie - 0.0km

Located on the north shore of the St. Mary's River, **Sault Ste. Marie** is strategically located on the waterway linking Lake Superior and Lake Huron, which continues to be a hub for transportation and commerce. The area was a gathering place for First Nations people long before the first European settlers came to Northern Ontario. The Ojibway were the area's first residents and called the area "Bawating", meaning turbulent and bounding waters.

French Explorers and Jesuit missionaries began exploring the area in the 1600s. A Jesuit mission was put in place by 1655 and the site was renamed to "Sault Sainte Marie", in honour of their patron saint. Sault Ste. Marie didn't become a major settlement until 1783 when the North West Company built a trading post on the Michigan side of the river. The English traders maintained the post until the south bank of the St. Mary's River became American territory. In 1797 the North West Company established another trading post after they were forced to move to the north shore. The first canal was also built around this time, but was destroyed in 1814, along with the trading post by the Americans during the War of 1812. After the war, the trading post was rebuilt, and in 1821 it was turned over to the Hudson's Bay Company. Work was started on the shipping canal in 1888; the canal was completed in 1895.

The arrival of American entrepreneur Francis H. Clergue in 1894 was the turning point in the history of Sault Ste. Marie. Clergue and his investors recognized the potential that the area held. They were responsible for constructing the core businesses of the city which still operate today: Algoma Steel, St. Marys Paper and the Algoma Central Railway.

2→ Algoma Central Railway Overpass - 9.3km

The Algoma Central Railway (ACR) passes over Highway 17 North, also known as the Trans-Canada Highway. The railway travels 377.6km northward through dense forests and deep ravines to join the Canadian National Railway in Hearst. The ACR helped to make Sault Ste. Marie an industrial town at the turn of the century by serving the power company, pulp and paper company, and the steel plant. It was used for hauling pulpwood, pine logs and iron ore.

White-tailed deer can often be seen along the side of the highway browsing on tender shoots of plants, including the leaves and tips of shrubs and trees. White-tailed deer range expanded into the Sault Ste. Marie area over a century ago, influenced by the changes in habitat produced by man. The intensive nature of logging in the early 1900s resulted in a vast cut-over area which produced new growth suitable for deer browsing.

3 → Highway 556 – Searchmont Turn-off - 17.8km

Approximately 30 km north on Hwy 556, is the small community of **Searchmont** with a population of about 300 permanent residents and 100 seasonal residents. The community has seen many sawmills and lumber camps over the years. Searchmont is now best-known for the ski resort of the same name.

4 → Mile Hill - 22km

Mile Hill gives a scenic view across the lowlands that were once flooded by Lake Superior. The cool, moist valley provides suitable growing conditions for conifers such as black spruce, jack pine and white pine. Hardwood forests dominate the surrounding hills. If you look behind as the bus travels down Mile Hill, you will be able to see a few of the wind turbines of the Prince Wind Farm. The Prince Wind Energy Project, operated by Brookfield Power, comprises 126 wind turbines making it the largest wind farm in Canada with a total installed capacity of 189 megawatts (MW).

5 → Goulais River - 28.5km

The **Goulais River** rises in the Algoma highlands and empties into Goulais Bay on eastern Lake Superior. It drains an area of approximately 2000km^2 and is one of Superior's largest tributaries. During the second half of the 19th century, the river was used to transport logs to local sawmills. It is now used for recreational activities such as canoeing and kayaking.

For the next 5km, the highway follows the coastline of Lake Superior. The lake is at its lowest water level in 81 years, exposing previously submerged bottom. Studies are being conducted to find answers for this alarming depletion of water. Some of the possible reasons include drought, shorter periods of ice cover and milder winters.

6 → Haviland Bay - 41.0km

Haviland Bay is a popular area for cottagers and recreational water activities. The scenic bay area is also highly used by local hiking and snowmobiling enthusiasts, providing access to the famous Voyageur Trail. This network of trails extends along the north shore of Lakes Superior and Huron between Thunder Bay and Manitoulin Island, and when completed, will provide outdoor adventurers with over 1,100 km of pristine trails.

7 → Chippewa Falls - 48.5km

Chippewa Falls is actually two falls of 6.1m (20 ft) each. The falls are most scenic in late spring with the water from melted snow rushing over the pink granite rocks. Rainbow trout and smelt fishing are popular further down from the falls.

A plaque installed at the parking area to the falls commemorates the halfway point of the Trans-Canada Highway, which runs from St. John's, Newfoundland, to Victoria, British Columbia. The total length of the route is 7,821 km (4,860 miles). The Trans-Canada was officially opened in 1962 for through traffic.

