GREY SAUBLE
CONSERVATION AUTHORITY

FOREST MANAGEMENT PLAN

January 1, 2013 – December 31, 2032

APPROVAL PAGE

Moved by: Michael Martin

Seconded by: Judy Gay

Motion #: FA13-017
That the Grey Sauble Conservation Authority adopt, in principle, this Forest Management Plan for the plan period of January 1, 2013 – December 31, 2032.

Carried.

January 16, 2013

Dick Hibma, Chair **Date:**

Note: Above motion approved at the Full Authority Meeting on January 16, 2013.

Authored by:

January 16, 2013

Anne Lennox, Forestry & Wildlife Coordinator **Date:**

With Contributions from:

Cam Bennett, Forest Technician & Gloria Dangerfield, GIS Specialist

Acknowledgments

Grey Sauble Conservation Authority (GSCA) thanks the following members of the Forestry Advisory Committee who provided valuable input and guidance towards the development of forest management policies on GSCA lands and nominated properties for a 'No forest management' classification:
Dick Hibma - GSCA Chair, Forestry Committee
Robert Reid - former GSCA Director, Forestry Committee
Arnold Kuhl (deceased) - former GSCA Director, Forestry Committee
John Gowan - former GSCA Director, Forestry Committee
David Fidler - Owen Sound Field Naturalists
Frank Beirnes - former County of Grey, Tree By-law Enforcement Officer
Ken Goldsmith - County of Bruce, Tree By-law Enforcement Officer
Robert Hurst - Trapper
Austin Ramage - Horse Logger
Marg Gaviller - Grey Sauble Conservation Foundation
Robert Lesperence - Maple Syrup Producer's Association
Russell Horning - Woodlot Owner, former GSCA Director
Mark Cressman - Retired Forester, Grey Association for Better Planning
John Hallman - Logger
Doug Thompson - Forest Cutter for Sawmill
Bob Day - Retired from Parks Canada, forestry training
Blake Smith (deceased) - Sydenham Sportsmen's Association, retired MNR Fish & Wildlife Supervisor
Carl Nuttall - Bruce Peninsula Sportsmen's Association
Rick Allen - Logger
Robert Lennox - Snowmobile Club
Don Scott - Planner, Niagara Escarpment Commission Director
John Lambie (deceased) - Forester
Malcolm Kirk (deceased) - Retired Resources Manager
Dave Taylor - Bruce Trail Club
Kevin Reese - Ministry of Natural Resources, Forester

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Grey Sauble Conservation also thanks the following people for their contributions to the development of this forest management plan:

- Carl Sadler for his technical advice and work on GSCA's forest management program,
- John Bittorf for the development of GSCA's forestry database and trouble-shooting expertise,
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- all summer students who assisted with the collection of inventory data or other forestry activities.

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EXECUTIVE SUMMARY

The Grey Sauble Conservation Authority (GSCA) was established by an Order-in-Council on January 1, 1985, following the amalgamation of the North Grey Region and Sauble Valley Conservation Authorities. The North Grey Region and Sauble Valley Conservation Authorities were established under the Conservation Authorities Act in 1957 and 1958, respectively.

The Province of Ontario has established three classifications for property assessment which provide significant tax savings for GSCA. These programs include the Managed Forest Tax Incentive Program, Conservation Land Tax Incentive Program, and the Farm Lands Property Class Tax Program. Each GSCA property that meets the eligibility requirements has been placed into one of these programs.

GSCA properties are classified according to their primary management use. These classifications include Management Areas, Conservation Areas, and Nature Preserves. The Agreement Forest properties, formerly managed by the Ministry of Natural Resources, are now being managed by GSCA and are included in the Management Area classification. For tax purposes, a list of all GSCA properties for each tax assessment program is provided using the property roll number and municipality in which they are located.

GSCA completed an inventory and mapping of all their properties between 1997 and 2002. The inventory and mapping are updated as management activities are undertaken and mapping is upgraded. For forest management planning purposes, each property was assigned a compartment name and number. In some cases, compartments are part of larger units, usually Management Areas or Conservation Areas.

This forest management plan defines the management goals and objectives for all GSCA lands and will guide the forest management activities over the next twenty-year period (January 1, 2013 – December 31, 2032). The objectives and strategies presented in this Forest Management Plan will apply to all properties where management has been deemed appropriate, and all planned activities will be conducted in a manner that will minimize adverse environmental impacts. The actual operations planned for each property over the next five year period (January 1, 2013 – December 31, 2017) are described in Section 10 of this Plan. An Annual Report will be prepared at the end of each year to track the progress of operations. The revenues generated from forest management activities will be placed in a forest management reserve and will be used primarily to offset the expenses of GSCA's forestry program.

In all management, GSCA will adhere to Provincial legislation and regulations, including the Trees Act, the Fisheries Act, the Fish and Wildlife Conservation Act, the Lakes and Rivers Improvement Act, the Endangered Species Act, Conservation Authorities Act, The Health and Safety Act, etc. GSCA will also be a 'Good Neighbour' and ensure that any forest management or wildlife management activities do not negatively impact a neighbour.

As part of the planning process, GSCA formed a Forestry Advisory Committee in 1998. This committee consisted of 24 individuals selected to represent a wide variety of interests, share extensive knowledge and experience of GSCA lands in forest, fisheries and wildlife management. Valuable input from this group forms part of this Forest Management Plan. Through this committee, a set of forest management policies were developed as guidelines for the management of GSCA properties. These policies were adopted by the GSCA Board of Directors in December, 1998 and are periodically updated as new information becomes available.

The Forestry Advisory Committee also examined the issue of 'No Forest Management' on a representative portion of GSCA lands as a commitment to permanently set aside some land that would have no forest management activities. All or parts of several properties were nominated by the committee. These properties have been identified in this forest management plan and the "No Forest Management" designation will be adopted upon approval of this plan.

Local agencies, councils, organizations and individuals will be provided with an opportunity to comment on this Forest Management Plan. Once this Forest Management Plan has been approved, on-going public input will be available through an open-ended consultation process. Any changes in the established policies will require approval of the directors.

In 2014, the Grey Sable Conservation Authority (GSCA) Board of Directors approved a motion (FA-14-028) to become Forest Stewardship Council® (FSC®) certified (FSC® C018800) through the Eastern Ontario Model Forest's (EOMF) Forest Certification Program. The FSC® is an international, membership-based, non-profit organization that supports environmentally appropriate, socially beneficial, and economically viable management of the world's forests. An independent third party organization, Rainforest Alliance, will evaluate GSCA's forest management activities periodically to ensure that the forest is being managed to the FSC® standards.

Management Goal

To create and maintain healthy and diverse forest ecosystems which will provide a sustained yield of wood products as well as environmental, ecological, social, and cultural benefits.

Environmental Objectives

Forest Health

Maintain healthy, forest ecosystems.

Environmental Protection

Protect special features, biodiversity values, sensitive flora and fauna, and soil and water resources.

Wildlife Habitat

Maintain and/or enhance wildlife habitats for wildlife species.

Species at Risk

Protect Species at Risk and their critical habitats.

Social/Cultural Objectives

Recreation

Provide a wide range of recreational opportunities.

Conduct risk management assessments to evaluate hazard trees to ensure public safety.

Natural Heritage Features

Protection of natural heritage features.

Education

Demonstrate sound forest management practices as an educational tool for watershed residents and visitors to the area.

Communication

Provide public consultation and input throughout the management cycle.

Adaptive Management

Implement a process for predicting management outcomes, monitoring changes, and learning through experience.

Economic Objectives

Wood Products

Produce a sustained yield of wood products through implementation of sustainable forest management practices.

Income

Generate revenue through the sale of wood products which will in turn support the local forest economy.

SECTION 1: PLAN ADMINISTRATION

1.1 INTRODUCTION

The Grey Sauble Conservation Authority (GSCA) was established by an Order-in-Council on January 1, 1985, following the amalgamation of the North Grey Region and Sauble Valley Conservation Authorities. The North Grey Region and Sauble Valley Conservation Authorities were established under the Conservation Authorities Act in 1957 and 1958, respectively. GSCA's mandate is to establish and undertake a program designed to further the conservation, restoration, development and management of natural resources other than gas, oil, coal, and minerals. The area over which GSCA has jurisdiction covers 3,146 square kilometres (1,215 square miles) and encompasses all or parts of eight municipalities in Grey and Bruce Counties. Within this area of jurisdiction, GSCA owns and manages more than 11,449 hectares (28,292 acres) of land. GSCA's Property History Information may be found in Appendix A.