8 → Batchawana Bay Provincial Park - 66km

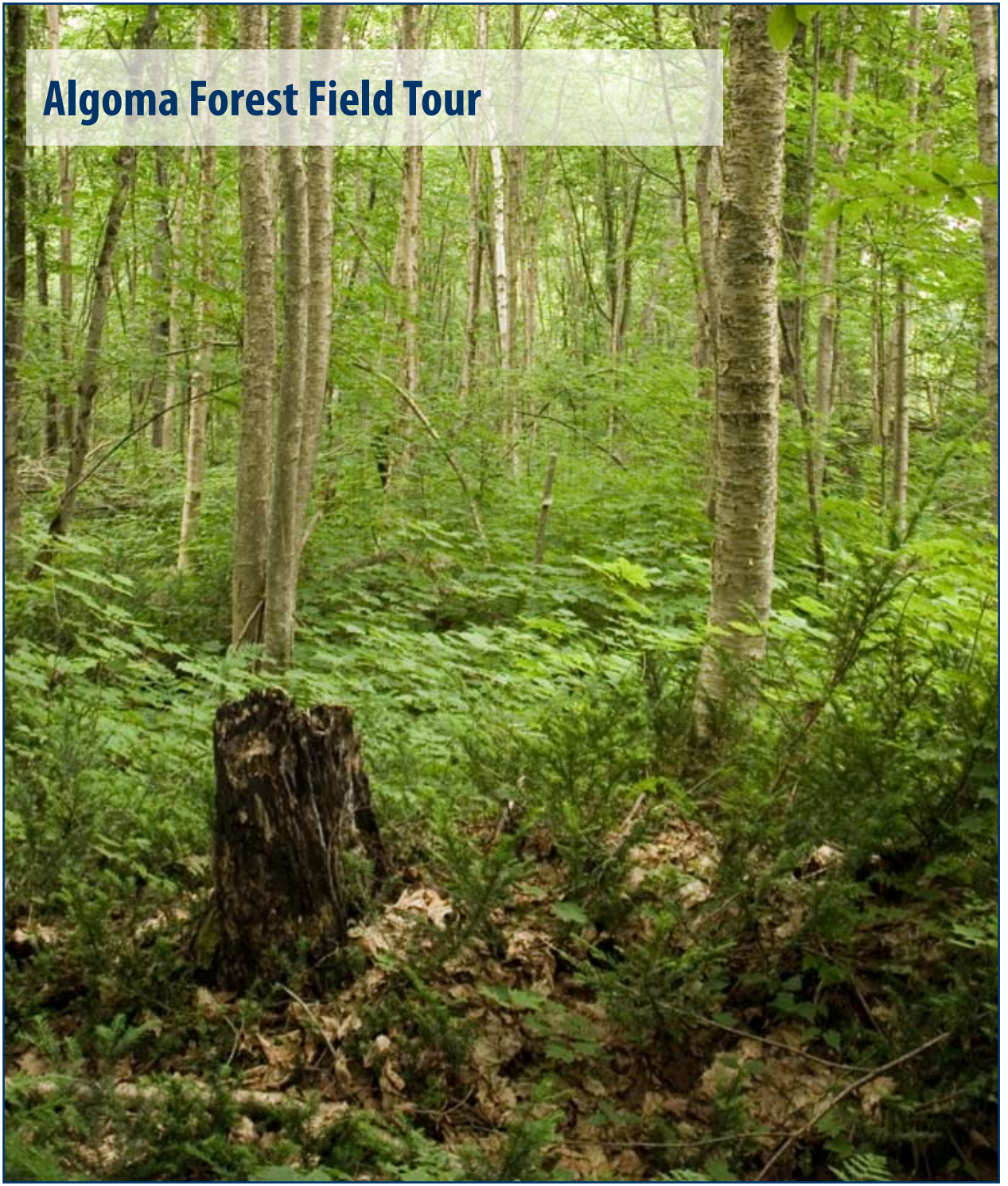
Batchawana Bay has a 1.6km long sandy beach which is a popular destination for swimming and picnicking. In 1824, the Hudson's Bay Company established a fur trading post on the bay to collect beaver pelts from the Ojibway. The name "Batchawana" comes from an Ojibway word meaning "narrows and swift water", which refers to the swift water that pours through the narrow mouth of the bay pushed by strong winds from Lake Superior.

9 → Pancake Bay Provincial Park - 77km

Pancake Bay received its name from the era of traveling fur-traders who would camp on the 3.2 kilometres of sandy shore, while enroute to Montreal from Fort William located in Thunder Bay, Ontario. They were running short on supplies at this point in their travels, so dinner consisted of pancakes made from their remaining flour.

The diverse vegetation in this area is typical of the transitional zone between the northern boreal forest and the Great Lakes-St. Lawrence lowlands. Pines are most common along the shoreline, with yellow birch and sugar maples predominating farther inland. Pancake Bay is home to a variety of wildlife including squirrels, chipmunks, red fox and over 200 species of birds.

Algoma Forest Field Tour



Field Site 1 ~ 10km up Tilley lakes Rd. (see pages 21 for site description)

Field Site 2 ~ 10km up Robertson Lake Rd. (see page 28 for site description)

Dinner at Buttermilk Alpine Village ~ 1km up Robertson Lake Rd.

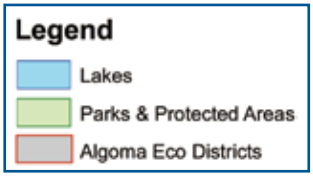
Invited After dinner Presentation by Dr. Art Groot: *"Transforming Newton's forest"*
(see page 32 for presentation abstract.)

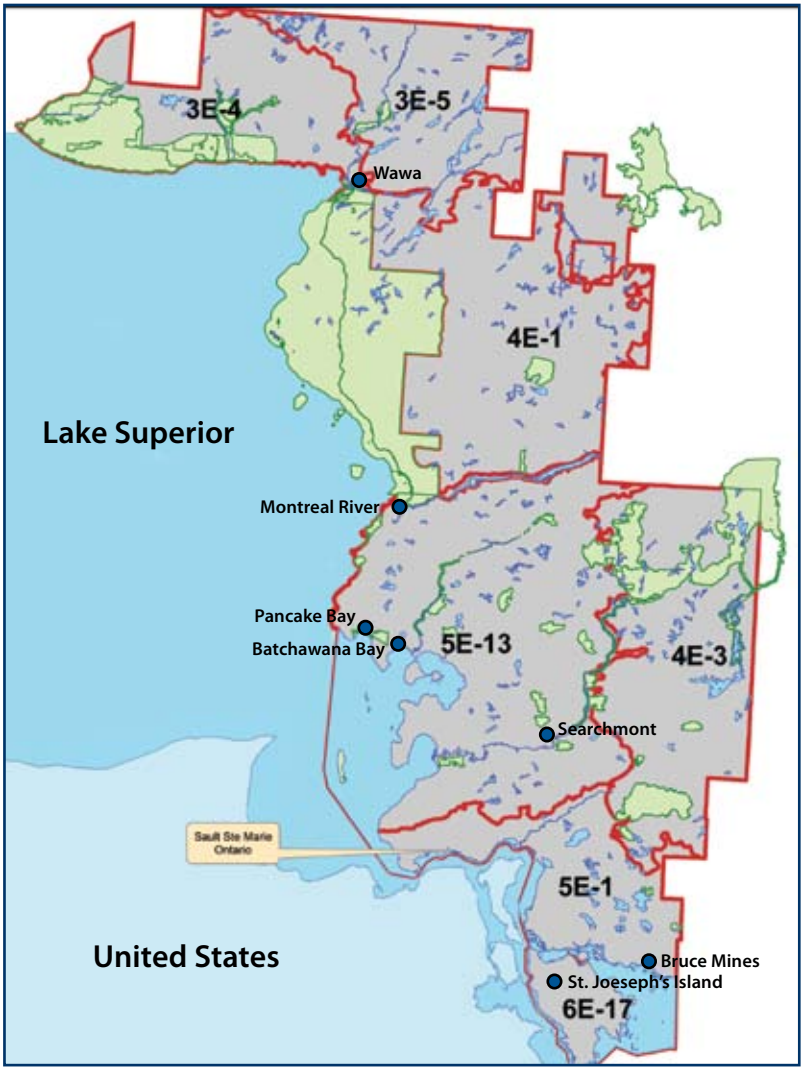
Afternoon Tour – Algoma Forest Field Tour