Plan Preparation Details

This Forest Management Plan is for the 20 year period from January 1, 2013 to December 31, 2032 with a detailed management program for each five-year operating period.

This forest management plan defines the management goals and objectives for all GSCA lands and will guide the forest management activities over the next twenty-year period (January 1, 2013 – December 31, 2032). The objectives and strategies presented in this Forest Management Plan will apply to all properties where management has been deemed appropriate, and all planned activities will be conducted in a manner which will minimize adverse environmental impacts.

The actual forest management operations planned for each property over the next 20 years is described in Section 10 of this Plan. An Annual Plan will be prepared at the start of each year, and an Annual Report will be prepared at the end of each year to track the progress of operations. The revenues generated from forest management activities will be placed in a forest management reserve and will be used primarily to offset the expenses of GSCA's forestry program.

Due to the large size of the maps referred to in this plan, these figures may be found in a folder at the back of this document.

1.2 PROPERTY OWNER INFORMATION

Registered Property Owner
GSCA is the sole participant in this Forest Management Plan and is the registered owner of the properties listed in this Plan. GSCA may be contacted at the address given below:

Name:	Grey Sauble Conservation Authority
Address:	237897 Inglis Falls Road, R.R. 4 Owen Sound, ON N4K 5N6
Phone:	(519) 376-3076
Fax:	(519) 371-0437
Web-site:	www.greysauble.on.ca

SECTION 2: PROPERTY LOCATION INFORMATION

2.1 LOCATION & GENERAL DESCRIPTION

GSCA has jurisdiction over 3,146 square kilometres (1,215 square miles) of land and water. There are five major watersheds, including the Beaver, Bighead, Sydenham, Pottawatomi, and Sauble Rivers along with many smaller watersheds that drain directly into Georgian Bay or Lake Huron. Included in GSCA's area are 155 kilometres (96 miles) of Lake Huron/Georgian Bay shoreline, approximately 5,165 hectares (12,763 acres) of land within the Niagara Escarpment planning area, and all or parts of seven rural municipalities within Grey and Bruce Counties plus the City of Owen Sound. Figure 1 outlines GSCA's sub-watershed boundaries plus Municipal boundaries and other watershed features.

GSCA currently owns 11,449 hectares (28,292 acres) of land. Most properties were purchased with grants provided by the Provincial Government and donations from private individuals or non-Government organizations. GSCA properties are also indicated in Figure 1.

Most GSCA properties are eligible for property tax incentive programs, namely, the Managed Forest Tax Incentive Program, the Conservation Land Tax Incentive Program, or the Farm Property Class Tax Program. A few properties are not eligible for any of the above programs, and these lands are assessed at the full residential tax rate for the municipality in which they are located.

Property Classifications

All GSCA lands have been divided into one of three classifications – Management Areas, Conservation Areas, and Nature Preserves. These classifications are based upon the reasons for acquisition, conditions on title, and the management objectives established for each type of property. A small number of properties are classed as a dam or erosion control project. These properties account for less than five (5) acres of land.

Management Areas

Properties classified as Management Areas contain large tracts of forests, along with other features such as trails, lakes, streams, wetlands, or the Niagara escarpment. Management Areas were purchased with the intention of being managed for a variety of uses including forest management, fish and wildlife management, recreation, and watershed protection. GSCA has approximately 25,899 acres classed as Management Areas.

Conservation Areas

Conservation Areas represent approximately 2,176 acres of GSCA land and were intended primarily for recreational use. These properties usually have attractions such as the Niagara Escarpment, a waterfall or a beach along the shoreline. These areas draw tourists, local residents, hikers, and naturalists to view the beautiful vistas, waterfalls, caves, trails, and sites of historical significance. Some of these properties have been developed with day-use facilities. Although recreational uses have been the main focus of Conservation Areas, forest management and/or fish and wildlife management activities have been allowed as demonstrations of sustainable management.

Nature Preserves

GSCA has five Nature Preserves comprising approximately 213 acres of land. These properties were acquired to protect against development or to preserve sensitive features, flora or fauna. These properties have been preserved in a natural state. Passive recreational activities such as hiking or nature appreciation are encouraged on these properties.

Property Tax Programs

There are several property tax programs that provide GSCA with either partial or complete tax relief. These programs are briefly described below and have been summarized in Table 1. Appendix B provides a list of GSCA Properties by Assessment Roll Number and Tax Assessment Program.

Managed Forest Tax Incentive Program (MFTIP)

The Managed Forest Tax Incentive Program is a voluntary program that offers a reduction in property assessment to forest owners who agree to be good stewards of their land. The goal of this program is to maintain or enhance healthy forests which in turn contribute to a healthy environment. Through the MFTIP program, the eligible portion is taxed at approximately 25 per cent of the municipal tax rate set for residential properties. In order to qualify for this program, landowners must prepare and submit an approved stewardship plan based on a 20 year period. Stewardship plans must be updated every ten years.

GSCA has 11,239.81 acres of land eligible for the MFTIP program. A landowner report of activities and updated forest management program must be submitted to the Ministry of Natural Resources every five years. GSCA employs qualified staff – Managed Forest Plan Approvers (MFPA's) and Associate Members of the Ontario Professional Foresters Association (OPFA) who can prepare and approve Stewardship plans.

Conservation Land Tax Incentive Program (CLTIP)

The Conservation Land Tax Incentive Program is a voluntary program that provides 100 percent tax relief to landowners who agree to protect the natural heritage values identified on their property. Lands eligible for this tax classification include provincially significant wetlands (formerly Class 1, 2, & 3), provincially significant Areas of Natural and Scientific Interest (ANSI's), areas designated as Escarpment Natural in the Niagara Escarpment Plan, Endangered Species Habitat, and certain conservation lands owned by non-profit charitable organizations. The landowner is required to complete and submit an application each year, postmarked by July 31st.

The CLTIP was clarified in a policy statement released in July, 2010. According to this policy, commercial harvesting of timber is excluded, because there is 'no regulatory requirement for a formal management plan to ensure sustainability'. Commercially harvested properties are excluded from CLTIP for 10 years, or until the property has been re-evaluated by the Ministry of Natural Resources, and it has been determined that the features and/or values remain.

Grey Sauble has 15,521.24 acres of land eligible for the CLTIP program.

Farm Property Class Tax Rate Program

A new taxation policy for farmland came into effect on January 1, 1998. Under this program, farm properties that satisfy the eligibility requirements, will be identified as Farm Property Class Tax Rate and will be taxed at 25 per cent of the municipal residential/farm tax rate. To be eligible for the Farm Property Class Tax Rate Program, the property must be assessed as farmland and must be part of a farming business generating over $7,000 of Gross Farm Income. A farm business must have a Farm Business Registration number that is registered annually through a registration fee. The property must also be owned by a Canadian citizen or a permanent resident of Canada.

Grey Sauble has 555.86 acres of agricultural land on thirteen different properties. These properties are leased to local farmers for cropping or pasturing purposes and are eligible for the Farm Property Class Tax program through the farmers who rent these lands.

Table 1. Summary of GSCA Properties by Property Tax Programs.

Property Name	MFTIP Area (Acres)	CLTIP Area (Acres)	Other Area (Acres)	Agricultural Area (Acres)	Total Area (Acres)
Ainslie Wood	24.00	--	1.00	--	25.00
Albemarle Brook	473.00	272.5	--	--	745.50
Arran Lake C.A.	--	--	3.00	--	3.00
Arran Lake M.A.	--	44.70	5.30	--	50.00
Bass Lake	410.00	419.50	--	14.50	844.00
Bayshore	--	--	42.92	--	42.92
Beattie Lake	99.40	0.60	--	--	100.00
Beaver Valley Lowlands	--	572.40	1.60	--	574.00
Berford Lake Dam	--	--	0.08	--	0.08
Big Mud Lake	24.00	255.10	60.90	54.00	394.00
Bighead Headwaters	64.70	140.00	--	--	204.70
Bighead River	36.80	--	1.00	--	37.80
Black's Creek	96.20	332.80	--	--	429.00
Boat Lake	859.13	705.90	7.30	--	1,572.33
Bognor Marsh	597.50	1,039.50	4.92	11.00	1,652.92
Brookholm	15.50	9.50	--	--	25.00
Bruce's Caves	50.00	187.00	--	--	237.00
Cape Commodore	171.00	--	--	--	171.00
Christie Beach	--	--	2.25	--	2.25
Clarksburg	13.00	--	2.80	--	15.80
Clendenan	62.92	--	52.85	--	115.77
Colpoy's Lookout	--	19.00	3.00	--	22.00
Epping – John Muir Lookout	11.19	--	1.00	--	12.19
Eugenia Falls	--	55.00	1.87	--	56.87
Feversham	195.46	--	--	--	195.46
Fishing Islands	--	62.62	--	--	62.62
Flesherton	71.90	--	--	--	71.90
Gleason Brook	109.50	93.50	--	--	203.00
Gowan Lake	--	200.00	--	--	200.00
Griersville	--	101.96	--	188.21	290.17
Haines Dam	18.72	--	2.5	--	21.22
Hepworth Creek	54.80	87.20	3.00	--	145.00
Hibou	323.30	--	5.20	--	328.50
Hodgins Lake	200.40	117.60	--	--	318.00
Holland Centre	47.00	--	--	--	47.00
Holmes Lookout	--	--	0.10	--	0.10
Indian Creek	22.00	33.00	--	--	55.00
Indian Falls	--	--	28.50	--	28.50
Inglis Falls	131.84	318.38	29.15	24.48	503.85
Isaac Lake	183.02	113.59	--	56.00	352.61
Kemble Mountain	12.00	448.50	7.00	--	467.50
Keppel Forest	100.00	--	--	--	100.00
Kolapore Uplands	560.90	274.60	--	--	835.50
Lake Charles	--	--	6.00	--	6.00
Leith Spit	--	--	0.68	--	0.68
Little Germany	732.40	773.10	3.50	--	1,509.00
Madeleine Graydon	36.53	--	--	--	36.53
Massie Hills	277.00	298.00	--	--	575.00
Mill Dam	--	--	1.50	--	1.50
Old Baldy	75.30	102.70	3.40	--	181.40
Oxenden Creek	--	--	3.45	--	3.45
Peasemarsh	57.50	--	1.00	--	58.50
Pottawatomi	--	218.40	2.40	72.00	292.80
Pottawatomi River	--	--	0.46	--	0.46
Pottawatomi Wetlands	192.00	152.75	6.80	--	351.55
Red Bay	15.00	26.00	3.00	--	44.00

Table 1. Summary of GSCA Properties by Property Tax Programs.

Property Name	MFTIP Area (Acres)	CLTIP Area (Acres)	Other Area (Acres)	Agricultural Area (Acres)	Total Area (Acres)
Rob Roy	--	117.00	--	--	117.00
Robson Lakes	60.00	400.75	--	--	460.75
Rockford	49.13	--	--	--	49.13
Rocklyn Creek	126.54	435.50	7.50	60.00	629.54
Sauble River	--	--	10.00	--	10.00
Shallow Lake	61.00	452.00	7.22	--	520.22
Shallow Lake Dam	--	--	0.37	--	0.37
Sheppard Lake	49.00	--	--	--	49.00
Shouldice Wetland	61.00	37.00	--	--	98.00
Skinner Marsh – McNab Lake	990.10	749.10	484.80	--	2,224.00
Skinner's Bluff	243.60	1,330.40	2.40	62.00	1,638.40
Sky Lake	249.30	131.70	--	--	381.00
Slough of Despond	154.33	507.00	8.95	4.67	674.95
Spey River	295.00	--	--	--	295.00
Spirit Rock	--	216.50	--	--	216.50
St. Jean Point	--	14.70	--	--	14.70
Sucker Creek	288.76	1,046.50	--	--	1,335.26
Sullivan Forest	150.00	--	--	--	150.00
Sydenham Forest	--	80.00	--	--	80.00
Sydenham Lowlands	358.39	--	--	85.00	443.39
Tara Dam	--	--	5.00	--	5.00
Taylor St. Detention Pond	--	--	0.76	--	0.76
Telfer Creek	--	43.00	--	--	43.00
The Glen	490.00	1,584.50	--	40.00	2,114.50
Walker Woods	34.00	--	--	--	34.00
Walter's Creek	246.14	201.60	2.50	--	450.24
West Rocks	--	176.70	0.48	--	177.18
Williams Lake	148.00	--	--	--	148.00
Wodehouse	760.61	521.89	--	30.00	1,312.50
Total Area					**28,292.32**

Federal, Provincial and Local Policies and Regulations

GSCA properties contain many features that are regulated by federal, provincial, and local policies and regulations. In all management, GSCA will adhere to Provincial legislation and regulations, including the Assessment Act, Trees Act, the Forestry Act, the Fisheries Act, the Fish and Wildlife Conservation Act, the Endangered Species Act & the Ontario Professional Foresters Act.

Many GSCA properties are participating in the Conservation Land Tax Incentive Program (CLTIP), and GSCA intends to continue participating in the CLTIP. The current CL confirmation number for GSCA's Forest Management Plan is: 07F1972. For CL confirmation numbers affecting individual properties, refer to the completed MFTIP Area Verification Form for each GSCA property. If GSCA undertakes forest management on a property with Conservation Land, the property will be transferred to the Managed Forest Tax Incentive Program (MFTIP) as soon as the management is completed.

Locally, GSCA will abide by the Forest Management By-Laws set out by Grey and Bruce Counties. GSCA will also be a 'Good Neighbour', ensuring that any forest management or wildlife management activities do not negatively impact a neighbour.

Other Legislation

There are other Acts that may also be relevant when working in or near water, including the Planning Act, Public Lands Act, the Lakes and Rivers Improvement Act, and the Conservation Authorities Act. Work permits may be required under any of these Acts prior to undertaking forest management activities.

2.2 PHYSIOGRAPHY

Both glacial and non-glacial landforms are represented in the GSCA watershed. These landforms are indicated in Figure 2.

Glacial Landforms

The glaciers of the Ice Age played a major role in shaping the landscape in GSCA's watershed. Materials deposited by glaciers are known as 'drift'. Drift consists of fragments of minerals and rocks that have been picked up and transported by a glacier (Tovell, 1992). Till is unstratified drift or sediment that was deposited in direct contact with glacial ice without the intervention of water. Stratified drift is sediment of glacial origin that is deposited by waters from melting ice. Stratified drift contains large deposits of sand and gravel that are commercially valuable. Erratics are large igneous rocks that have eroded out of drift and are very conspicuous in both fields and forests in this area.

Meltwater was released from glaciers as they retreated, both from within the glacier and along its base. Eskers are snake-like ridges of sand and gravel left by meltwater channels from sub-glacial rivers. Glacial streams formed such features as limestone plains, sand plains, drumlins, moraines, kames, and eskers. In areas where meltwaters were trapped, fine sediments were deposited forming clay plains. Portions of the Kolapore Uplands are part of The Gibralter Moraine and the Banks Moraine.

Drumlins are streamlined hills of glacial drift that have a long axis parallel to the flow of a former glacier. Drumlins tend to occur in fields. They generally face in a NW-SE direction. At the upstream end of the glacier, the slopes are steeper, and at the downstream end, they are narrower with more gentle slopes. There are a large number of drumlin fields in the Sauble River and Bighead River watersheds.

Kettles are closed circular depressions that were formed as a result of buried blocks of ice which eventually melted. Kettles usually contain water and may be found in several areas of GSCA's watershed. Robson Lakes is a GSCA property which contains kettles.

Non-glacial Landforms

The Niagara Escarpment is a non-glacial landform that is a dominant feature of GSCA's watershed. In Southern Ontario, the Niagara Escarpment runs for 725 kilometres from Queenston on the Niagara Peninsula to Tobermory at the tip of the Bruce Peninsula (Tovell, 1992). At Tobermory, the escarpment goes underwater and re-surfaces on Manitoulin Island.

In some places, the escarpment is hidden by glacial deposits that create a rolling, hilly topography. In other areas, the escarpment is broken by large valleys known as re-entrants that were created in the past by erosion from major rivers. The Beaver Valley, through which the Beaver River flows, is a large re-entrant valley in GSCA's watershed.

The escarpment is capped by an erosion-resistant rock that breaks off only after the softer rock underneath, has eroded away. Adjacent to the base of the escarpment are shale plains where the overlying protective covering has been removed and exposed the more erodible rock underneath. These shale plains have been covered with coarse materials from ancient lakes.