Location

The **Algoma Forest** is a large forest management unit in north-central Ontario. The forest encompasses more than 1.5 million hectares, of which 1.3 million, or 85%, is considered productive forest land. The Algoma Forest stretches from the north shore of Lake Huron along the eastern shores of Lake Superior. The Forest includes the City of Sault Ste Marie (population 75,000), the Town of Wawa (population 3,700) and several small hamlets including Echo Bay, Searchmount, Heyden, Bruce Mines and Montreal River.

Algoma Forest Eco-districts





Because Sault Ste Marie is a major regional service centre in Northern Ontario there is a diversity of employment and economic opportunities available. The forest products industry is a major contributor to the local economy. Along with mill and woodlands opportunities, Sault Ste. Marie is the home to provincial and federal forestry research facilities, the headquarters for the Ontario Ministry of Natural Resources (OMNR) Forest Management Branch, and a large number of forestry consultants, contractors and suppliers.

The Crown-managed portion of the Algoma Forest is highly fragmented by large parcels of privately owned land around Sault Ste Marie, along the shore of Lake Superior and lands formerly owned by the Algoma Central Railway and by several parks and other protected areas. The southern portion of the forest is highly accessed and utilized by the urban population of Sault Ste Marie for a wide diversity of recreational uses.

Clergue Forest Management Inc.

Clergue Forest Management Inc. (CFMI) manages the Algoma Forest under a Sustainable Forest License (SFL) issued by the OMNR. Under the requirements of the SFL, CFMI is the licensee responsible for carrying out the activities of forest management planning, forest renewal and maintenance. Clergue partner companies carry out forest harvesting, access road construction, monitoring and reporting, as harvest contractors for CFMI. All activities carried out by CFMI and partner companies are subject to provincial legislation and OMNR approvals.

CFMI has six partner companies that are partially dependent on timber from the Algoma Forest. These companies include:

- **Boniferro Mill Works Inc.** (Sault Ste. Marie, ON) – Produces hardwood lumber (primarily maple and to a lesser extent white and yellow birch);
- **Domtar Inc.** (Espanola, ON) – Produces pulp, printing papers, imaging papers, medical papers and flexible packaging;
- **Levesque Plywood Limited** (Columbia Forest Products – Hearst, ON) – Produces poplar veneer;
- **St. Marys Paper Ltd.** (Sault Ste. Marie, ON) – Produces super calendar paper;
- **Midway Lumber Mills Limited** (Thessalon, ON) – Produces hardwood lumber and pine dimension lumber;
- **Weyerhaeuser Company Limited** (Wawa, ON) – Produces oriented strand board using poplar and white birch.

CFMI's main office is located in Sault Ste. Marie, ON. Almost 900 people are employed in the CFMI partner company mills, with approximately 300 additional employees in woodland operations.

Algoma Forest Species Composition

The Algoma Forest is uniquely divided between the Great Lakes-St. Lawrence and Boreal Forest Regions. The southern portion of the Algoma Forest is located within the Great Lakes-St. Lawrence Forest Region and Site Region 5E. Progressing north-easterly away from the Great Lakes, the forest changes into a transition forest and Site Region 4E, eventually becoming Boreal Forest in the north and northeast portion of the Algoma Forest.

White birch and hard maple are the most highly represented working groups in the Algoma Forest; however, due to the transitional nature of the Algoma Forest, numerous tree species are present on the landscape. Hard maple, along with lesser amounts of yellow birch, are the most common tree species in the Great Lakes-St. Lawrence Region of the landscape. Other species in this forest region include soft maple, balsam fir, white spruce, white pine and red oak. The Great Lakes- St. Lawrence Region extends north into the Algoma Forest because of the moderating influence of the Great Lakes, but maple stands in the northern portion of the forest are generally poorer in quality than those closer to the Great Lakes. Hard maple, yellow birch and soft maple tend to grow on fine textured till soils with hard maple occupying the drier sites, yellow birch growing on the moister sites and soft maple dominating on the wet sites.

Species such as white and black spruce, jack pine and lesser amounts of white pine, balsam fir, balsam poplar, white birch, eastern white cedar and tamarack dominate the Boreal Forest Region of the Algoma Forest.

Climate of the Algoma Forest

The climate in the southern half of the Algoma Forest area is strongly influenced by Lakes Superior and Huron. The mean annual temperature ranges from +2 °C at the northern edge of eco-district 4E-1 to +6 °C at the southern edge of Eco-district 6E-17. The mean annual precipitation is greatest along the shoreline of Lake Superior in Eco-district 4E-1 where it is 97 cm per year; it decreases to 81 cm per year inland and to the south (Eco-districts 5E-13, 4E-3, 5E-1, and 6E-17).

The climate in the northern part of the Algoma Forest (Eco-districts 3E-4 and 3E-5) can be classified as "cool continental", which is characterized by very cold winters and cool summers. Lake Superior has a pronounced moderating effect on the climate in this area. This marine influence affects the climate several kilometres inland from the lakeshore, by increasing the humidity and producing cooler days in the summer and milder days in the winter. Killing frosts may occur as late as mid-June, after the current year's vegetative growth has flushed, and it is not unusual for frosts to occur by mid August.