Karst Topography
Karst topography is another prominent land feature within the GSCA watershed. Underground drainage and sinkholes are common with this type of landform. The Wodehouse Management Area (Sinkhole property) and several GSCA properties in the former Keppel Township exhibit Karst topography.

2.3 SOILS

The soils found in GSCA's watershed are all the result of glacial action, weathering processes, type of bedrock, and drainage. Soil type, soil depth, soil nutrient levels, and drainage all play an important part in determining the vegetation that will grow on a site. Table 2 indicates the most common soil types found in this area plus the associated topography and drainage for each one.

The most common soil series found on GSCA properties include Harkaway loam, Osprey loam, Pike Lake loam, Vincent silty clay loam, Dunedin clay loam, Plainfield sand, Breypen – shallow soils over bedrock, Bottomland, and Muck.

2.4 HYDROLOGY

The GSCA watershed contains five major river systems – Beaver River, Bighead River, Sydenham River, Pottawatomi River, and Sauble River. These watercourses comprise approximately 70.6% of GSCA's watershed area. The remaining 29.4% is made up of numerous smaller watersheds that empty directly into Georgian Bay or Lake Huron. The watercourses in the GSCA watershed are indicated in Figure 1.

The Beaver River, located at the east end of the watershed, is approximately 65.3 km in length and has a drainage area of approximately 609 square kilometres. The Beaver River travels from headwater areas in the Municipality of Grey Highlands, over the escarpment at Eugenia Falls, through the Beaver Valley lowlands, and then empties into Georgian Bay at Thornbury. The gradients on the Beaver River vary from 2.08 – 17.76 m/km. The Beaver River has a shallow man-made reservoir on it, known as Lake Eugenia. This reservoir was created for a Hydro-electric Power Commission Plant in the Beaver Valley below the escarpment. Wodehouse Creek, Mill Creek and the Boyne River are some of the main tributaries on the Beaver River, but there are many unnamed ones as well.

The Bighead River has a drainage area of approximately 343 square kilometres and is 42.3 km in length. From the headwaters south of Grey Road 40 in the former Holland Township, the Bighead River flows through Bognor and empties into Georgian Bay at Meaford. The gradients on the Bighead River vary from 3.26 – 8.05 m/km.

The Sydenham River originates in Williams Lake near Holland Centre. It travels northward over the escarpment at Inglis Falls and empties into Georgian Bay at Owen Sound. The Sydenham River is 34.4 km in length and has a drainage area of about 206 square kilometers. The gradients vary from 2.52 – 47.37 m/km.

The Pottawatomi River has a drainage area of approximately 99 square kilometers and is 17.9 km in length. It originates in the former Derby Township and flows northeast over the escarpment at Springmount and empties into Georgian Bay on the west side of Owen Sound. Gradients vary from 1.23 – 10.32 m/km.

The Sauble River is the largest river system in GSCA's watershed with a total drainage area of 963 square kilometers. The main Sauble River originates near Desboro and is 81.7 km in length. It flows northward and eventually empties into Lake Huron at the north end of Sauble Beach. The gradients vary from 0.53 – 3.64 m/km. Many tributaries including Grimston Creek, Keady Creek, Tara Creek,

Arkwright Creek, Parkhead Creek, Spring Creek, and several unnamed creeks all flow into the Sauble River as it winds its way northward. The Rankin River is another major tributary of the Sauble River which flows south through Sky, Isaac, and Boat Lakes and joins the Sauble River upstream of Sauble Falls. It is 23.9 km in length and has gradients which vary from 0.06 – 6.5 m/km.

Table 2: Soil Types found within the Grey Sauble Conservation Watershed.

Soil Series	Soil Materials	Soil Type	Stoniness	Topography	Drainage
Harriston	Medium textured dolomitic limestone till	Loam or silt loam	Moderately stony	Smooth, gently to moderately sloping	Good
Listowel	Medium textured dolomitic limestone till	Loam or silt loam	Slightly stony	Smooth, gently sloping	Imperfect
* Harkaway	Medium textured dolomitic limestone till	Loam or silt loam, (may be shallow or stony)	Moderately stony	Smooth, gently to moderately sloping	Good
Wiarton	Medium textured dolomitic limestone till	Loam or silt loam	Moderately stony	Smooth, gently sloping	Imperfect
* Osprey	Medium textured stony dolomitic limestone till	Loam or sandy loam (may be bouldery)	Very stony	Irregular, moderately sloping to steeply sloping	Good
Lily	Medium textured stony dolomitic limestone till	Loam	Very stony	Undrained basins to nearly level	Poor
* Pike Lake	Medium textured stony dolomitic limestone till	Loam	Very stony	Irregular, moderately sloping to steeply sloping	Good
* Vincent	Heavy textured limestone till	Silty clay loam (may be eroded or bouldery)	Slightly stony	Smooth, gently to steeply sloping	Good
Kemble	Heavy textured limestone till	Silty clay	Slightly stony	Smooth, very gently to gently sloping	Imperfect
Brookston	Heavy textured limestone till	Clay loam (may be bouldery)	Slightly stony	Smooth, very gently sloping	Poor
* Dunedin	Heavy textured red shaley till	Clay (may be eroded)	Slightly stony	Smooth moderately sloping to irregular steeply sloping	Good
Morley	Heavy textured red shaley till	Clay (may be bouldery)	Slightly stony to very stony	Smooth, very gently sloping	Poor
Saugeen	Lacustrine materials	Silty clay loam	Essentially stonefree	Smooth, moderately sloping	Good
Elderslie	Lacustrine materials	Silty clay loam	Essentially stonefree	Very gently to gently sloping	Imperfect
Chesley	Lacustrine materials	Silty clay loam	Essentially stonefree	Smooth, very gently sloping	Poor
Toledo	Lacustrine materials	Clay loam	Essentially stonefree	Smooth, very gently sloping	Poor
Leith	Lacustrine materials	Silty clay loam	Essentially stonefree	Smooth, moderately sloping to irregular, moderately sloping	Good
Gilford	Well sorted gravelly outwash	Loam	Moderately stony	Smooth, very gently sloping	Poor
Sargent	Well sorted gravelly outwash	Loam	Moderately stony	Very gently sloping	Good
Brighton	Well sorted sandy outwash	Sand, sand over gravel, sandy loam over gravel	Essentially stonefree	Gently sloping	Good
Granby	Well sorted sandy outwash	Sand	Essentially stonefree	Smooth, very gently sloping	Poor
* Plainfield	Well sorted sandy outwash	Sand	Stonefree	Smooth, gently sloping	Excessive
Fox	Well sorted sandy outwash	Sandy loam	Essentially stonefree	Smooth, gently sloping	Good
Tioga	Well sorted sandy outwash	Sandy loam	Essentially stonefree	Smooth, gently sloping to irregular, steeply sloping	Good to excessive
Sullivan	Well sorted sandy outwash	Sand or sandy loam	Stonefree	Smooth, gently sloping	Good
Waterloo	Poorly sorted outwash	Sandy loam	Essentially stonefree to slightly stony	Irregular, moderately sloping to irregular, steeply sloping	Good
Donnybrook	Poorly sorted outwash	Sandy loam	Moderately stony-very stony	Irregular, moderately sloping to irregular, steeply sloping	Good
* Breypen	Shallow soils over bedrock	Variable	Very stony	Nearly level with numerous outcroppings	Variable
Farmington	Shallow soils over bedrock	Loam	Variable	Smooth, very gently sloping	Variable
Eastport	Miscellaneous soils	Sand or gravel	Stonefree	Smooth, moderately sloping	Excessive
* Bottomland	Alluvial soils	Variable	Moderately stony	Variable	Poor
* Muck	Miscellaneous soils	Organic matter	Stonefree	Level undrained basin	Poor
Marl	Miscellaneous soils	Marl	Stonefree	Level undrained basin	Poor

*** most common soil types on GSCA properties.**

2.5 CLIMATE

There are three basic climatic regions in the GSCA's watershed, these being the Lake Huron / Georgian Bay Region, the Huron Slopes Region, and the Dundalk Upland Region (Brown et al., 1980). The Huron Slopes is the widest band which takes in most of GSCA's watershed between the coastal regions and the Dundalk Uplands. The Dundalk Upland Region includes the highlands in both The Blue Mountains and the Municipality of Grey Highlands.

The Lake Huron / Georgian Bay Region includes the Bruce Peninsula and a narrow band along the shores of Lake Huron and Georgian Bay. The climate here is moderated by these large waterbodies. This area is characterized by altitudes of 700 feet above sea level. The mean annual temperature is 45 ºF, and extreme temperatures may reach a low of – 35 ºF and a high of 102 ºF. The growing season starts around April 15th and ends around November 5th, and the mean annual length of the growing season is about 205 days. The mean annual frost free period is 150 days, the mean annual precipitation is about 33 inches, and the mean annual snowfall is 100 inches.

The Huron Slopes Region is characterized by altitudes of 1100 feet above sea level. The mean annual temperature is 44 ºF, and extreme temperatures may reach a low of – 43 ºF and a high of 102ºF. The growing season starts around April 17th and ends around October 31st. The mean annual length of the growing season is 195 days, and the mean annual frost free period is 135 days. The mean annual precipitation ranges from 32-39 inches, and the mean annual snowfall is 110 inches.

The Dundalk Upland Region is characterized by elevations of 1600 feet above sea level. The mean annual temperature is 42 ºF, and extreme temperatures may reach lows of – 27 ºF and highs of 93 ºF. The growing season starts around April 20th and ends around October 25th. The mean annual length of the growing season is 190 days, and the mean annual frost free period is 115 days. The mean annual precipitation is 27 inches, and the mean annual snowfall is 100 inches.

2.6 ENVIRONMENTALLY SENSITIVE AREAS

Niagara Escarpment

The Niagara Escarpment is a very prominent natural feature in GSCA's area of jurisdiction and was designated an UNESCO World Biosphere Reserve in 1990 because of its ecological, cultural, and scientific importance (Riley et al., 1996). The Niagara Escarpment Plan is an environmental land use plan that balances protection, conservation and sustainable development to ensure that the escarpment remains a natural environment for future generations. There are seven land use designations including Escarpment Natural Area, Escarpment Protection Area, Escarpment Rural Area, Minor Urban Centre, Urban Area, Escarpment Recreation Area, and Mineral Resource Extraction Area. Figure 3 shows the Niagara Escarpment planning designations within the GSCA watershed.

Areas of Natural and Scientific Interest (ANSI's)

An Area of Natural and Scientific Interest (ANSI) is an area of land and water that represents either significant geological (earth science) or biological (life science) features that are important for natural heritage protection, appreciation, scientific study or education (Riley et al., 1996). An earth science ANSI contains examples of rock, fossil and landform features, whereas a life science ANSI represents Ontario's biological diversity and natural landscapes. A life science ANSI features a variety of ecosystems and includes the native plants and animals and their supporting environments. Figure 3 shows all Provincially significant ANSI's found in GSCA's watershed.

Wetlands
The Province of Ontario has developed a classification system for wetlands that is used for planning purposes. Class 1 to 3 wetlands are considered provincially significant, whereas Class 4 to 7 wetlands are considered either regionally or locally significant. Figure 3 shows all Provincially Significant Wetlands found in the GSCA watershed.

Wetlands provide many valuable ecological functions including 1) habitat for a variety of fish and wildlife species, 2) habitat for rare and endangered flora and fauna, 3) renewing groundwater supplies, 4) filtering contaminants and excess nutrients, 5) trapping eroding soil, 6) controlling flooding and reducing flooding damage, 7) protecting shorelines against wave action, 8) providing a source of economically valuable products, and 9) providing recreational activities.

There are four types of wetlands found in this area, these being swamps, marshes, fens and bogs. Swamps contain woody plants, mostly trees and/or shrubs, and are periodically or permanently flooded. Swamps may contain either coniferous or deciduous tree species or a mixture of both. Dead tree swamps result when standing water kills the trees growing in the swamp. This is usually caused by beaver dams that maintain elevated water levels in the swamp. Marshes are areas with non-woody plants such as bulrushes, reeds, cattails, and other aquatic plants. These areas may be permanently or periodically flooded. Fens are low-lying peat land areas where the water is at or near the surface and fed by relatively fast-moving groundwater. These wetlands are usually alkaline and rich in calcium. Vegetation is dominated by mostly sedges and occasionally some cedar or tamarack trees. Bogs are depressions with stable water levels that contain predominantly sphagnum moss. The water is acidic and provides habitat for pitcher plants, sundews and some low shrubs or black spruce trees on drier ground.

Old Growth Forests
Old growth forests in southern Ontario were destroyed approximately 100-150 years ago by logging and forest fires (OMNR, 1996). Old growth forests are important for their diversity and undisturbed state. They contain more tree species in different proportions than second growth forests. An old growth forest has trees of all sizes and ages, including supercanopy trees, large mature trees, and younger understory trees. There are canopy gaps created by large trees that have died and fallen over. At ground level, there are many saplings, shrubs and lots of ground cover. Old growth forests have ample decaying wood matter and organic litter that provides moist conditions in which fungi, reptiles, amphibians, invertebrates, bacteria, and trees can survive. They also exhibit pits and mounds that are formed when large trees are uprooted. The pits are the depressions left by the tree's roots and soil, and the mounds are formed by the decaying tree and its roots. Old growth forests also contain snags and cavity trees that provide valuable habitat for many wildlife species.

Forest Interior Habitat
Forests in southern Ontario have become increasingly broken and fragmented which affects the quality of habitat available for forest-dependent wildlife species. The term 'forest interior' refers to habitat that is deep within a forest, at least 100 metres from the forest edge and away from the influence of environmental changes. The forest interior is buffered against extreme weather, outside disturbances and predators. Forest edges are more susceptible to drying winds, warmer temperatures, invasive plants, and disturbances outside the forest. There is usually a higher density of predators in forest edge areas.

Forests with greater than 250 acres of forest interior habitat are considered to provide habitat for forest-dependent wildlife. However, those forests with more than 500 acres of forest interior habitat are considered to be the most valuable. These forests are healthier and support larger and more stable populations of wildlife species.

Lake Huron / Georgian Bay Shoreline

The Grey Sauble watershed has 155 kilometres along the Lake Huron and Georgian Bay shoreline that is constantly subject to strong prevailing winds, wave action and moderated climates. There are eight Grey Sauble properties – St. Jean Point, Spirit Rock, Oxenden Creek, Colpoy's Lookout, Hibou, Ainslie Wood, Christie Beach, and Peasemarsh, that abut either the Lake Huron or Georgian Bay shorelines. These properties are mostly nature preserves or conservation areas that are used for recreational activities.

Riparian Areas

The riparian zone is the terrestrial area along creeks and streams where the vegetation is influenced by perennial and/or intermittent water, associated high water tables and soils that exhibit some wetness. The riparian zone influences and is influenced by the aquatic ecosystem. Buffers of varying widths depending on site conditions are often established along riparian zones to protect aquatic ecosystems.

SECTION 3: FOREST MANAGEMENT HISTORY

3.1 HISTORY OF FOREST MANAGEMENT IN GREY & BRUCE COUNTIES

Grey and Bruce Counties were surveyed between 1831 and 1855, and pioneer settlement soon followed. Much of the upland area was forested with sugar maple, beech, white elm, white ash, basswood, and hemlock trees and lesser amounts of red oak and white pine trees. The lowland areas contained spruce, tamarack, black ash, and dense white cedar swamps. In many instances, the forests were burned to clear the land for agriculture regardless of its suitability for growing crops.

The wood provided early settlers with lumber for building homes, barns, and sheds; veneer for the furniture industry; maple syrup; firewood; and potash for the lye trade. Since wood was so abundant, there was little thought given to forest management. Many forests were 'high graded', a practice where the high quality trees were removed leaving behind a stand of poor quality trees. When the best quality trees are always taken, a forest becomes degraded over time.

The markets for firewood, masts, tanbark, lathwood, and staves fluctuated depending upon local demands for these products (Lambie, 1980; Tennant, 1980). In this area, sugar maple wood is very white with small hearts and is reportedly the best maple in the world. The price for sugar maple has fluctuated significantly over time. As the prices go up, so does the level of harvesting activity and vice versa.