The western shore of Lake Superior receives large amounts of "lake-effect" snowfall. Bands of heavy snowfall are generated when cold westerly winds sweep across the ice-free Lake Superior in early- and mid-winter. Snowfall is intensified by the orographic effect of the rugged topography that is prevalent in the region.

Geology, Landforms and Soils of the Algoma Forest

Throughout much of the Algoma Forest, the soil mantle is usually very thin and bedrock outcrops are common, especially along river valleys, gorges and fault lines. Rock knobs and cliffs of over 120 metres relative relief are common. A small portion of the Forest has level to undulating terrain. Pleistocene glaciation removed much of the original soil from the landscape causing a surficial geology characteristic of glaciation. Soils are typically very shallow to shallow tills in the form of ground, interlobate and end moraines, deep sandy to gravely glacio fluvial deposits, as well as aeolian deposits of fine sands over glaciofluvial or organic deposits. The drainage pattern is irregular and frequently interrupted by bedrock formations causing swamps, ponds and lakes.

The northern section of the Algoma Forest (Eco-district 3E-4 and 3E-5) has variable topography. The portion of the forest west of Wawa is characterized by rough, broken topography with hills rising steeply from Lake Superior and along river valleys leading to the lake. The extremes in landforms become moderated along a gradient heading inland from Lake Superior. Only a few large lakes occupy the area to the west. The extremes in topography gradually become less drastic moving east and north east of Wawa. Rock outcrops become less prevalent and yield to gently rolling to flat relief.

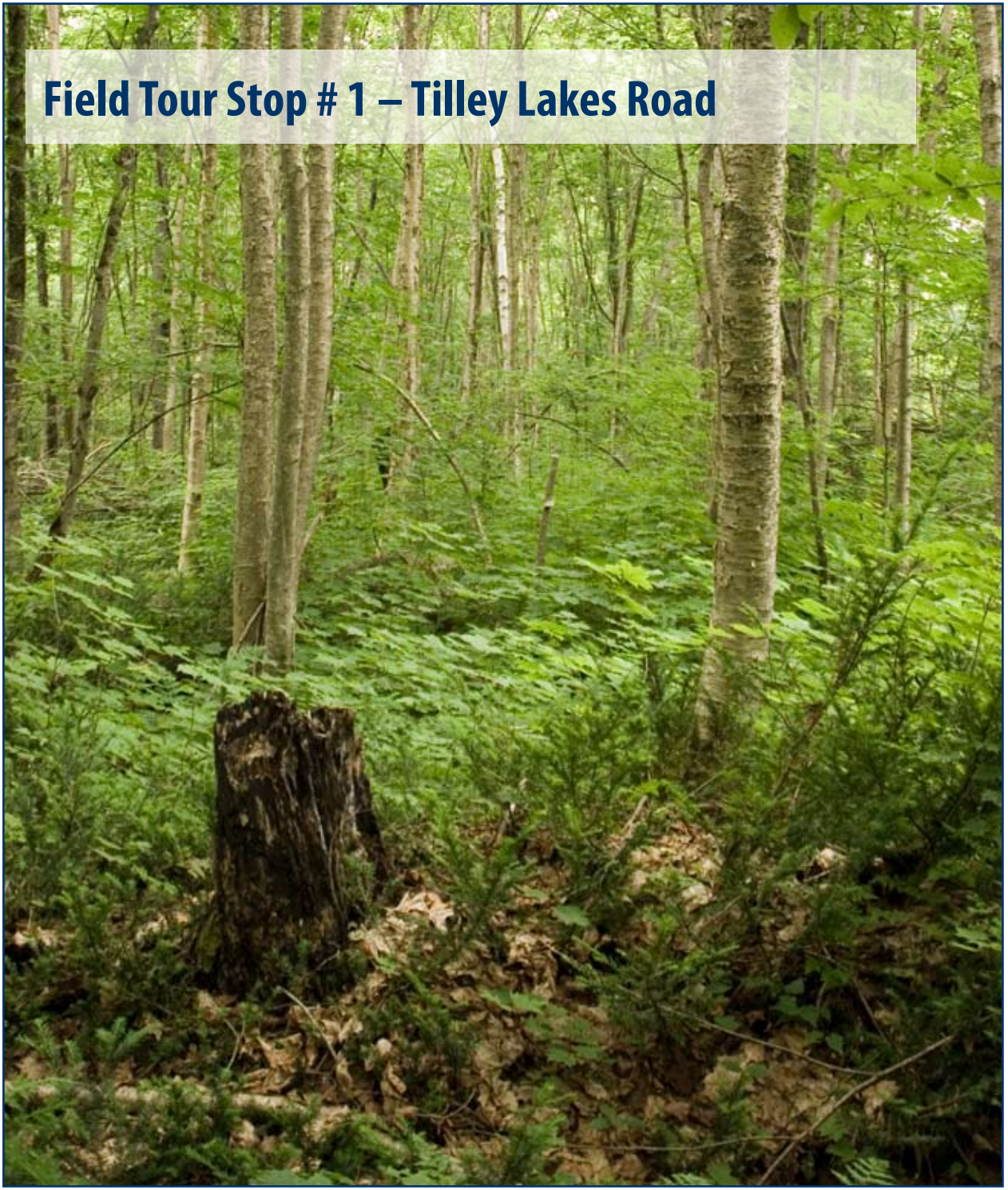
The southern half of the Algoma Forest is home to some of the most striking and highest elevations found in Ontario. The highest elevations in the area are found in the near shore areas of Lake Superior in Eco-districts 4E-1 and 5E-13 where the mean elevation is 579 metres. Inland from this, the mean elevation in the more northern parts of the Eco-districts is 488 metres, while the southern portions of these Eco-districts average 396 metres in height. The macro relief of the entire area is moderately to weakly broken bedrock consisting of basalt and sandstone (4E-1 and 5E-13), granodiorite, greywacke, conglomerate, and shale (6E-17). The land-water ratio is 80:20 throughout most of the area, with the exception of the area along the Lake Superior shoreline in Eco-districts 4E-1 and 5E-13 where it is 90:10.