Tree Cutting By-Laws

Grey and Bruce Counties have each passed a new tree cutting By-Law which restricts and regulates the harvesting and destruction of trees within their respective Counties. Bruce County Council passed their new Forest Conservation By-Law No. 4015 on May 8, 2003, and updated it in 2004 with Forest Conservation By-Law No. 4017. Grey County Council passed their Forest Management By-Law No. 4129-04 on November 28, 2006 and updated it on May 6, 2008 with Forest Management By-Law No. 4341-06. The intent of a tree cutting by-law is to ensure that a forest remains after harvesting is completed. Although these new by-laws allow diameter limit cutting, they also provide an option for landowners to choose good forestry practices.

When using good forestry practices, trees are selected for removal from all merchantable size classes based on vigor, quality and risk factors which determines whether they will last until the next cutting cycle. This method of management results in removing diseased and defective trees and retaining good quality trees in all size classes. Therefore, the quality of the forest improves over time. In contrast, diameter limit cutting allows all the best and largest trees to be removed which leads to a degraded forest over time.

Importance of GSCA Properties to the Surrounding Landscape

With its diverse mix of landforms and features, the GSCA watershed is an attractive place to live or visit. An excellent range of recreational activities are available including golfing, fishing, sailing/ boating, and cross-country/downhill skiing. GSCA properties are an integral part of this attraction, providing the public with a wide variety of recreational opportunities such as hiking, nature appreciation, wildlife viewing, picnicking, hunting, fishing, and swimming.

The amount of agricultural land has steadily decreased due mainly to the topography and site conditions in this area. As a result, there has been an influx of non-resident landowners who have purchased abandoned agricultural land. Since this land is not being farmed, a large proportion of it is regenerating naturally to forest. The GSCA watershed is about 45-50 per cent forested and therefore supports a strong local forest economy.

Grey Sauble's properties provide wildlife with natural sources of food, water, shelter, nesting habitat and travel corridors. The large forested tracts of land also provide forest-dependent wildlife with forest interior habitat.

3.2 FOREST MANAGEMENT HISTORY ON GSCA PROPERTIES

Agreement Forest Program

The Agreement Forest program was a program coordinated by the Ontario Ministry of Natural Resources (OMNR) on behalf of the owner. Agreement Forest properties were purchased with provincial grants provided under the Forestry Act. Through the Forestry Act regulations, these properties were managed primarily for forestry purposes by OMNR foresters and forest technicians, although other uses included the provision of fish and wildlife habitat, recreational opportunities, and the protection of water supplies to prevent floods and erosion. Properties purchased through this program contained natural upland and lowland forests. Most open areas were planted to trees.

GSCA originally had approximately 10,859 acres under the Agreement Forest Program. The Agreement Forest management agreement was in effect until 2005. However, OMNR was unable to fulfill their management obligations to the Agreement Forest partners after 1995, due to economic constraints. As an alternative to providing active management, OMNR now coordinates yearly workshops to provide technical updates and networking opportunities.

The OMNR prepared a 20 year management plan for the management of 10,859.43 acres of GSCA land under the Agreement Forest Program. While under this agreement, MNR undertook all management activities on Agreement Forest properties. However in 1995, the Provincial government cutbacks resulted in GSCA taking over the management of these lands.

Properties Managed by GSCA

Since 1985, GSCA has gradually increased the amount of forest management being carried out on their properties. Prior to 1985, tree marking services were provided by OMNR on properties not managed under the Agreement Forest Program. After that point, GSCA hired forestry staff to complete forest management work on properties that were not part of the Agreement Forest Program. Forest management plans written by GSCA staff were approved by the forester at the Owen Sound OMNR District office until 1995. GSCA has always tendered forest management operations. These tenders have always been awarded by GSCA directors. GSCA's History of Past Management is provided in Appendix C.

Reforestation

When GSCA properties were purchased, especially under the Agreement Forest Program, any open land was immediately planted to trees. White or red pine, white or Norway spruce, and European larch were the most commonly planted species. Survival in these early plantations was very good, except in pockets of poor drainage or areas susceptible to white pine blister rust.

Tending Activities

Tending activities included tree girdling in hardwood stands and pruning in plantations to improve quality or control insect problems such as white pine weevil, *Pissodes strobi* or disease problems such as white pine blister rust, *Cronartium ribicola.*

Harvesting activities

Most GSCA properties have had one or more improvement thinning or harvesting operations since their purchase. All harvesting activities recorded in the files have been added to GSCA's forest management database.

Table 3 provides a summary of the volumes and revenues for all known forest management activities on GSCA land from 1985 – 2013. This table reflects the changes in market values for both firewood and sawlogs over the past 26 years.

500

Table 3. Total Volumes and Revenues from all GSCA lands between 1985 and 2013.

Year Sold	Total Area Marked (acres)	Total # of Cords Marked	Total # of Board Feet Marked (fbm)	Total Revenue (Cords)	Total Revenue Board Feet (fbm)	Total Revenue (Cords & fbm)
1985	381	504	863,237	$9,580.00	$114,025.00	$ 123,605.00
1986	141	463	18,932	$8,828.00	$2,650.00	$ 11,478.00
1987	122	93	147,446	$1,645.00	$32,000.00	$ 33,645.00
1988	203	562	92,519	$10,865.00	$15,032.00	$ 25,897.00
1989	126	693	19,700	$13,488.00	$2,682.00	$ 16,170.00
1990	143	560	52,590	$14,280.04	$12,256.00	$ 26,536.04
1991	140	226	73,188	$5,316.16	$16,400.00	$ 21,716.16
1992	463	1,101	432,792	$23,143.00	$100,800.04	$ 123,943.04
1993	522	1,371	94,864	$28,118.00	$21,412.71	$ 49,530.71
1994	581	2,821	188,257	$56,751.80	$97,415.88	$ 154,167.68
1995	303	1,276	3,613	$27,151.00	$1,564.90	$ 28,715.90
1996	193	449	401,302	$7,448.44	$218,749.79	$ 226,198.23
1997	384	4,807	406,503	$14,345.08	$315,589.75	$ 329,934.83
1998	327	942	47,189	$16,467.48	$37,562.40	$ 54,029.88
1999	253	977	56,502	$15,554.75	$16,544.52	$ 32,099.27
2000	478	1,598	415,186	$25,041.30	$419,541.94	$ 444,583.24
2001	361	770	331,914	$12,775.00	$350,722.92	$ 363,497.92
2002	375	451	466,892	$13,056.00	$383,894.40	$ 396,950.40
2003	594	2,788	342,906	$47,780.40	$255,328.00	$ 303,108.40
2004	396	886	537,937	$12,921.35	$596,253.65	$ 609,175.00
2005	185	929	67,054	$22,855.40	$44,625.40	$ 67,480.80
2006	310	1,388	231,028	$31,476.00	$118,958.00	$ 150,434.00
2007	775	3,515	913,577	$73,468.67	$470,606.71	$ 544,075.38
2008	331	1,294	198,410	$38,570.00	$107,166.00	$ 145,736.00
2009	723	2,305	309,988	$88,460.00	$76,879.95	$ 165,339.95
2010	397	1,222	292,501	$43,101.00	$216,096.00	$ 259,197.00
2011	446	1,804	454,362	$42,330.00	$231,955.00	$ 274,285.00
2012	464	2,158	128,220	$94,524.00	$54,380.50	$ 148,904.50
2013	482	940	29,931	$30,370.10	$22,909.90	$ 53,280.00
Total	**10,599**	**38,893**	**7,618,540**	**$829,711.00**	**$4,354,003.00**	**$ 5,183,714.00**

Note: Represents total tendered operations for each year and not actual revenues received each year.

Forest Health

In 1989, GSCA sprayed a biological control agent, *Bacillus thuringiensis,* variety *Kurstaki,* on approximately 2,182 acres of high quality hardwood forests in Keppel Township to protect them from an outbreak of forest tent caterpillar, *Malacosoma disstria*. In 1990, another 209 acres of valuable hardwood was sprayed in Sydenham Township. Some of this spraying was done in response to requests from neighbours who wished to protect their forests. In 1991, a further 1,766.5 acres were sprayed in Holland and Keppel Townships. The aerial spraying was completed by Crop Protection Services Ltd. of Cambridge, Ontario.

In 2004, GSCA once again sprayed several properties to control an outbreak of forest tent caterpillar in the former Keppel Township. Egg mass counts indicated that GSCA's hardwood forests at Bass Lake and Gowan Lake would be severely defoliated; therefore, GSCA sprayed 790 acres with Foray 48B containing *Bacillus thuringiensis* to control this outbreak.