History of Forest Management on the Algoma Forest

Prior to large-scale harvesting operations and organized fire suppression activities, wildfires, windthrow, insect attacks and disease infestations were the driving forces that determined species composition, forest structure, age and landscape patterns on the Algoma Forest. Harvesting operations have had a significant impact on the nature of the Algoma Forest through product specific cutting or high grading in the tolerant hardwood forest units and clearcutting in the conifer forest units without adequate renewal. This historic high grading has resulted in many stands with a significant component of low quality hardwoods. During the period from 1870 to 1930, extensive areas of large white pine were harvested. As a result, the Algoma Forest contains much less white and red pine today. Spruce and balsam fir have been harvested for pulpwood since the early 1900s. Since the 1940s, veneer and sawlog quality yellow birch and hard maple have been the primary sought-after products. These series of harvests, for specific high quality products, have resulted in today's mixture of poorer quality trees, in older age classes.

Current forest management strategies are aimed at removing this low grade growing stock to improve stand quality over time. However the availability of local markets for low-quality tolerant hardwood is an issue and many stands cannot be economically harvested and are bypassed. The forest has become more fragmented with large numbers of small cuts that reflect economic considerations and provincial policy direction to limit the size of clearcuts and distribute harvest areas through the forest.

Field Tour Stop # 1 – Tilley Lakes Road



Tilley Lakes Road

The application of tree marking began on the Algoma Forest in 1995, which marked the initiation of hardwood management and an effort to reverse the effect of past harvesting practices on the Forest . Prior to 1995, hardwood management consisted of selective harvesting, or high grade harvesting.

All harvesting performed in the tolerant hardwood stands on the Algoma Forest is done using either the uniform shelterwood or selection harvesting system. Trees are marked by certified tree markers who have successfully completed the Ontario Tree Marking Certification Program, where they are taught the identification of tree defects, tree quality, wildlife values, and under what conditions to apply the selection or shelterwood system. (see the Ontario Tree Marking Guide and, A Silvicultural Guide for the Tolerant Hardwood Forest in Ontario for more details)

http://www.mnr.gov.on.ca/mnr/forests/public/guide/tree_marking_guide.pdf
http://www.mnr.gov.on.ca/mnr/forests/forestdoc/guidelines/hrdwd/pdf/cover.pdf

Trees are classified as either:

Acceptable Growing Stock (AGS):

» AGS trees exhibit form and appearance that suggest they can reasonably be expected to maintain and/or improve their quality and can be expected to contribute significantly to future crops in the form of vigorous, high quality stems.

Features of AGS:

» Contain or may potentially produce high or medium quality logs.
» Will maintain or improve in quality within the next cutting cycle.
» Will produce high quality sawlogs, veneer logs or sawlogs for dimensional lumber (medium quality).

Or

Unacceptable Growing Stock (UGS):

» UGS trees are high risk and are expected to decline during the next cutting cycle. UGS trees may also be of poor form and/or low quality and cannot reasonably be expected to improve in quality.

Features of UGS:

» High risk, or are expected to decline within the next cutting cycle.

» Contain or have the potential to produce low quality logs but no better. Such trees are often used or pulpwood, poker poles, or fuelwood but are not normally considered as crop trees.
» May contain cavities. Some trees in this category are retained for their wildlife value, when necessary to meet cavity guidelines.

The selection system is used on the Algoma Forest when stands are managed for maple and have at least 9 m^2/ha AGS. When quality falls below 9 m^2/ha AGS the shelterwood system is applied. The selection system is designed to apply the reverse "J" shape stem size distribution and remove up to 1/3 of the basal area per harvest entry. The current harvest cycle for selection stands is 28 years. The shelterwood system manages stands using crown closure targets, and generally requires the removal of ½ the basal area with a follow-up removal cut once regeneration is established and meets planned targets. The application of both systems requires the removal of the worst first with emphasis on trees with critical defects such as infectious diseases or visible conks.

Due to the history of selective harvesting on the Algoma Forest, marking during the first entry is based on the retention of quality over trying to meet the diameter class distributions listed below:

Size Class	Diameter Range (cm)	Target Residual Basal Area (m^2/ha)
Pole	10-24	6
Small Logs	26-36	6
Medium Logs	38-48	4
Large Logs	48+	2
	Total	18

In addition to marking trees for harvest, consideration is also given to the protection of mast trees to provide food for wildlife, as well as the retention of wildlife trees, generally cavity trees.

Wildlife Tree Retention in Marked Stands

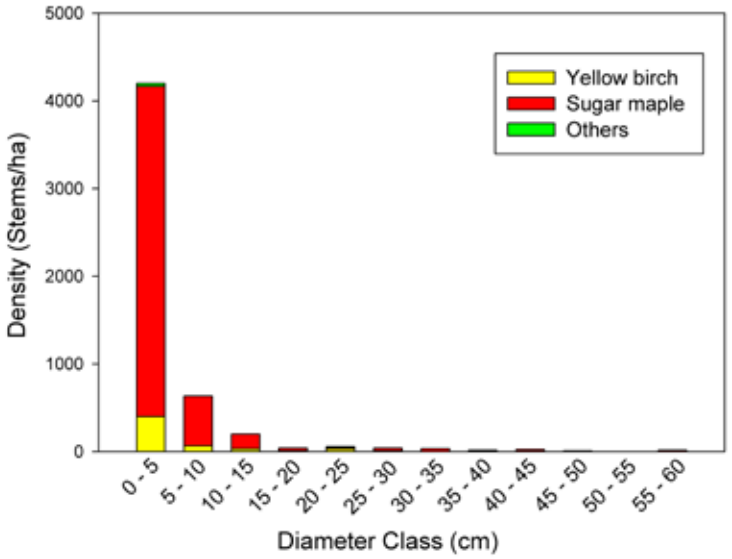
It is not a requirement to mark wildlife trees with any type of identifying mark in the Algoma Forest because of their abundance throughout these forest types. Tree markers and auditors must be aware of their presence and relative abundance throughout the stand. If an auditor feels that the targets for wildlife tree retention are not being achieved this should be documented on a tree marking audit report. Below is a summary of the types of trees that are considered beneficial to wildlife:

Cavity Trees	• Retain at least 6 per hectare based on the following order of priority 1. pileated woodpecker roost cavities 2. pileated woodpecker nest cavities 3. other woodpecker nest cavities or natural den cavities 4. escape cavities 5. woodpecker feeding cavities 6. high potential to develop cavities Trees should be at least 25 cm dbh
Mast Trees	• Retain at least 8 per hectare 1. Red oak is preferred, yet only occasionally encountered on most of the Algoma Forest – stands with a significant amount of red oak should be reported to Clergue 2. Ironwood (> 10 cm dbh) is also a recognized mast tree and are not marked for harvest
Scattered Conifer in Hardwood Stands	• Retain at least 10 conifers per hectare • Preference for long lived species – areas of high hemlock composition should be reported to Clergue
Supercanopy Trees	• Retain at least 1 per 4 hectares – these trees are long lived species greater than 60 cm dbh and emerging above the main canopy

Canada yew (*Taxus canadensis*), also known as ground hemlock, is an evergreen shrub commonly found in the Algoma Forest. This shrub's foliage, bark, and roots are sources of the valuable anticancer chemical paclitaxel, the drug form of which is called Taxol®, and two other chemicals of pharmaceutical interest, known as 10-DAB and DHB. Paclitaxel is used to treat ovarian, breast, non-small cell lung, and other cancers and has been one of the best-selling anti-cancer drugs in the world, with global sales of $9 billion US during 1993-2002.

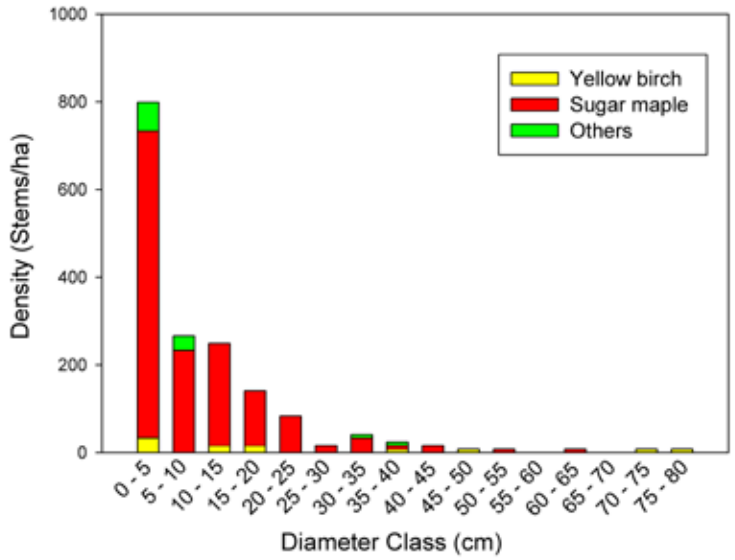
In recent years, large scale harvesting programs have been initiated in the Algoma Forest to capitalize on this important non-timber forest product. Evidence of past harvesting is visible throughout today's tour.

Tour Stop 1. Tilley Lakes Road Hardwood Management (harvested area)



	Density (stems ha^{-1})	Basal Area (m^2 ha^{-1})
Trees < 10 cm DBH	4833	3.1
Trees ≥ 10 cm DBH	442	22.4
Total	5275	25.5

Tour Stop 1. Tilley Lakes Road Hardwood Management (unharvested area)



	Density (stems ha^{-1})	Basal Area (m^2 ha^{-1})
Trees < 10 cm DBH	1067	0.3
Trees ≥ 10 cm DBH	617	31.9
Total	1684	32.2

Field Tour Stop # 2 – Robertson Lake Yellow Birch Crop Tree Release

Stand History

The Robertson lake yellow birch thinning site was selectively harvested in 1967. This harvest involved selecting out the high quality/high value birch veneer and logs, while retaining poorer quality trees. The site was subsequently site prepared using a bulldozer then planted with red pine and white pine, which was not a success. The failed plantation was then seeded with 50,000 yellow birch seeds per hectare. The site has been pre-commercially thinned twice, once in 1987 and a second time in 2003. To date the present value of investment in this site is $ 2,300/ha, which is one of the highest investment stands on the Algoma Forest.

Site Conditions:

Texture: Clay Loam
Deposit: Till
Moisture: Fresh
Site Class: 1

Prescription:

The crop tree release treatment has gone through a couple of refinements since its inception on the Algoma Forest in 2002 as part of Clergue Forest Management's adaptive management.

All sites are tree marked using blue paint to identify desired crop trees to be crown released. The following criteria are used to select crop trees:

- Select up to 250 crop trees per hectare, spaced at 6 to 7 metres apart. This should produce approximately 185 final harvest trees per hectare.
- Dominants and codominants
- Capable of producing a Grade 1 butt log.
- Potential 2 log trees
- Straight and well formed, without crooks and sweep
- No major forks (high U shaped forks are acceptable)
- No major defects (stem cankers, splits, seams, large wounds, heavy sapsucker damage, and dead branches in the butt log)
- Clean bole for half height (small live branches less than 2.5 cm in diameter in the second logs are acceptable).
- Full crown with dense foliage.
- Well spaced throughout the stand.

Once marking has been completed thinning can begin. This work is completed by local cutters that work on the Algoma Forest during the cutting season from June 15 to spring break-up. Trees are released using crown spacing. The following conditions are used to determine whether thinning has been completed in accordance with the silvicultural prescription:

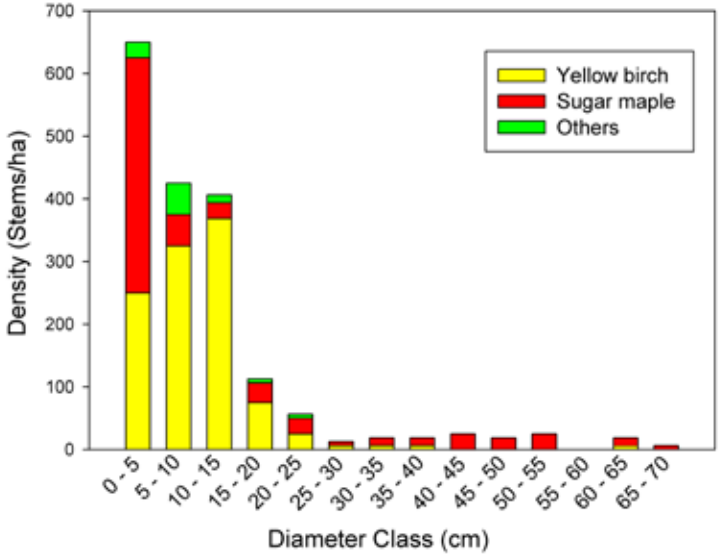
- Removing all those dominant and codominant trees that are interfering with the growth of the yellow birch crop trees. A dominant tree is defined as a tree with a crown that extends beyond the height of the crop tree. A codominant tree is defined as a tree with a crown that is the same height as the crop tree
- Marked crop trees shall be released by removing all competing crowns on two to three sides within 6 to 8 feet of the marked crop tree's crown to ensure the best results.
- The trees that must be felled to release the yellow birch crop trees must be completely severed from their stumps and dropped completely to the ground, no hang-ups or partially severed trees are to be left on the project site.
- No trees are to be felled outside the project area, such that any portion of a felled tree is beyond the treed edge of any block.
- The contractor must ensure that no damage is done to the marked crop trees.

Clergue now releases crowns of crop trees on three sides within 8-10 feet. Openings around crop trees were found to be closing in much more quickly than originally expected, as can now be seen on this site. Early fears of epicormic branching and subsequent reduced product value were the leading factors to the conservative crown release target. There have been little to no indications that opening the trees up a couple of extra feet will result in epicormic branching.

Expected Results:

Research has shown that yellow birch between 16 to 55 years of age respond well to thinning where growth can increase by as much as 7.5 cm in a ten year period. Along with the increased growth there is also expected to be an increase in the value of products that are derived from this site. The values of a truck load of yellow birch veneer versus pulpwood is eight fold, and about a six fold value increase for veneer versus logs.

Tour Stop 2. Roberston Lake Yellow Birch Management



	Density (stems ha^{-1})	Basal Area (m^2 ha^{-1})
Trees < 10 cm DBH	1075	2.4
Trees ≥ 10 cm DBH	719	33.7
Total	1794	36.1

Transforming Newton's Forest

Dr. Arthur Groot
Canadian Wood Fibre Centre
Canadian Forest Service

The foundations of forest management were established in 18th century Europe during the Age of Enlightenment. The development of forest management was strongly influenced by the scientific breakthroughs of Sir Isaac Newton and other scientists, making "Newtonian forestry" a fair description of the result. This presentation traces the direct historical connection between Newton and the first efforts at organized forestry in Prussia, and also the export to North America of the European approach to forest management by Bernhard Fernow.

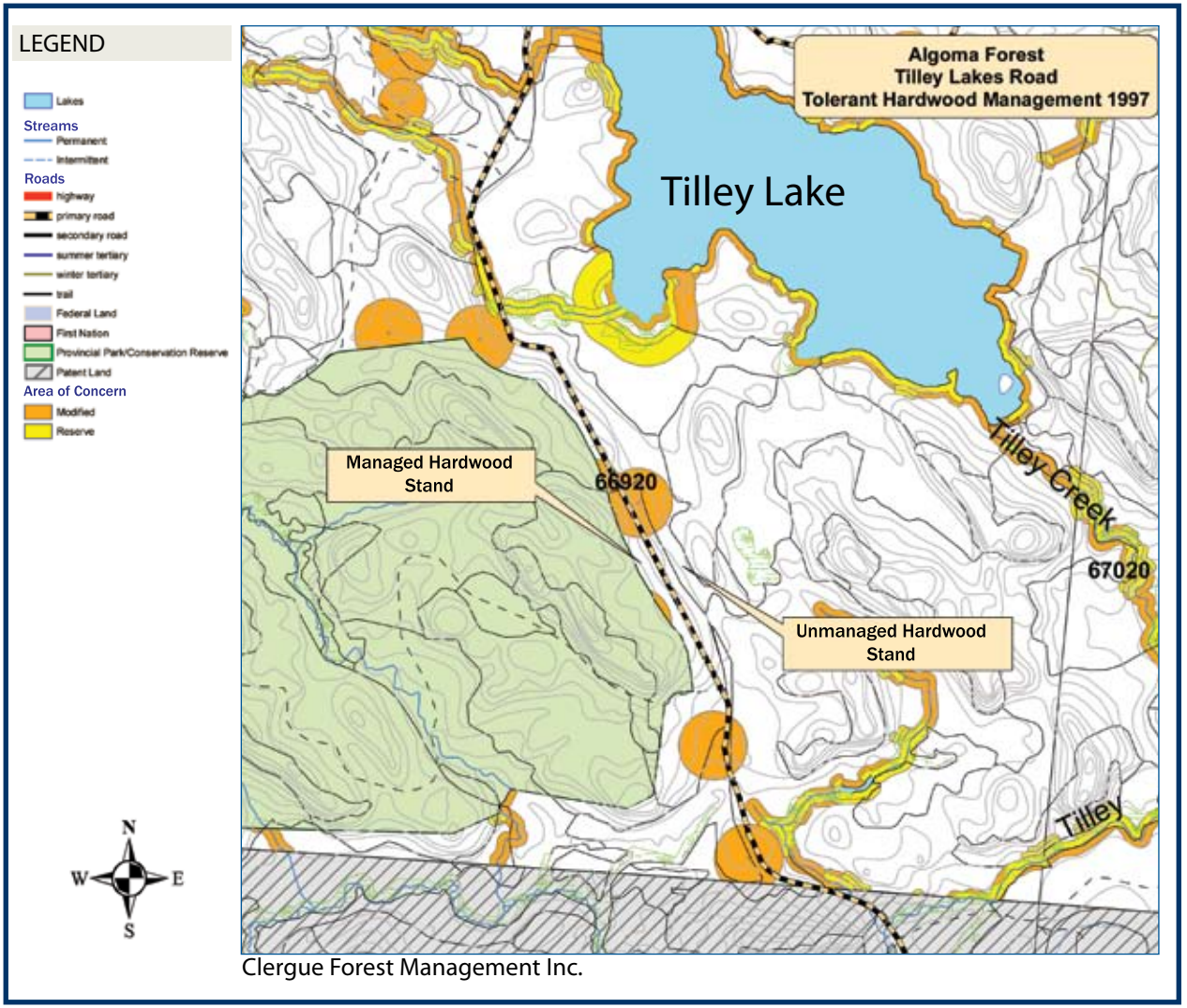
A key feature of Newtonian forestry is the strong tendency towards simplification of forest structure and dynamics. In our current post-Enlightenment era, forest simplification has become increasingly unacceptable for social, ecological and economic reasons. Concepts and tools that will enable the management of forest complexity are greatly needed, and this IUFRO conference on Complex Stand Structures and Associated Dynamics advances the task of transforming Newton's forest.