In 2010 there was heavy defoliation caused by forest tent caterpillar mainly in the Township of Georgian Bluffs and the Municipality of Meaford. In 2011 GSCA contracted Zimmer Air Services of Bleinhem, Ontario to spray 2,372.40 acres with Foray 48B to control the outbreak.

There was a localized outbreak of Bruce Spanworm, *Operophtera bruceata,* in the Kolapore Uplands in 2003. In 2004, GSCA sprayed 98 acres with Foray 48B containing *Bacillus thuringiensis* to control this pest.

White pine weevil, *Pissodes strobi*, has caused problems in many white pine plantations. A program of pruning and burning infected leaders plus pruning to correct form has been on-going for many years in young plantations.

Pine false webworm, *Acantholyda erythrocephala,* has caused some defoliation of white pine trees in localized areas. GSCA's property in Holland Centre was moderately affected by this insect pest several years ago. Control measures were not feasible on this property due to its location and small size. Trace levels of the insect have been observed throughout the watershed annually.

GSCA forest areas are monitored for tree health on a yearly basis. Any forest health concerns were passed on to the local Forest Health Monitoring Officer from the Canadian Forest Service. More recently, Forest Health Specialists with OMNR have assumed responsibility for this monitoring. Each fall, OMNR along with the Canadian Forest Service, hold an annual Forest Health Review to inform forestry workers about current forest health problems.

Invasive Species

Invasive species are a growing environmental and economic threat to Ontario. Invasive species are defined as harmful alien species whose introduction or spread threatens the environment, the economy, or society, including human health (OMNR, 2012). Second to habitat loss, invasive species have been identified by the International Union for Conservation of Nature as the most significant threat to biodiversity (IUCN, 2000).

Invasive species can outcompete and displace native species from their habitats. They are often prolific seed producers, can spread by underground roots and re-sprout after being disturbed. They can quickly colonize an area and permanently alter the landscape. They can have a negative impact on wildlife populations by disrupting native habitats. Once established they are difficult or impossible to control and restoration efforts are expensive. Some invasive species have been here for decades but the negative impacts of invasive species on our ecosystems is only now being recognized and understood. Prevention is the best tool to deal with invasive species. To date, GSCA has attempted to control some populations of invasive species such as Garlic Mustard and Wild Chervil through manual pulling or cutting. Table 4 lists the known invasive plants, insects and diseases that may be found in the GSCA watershed.

Table 4. Invasive Species found in or near the GSCA Watershed.

Plants	Common Name	Scientific Name
	Manitoba maple	*Acer negundo*
	Norway maple	*Acer platanoides*
	Scotch Pine	*Pinus sylvestris*
	Russian Olive	*Elaeagnus angustifolia*
	Autumn Olive	*Elaeagnus umbellate*
	Tartarian, Amur, Morrow, Bells & European Fly Honeysuckle	*Lonicera tatarica, L. maackii, L. morrowii, L x. bella, L. xylosteum*
	Common or Giant Reed	*Phragmites australis subsp. australis*
	Purple Loosestrife	*Lythrum salicaria*
	English Ivy	*Hedera helix*
	Goutweed	*Aegopodium podagraria*
	Periwinkle	*Vinca minor*
	Miscanthus	*Miscanthus sinensis & M. sacchariflorus*
	Japanese knotweed	*Polygonum cuspidatum*
	Giant Hogweed	*Heracleum mantegazzianum*
	Garlic Mustard	*Alliaria petiolata*
	Dog Strangling Vine	*Cynanchum rossicum & C. Nigrum*
	Common & Glossy Buckthorn	*Rhamnus cathartica & R. Frangula*
	Wild Chervil	*Anthriscus sylvestris*
Insects	Emerald Ash Borer	*Agrilus planipennis*
	Asian Longhorned Beetle	*Anoplophora glabripennis*
	Sirex Woodwasp	*Sirex noctilio*
	Pine False Webworm	*Acantholyda erthrocephala*
	Larch Casebearer	*Coleophora laricella*
	Beech Scale	*Cryptococcus fagisuga*
	Satin Moth	*Leucoma salicis*
	Pine Shoot Beetle	*Tomicus piniperda*
	Gypsy Moth	*Lymantria dispar*
Diseases	Butternut Canker	*Sirococcus clavigignenti-juglandacearum*
	Dutch Elm Disease	*Ophiostoma novo-ulmi*
	White Pine Blister Rust	*Cronartium ribicola*
	Beech Bark Disease	*Neonectria faginata*

Forest Fire Management

Municipal fire departments are responsible for fighting fires within their boundaries. The Municipal fire department may turn the suppression of a fire over to the Ministry of Natural Resources or other suppression organizations if, a) the fire department determines that the fire has grown in size and/or complexity beyond its capability, b) a structural fire situation has developed that requires all the resources at its disposal, or c) under rare circumstances where the OMNR determines that the actions taken by a municipality are inadequate and finds that it must exercise its powers under Section 21(1) of the Forest Fire Prevention Act and assume suppression control of the fire (OMNR, 1999).

Forest fire management is a cooperative undertaking between the OMNR, Municipalities, and other wildland users and is based upon legislative mandates and policies. The development of a forest fire management plan is recommended in which a mission statement is defined, the wildfire potential is analyzed, objectives are set, capabilities are analyzed, and the plan is monitored and evaluated.

Forest fire management involves several principles – prevention, protection, emergency response, and the use of prescribed fire to obtain desirable outcomes.

The potential for forest fires in southern Ontario is much lower than in northern Ontario due to a higher proportion of broadleaf or deciduous forests in this area as opposed to coniferous forests. Lightning is responsible for approximately 30% of forest fires, and people are responsible for all other forest fires (OMNR, 1996). Historically, there were some major forest fires in southern Ontario as forests were cleared and the land was settled. More recently, there have only been a few minor fires on GSCA properties, one at Inglis Falls and the other in the Kolapore Uplands.

Access

Access to GSCA properties is usually good, via township roads. Access is poor on properties that are located along unopened road allowances or where there are swamps along township roads. It is occasionally necessary to gain access to a property through a neighbour's property.

Most properties have well established interior road systems as a result of past harvesting activities, but some properties that are difficult to access or have not been managed previously do not have interior roads at all. On many GSCA properties, road systems were improved by exchanging wood products for upgrading or establishing new roads. Depending on the situation, road improvements may be a shared cost between GSCA and the contractor. GSCA's forest management agreements require contractors to leave roads in 'as good' or 'better' condition than they were initially found.

Recreation

The GSCA watershed provides many opportunities for a wide variety of recreational activities including hiking, nature appreciation, cross-country and downhill skiing, snowmobiling, mountain biking, golfing, boating, hunting, fishing, swimming, and picnicking.

Trails

The Bruce Trail, the oldest and longest marked hiking trail in Canada, is 800 km long, starting at Queenston near Niagara Falls and running to Tobermory. This significant trail system has helped increase awareness of the unique and rich diversity of the Niagara Escarpment and was instrumental in the Niagara Escarpment being named an UNESCO World Biosphere Reserve. The Bruce Trail Conservancy, a charitable, membership based, volunteer organization, maintains this trail through its nine Bruce Trail clubs. Members of the Beaver Valley, the Sydenham, and the Peninsula Bruce Trail Clubs maintain sections of The Bruce Trail which pass through GSCA's watersheds and properties.

Permitted Uses on GSCA Lands

On GSCA lands, all activities are regulated through the Conservation Authorities Act and the Trespass to Property Act and its regulations. Each property is posted with a sign indicating the activities that are permitted on that property. Activities that are not listed on the sign are prohibited. Designated staff are trained and appointed as Provincial Offences Officers to enforce the regulations. Copies of The Conservation Authorities Act and Regulations and Trespass to Property Act have been included in Appendix D.

GSCA allows picnicking, nature appreciation, photography, hiking, walking, or cross-country skiing on all properties. Unsupervised swimming is permitted at Arran Lake, Peasemarsh, Hibou, and Christie Beach.

Rock climbing is a permitted use at Old Baldy as long as the climber has obtained a permit from GSCA. Climbers must sign a waiver of liability insurance and adhere to the rules set out in the permit.

Snowmobiling is permitted on designated trails by agreement with the Ontario Federation of Snowmobile Clubs. These trails are monitored and maintained by the local Snowmobile Clubs.

Fishing, in accordance with provincial regulations, is allowed in all Management Areas.