Appendix 1

Scientific names of common tree species in the Algoma Forest

American beech	*Fagus grandifolia*
American elm	*Ulmus americana*
Balsam fir	*Abies balsamea*
Balsam poplar	*Populus balsamifera*
Basswood	*Tilia americana*
Black ash	*Fraxinus nigra*
Black spruce	*Picea mariana*
Canada yew	*Taxus canadensis*
Eastern hemlock	*Tsuga canadensis*
Eastern white cedar	*Huja occidentalis*
Ironwood	*Ostrya virginiana*
Jack pine	*Pinus banksiana*
Largetooth aspen	*Populus grandidentata*
Red maple	*Acer rubrum*
Red oak	*Quercus rubra*
Red pine	*Pinus resinosa*
Silver maple	*Acer saccharinum*
Sugar maple	*Acer saccharum*
Tamarack	*Larix laricina*
Trembling aspen	*Populus tremuloides*
White ash	*Fraxinus americana*
White birch	*Betula papyrifera*
White pine	*Pinus strobus*
White spruce	*Picea glauca*
Yellow birch	*Betula lutea*

Field Tour Stop # 1 – Tilley Lakes Road



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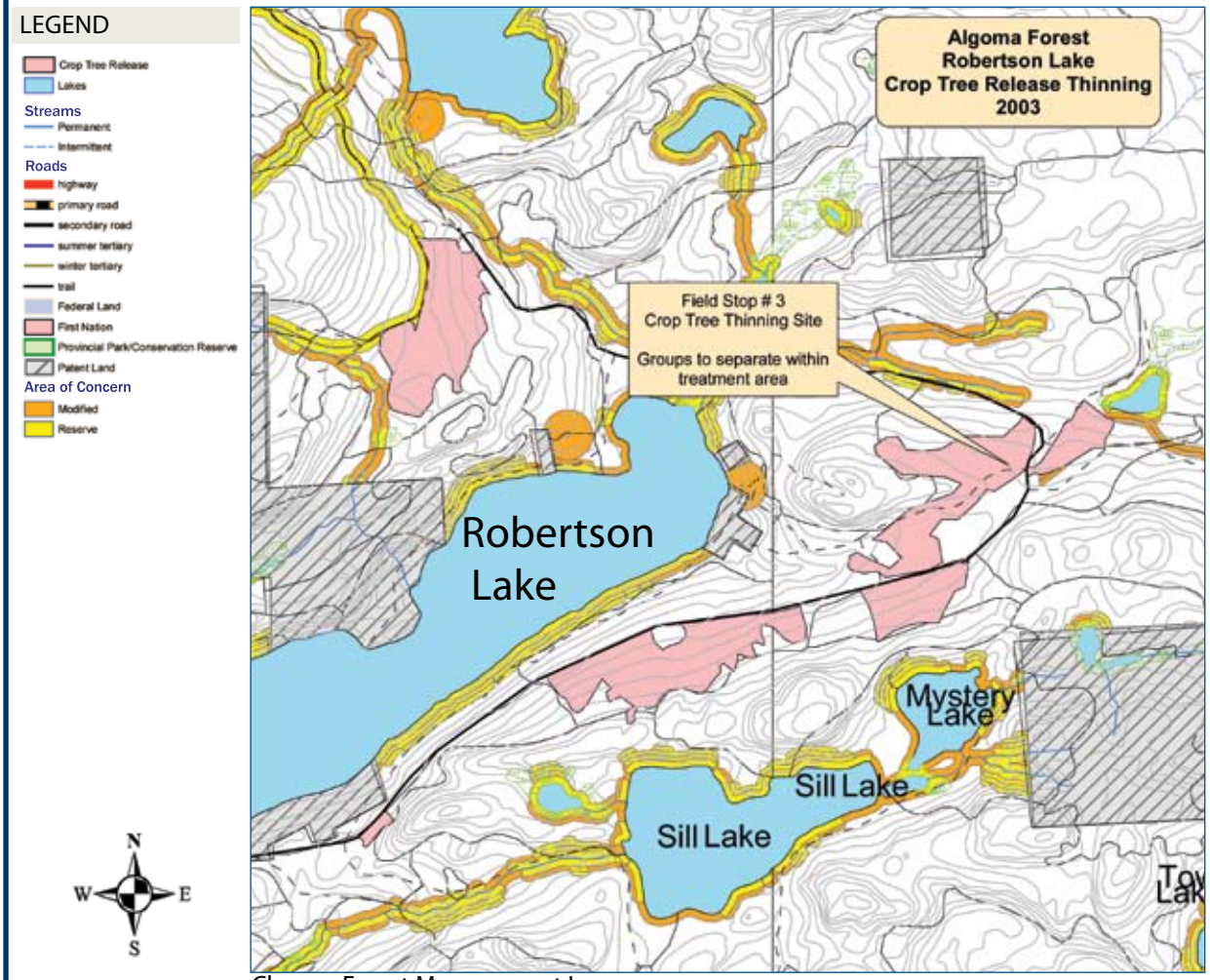
Field Tour Stop # 2 – Robertson Lake Yellow Birch Crop Tree Release



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