Hunting, in accordance with provincial regulations, is allowed in all Management Areas but not in any Conservation Area with the following exceptions: hunting is allowed at Spirit Rock CA except within 500 m of the Corran ruins, and bow hunting only is allowed at Pottawatomi CA. Permanent tree stands are not permitted on any GSCA property, although temporary, removable tree stands are allowed.

Trapping, in accordance with provincial regulations, is allowed on all Management Areas with written agreement from GSCA. Trappers assist GSCA with controlling nuisance beaver problems.

Occasionally, GSCA is approached by an interest group to use a property for an activity which is not usually permitted. In these cases, the group is required to sign a special activity licence agreement which sets out the terms and conditions of the activity. The interest group assumes responsibility for a specified land area and provides adequate insurance for their group's activities.

According to GSCA's Conservation Area regulations, motorized vehicles such as ATVs, dirt bikes and off-road vehicles are not a permitted use. These vehicles can cause significant environmental damage and can disrupt wildlife activity, especially during the nesting season.

SECTION 4: MANAGEMENT GOAL, OBJECTIVES AND STRATEGIES

4.1 GOALS

GSCA's Management Goal is as follows:

"Healthy, diverse forest ecosystems which will provide a sustained yield of wood products as well as environmental, ecological, social and cultural benefits."

4.2 MANAGEMENT OBJECTIVES

Priority of Objectives

Objectives	Priority for Management		
	Low	Medium	High
Environmental Objectives			
Forest Health			√
Environmental Protection			√
Wildlife Habitat			√
Invasive Species			√
Social/Cultural Objectives			
Recreation			√
Education			√
Adaptive Management			√
Communication			√
Economic Objectives			
Forest Products			√
Income			√

Environmental Objectives

Forest Health

The maintenance of healthy, diverse forest ecosystems is a high priority with GSCA. Healthy forest ecosystems perform many important functions such as providing habitat for forest-dependent wildlife, maintaining site productivity and genetic diversity, cleaning the air and water, preventing flooding and erosion, and providing people with recreational areas.

Environmental Protection

GSCA recognizes the importance of protecting sensitive areas and features, biodiversity values, and soil and water resources.

Many GSCA properties contain environmentally sensitive areas such as unique Niagara Escarpment features; ANSI's; wetlands; species at risk; old growth forests; forest interior habitat; the Lake Huron/Georgian Bay shoreline; fish habitat; watercourses and riparian areas; steep slopes; springs/seepage areas; and significant trails. Environmentally sensitive areas require protection before, during and after forest management activities.

Nature preserves will be protected from active forest management and development pressures. Through the Forestry Advisory Committee, some GSCA properties or portions of properties will be 'set aside' to develop into older growth forests. In these areas, no forest management activities will be allowed. Older growth forests provide more diversity and habitat for rare or endangered species than some of the second growth forests present today. The benefits of setting aside some forests to

become older growth include their age, diversity, uniqueness and spiritual qualities, ability to store carbon and reduce carbon dioxide in the atmosphere, and their value as living laboratories (Maser, 1994). Active forest management will not be permitted in these designated areas, although other recreational uses will be allowed.

GSCA employs an Integrated Pest Management approach when dealing with insect infestations, invasive species and vegetation control. In all cases, chemical products are used only as needed and are applied by licensed exterminators according to product label guidelines. Chemicals identified by FSC® as highly hazardous will not be used.

Wildlife Habitat
GSCA places a high value on preserving rare, threatened, and endangered species and their respective habitats as well as maintaining and/or enhancing wildlife habitats. GSCA will partner with interest groups to maintain existing wildlife habitat projects and undertake new ones.

Invasive Species
GSCA understands the negative impacts that invasive species have on native plant populations and will identify, monitor and control invasive species on their properties where feasible. GSCA also recognizes the importance of locating and keeping track of new invasive species within their watersheds and reporting locations of known invasive species to local municipalities.

Social/Cultural Objectives
Natural Heritage Features
GSCA places a high value on the protection of Natural Heritage Features. All identified Natural Heritage Features will be treated as an Area of Concern during the planning and implementation of forest management activities.

Recreation
GSCA encourages a wide range of recreational activities on most of their lands and works closely with various interest groups to provide and maintain recreational activities. Safety is always a major concern for GSCA; therefore, some activities may be prohibited on some properties or require a special permit.

Conservation Areas typically have well developed facilities (parking lots, picnic pavilions, washrooms, etc.), consequently attracting more visitors to the area. Management areas are available for many recreational uses but do not have well-developed facilities. The Nature Preserves are open for passive recreational use only.

Education
GSCA intends to demonstrate and promote sustainable forest management practices as educational tools for watershed residents and visitors to the area. GSCA recognizes the importance of providing staff with related training opportunities to ensure that knowledgeable and informed management decisions are made.

Communication
GSCA recognizes the importance of communicating with the public about forest management operations to keep them informed and ensure their continued support. A high priority will be placed on providing a forum for public consultation and input throughout the management cycle.

Adaptive Management

GSCA intends to implement adaptive management techniques such as predicting management outcomes, monitoring changes and learning through experience to ensure that the best possible management practices are being administered. This management approach will require novel thinking and flexibility.

Economic Objectives

Forest Products

GSCA believes that the sustainable management of their forested lands is a high priority. Healthy forest ecosystems will be maintained which will produce a sustained yield of high quality forest products. Posts, poles, firewood, and sawlogs will be produced from sustainable forest management operations.

Other forest values will be considered when planning forest management operations. In environmentally sensitive areas, operations will be modified to protect the values of the site. Forest management operations will be planned in such a way as to minimize site damage, visual impacts and disturbances to wildlife and recreational activities. On occasion, it may be necessary to restrict access to a property during forest management activities for public safety purposes.

Income

The proper management of GSCA's forests will generate wood products that will be tendered or sold for reasonable prices. The revenue generated will be used to offset GSCA's management and operation costs. At the same time, these products will contribute to the local forest economy. Over time, the value of GSCA forests will improve as a result of sustainable forest management practices.

4.3 MANAGEMENT STRATEGIES TO ACHIEVE OBJECTIVES

Management Strategies to Achieve Environmental Objectives

Forest Health

GSCA will monitor the health of their forests on a regular basis and implement insect, disease or wildlife control measures as needed. Staff will attend yearly forest health reviews to keep appraised of upcoming insect or disease problems. Unauthorized uses of GSCA properties will be resolved as necessary to ensure the long-term health of their forests.

Environmental Protection

Areas of Concern (AOC) refer to an area of value to users/uses which may be affected by forest management activities (OMNR, 1996). On GSCA properties, the values which require protection include unique Niagara escarpment features, ANSI's; wetlands; species at risk; old growth forests; forest interior habitat; the Lake Huron/Georgian Bay shoreline; fish habitat; watercourses and riparian areas; steep slopes; springs/seepage areas; and significant trails such as The Bruce Trail.

Management may be allowed using modified operations designed to safeguard the values to be protected. Modified operations will be determined on a site by site basis. For example, the timing of an operation may be restricted (i.e. frozen periods with snow cover), access may be restricted (i.e. using specialized equipment such as skidding winches), marking regimes may be adjusted to leave a higher basal area, buffers may be established or 'No management' zones may be designated. GSCA will cease all forest management operations during unsuitable periods of the year and when trees are actively growing (early spring to early summer). The actual timing of these periods will vary depending upon weather conditions each year.

Management activities will be conducted in a manner that will minimize soil erosion, soil compaction and rutting. All forest management activities will cease during unsuitable periods to minimize damage to the site and remaining trees. GSCA will follow the guidelines set out in the technical guide entitled 'Forest Management Guide for Conserving Biodiversity at the Stand and Site Scales' (the Stand and Site Guide).

Older growth forests provide more diversity and habitat for rare and endangered species than some of the second growth forests which have a higher percentage of more shade tolerant species like sugar maple. The benefits to setting aside some older growth forest include their age, diversity, uniqueness and spiritual qualities, ability to store carbon and reduce carbon dioxide in the atmosphere, and their value as living laboratories (Maser, 1994).

Several GSCA properties have been designated as 'No forest management' and active forest management will not be permitted in these areas. Other passive recreational uses such as hiking or nature appreciation will be allowed.

During all forest management operations, diversity in GSCA forests will be preserved by retaining a component of all the species currently present in a stand. Attempts to increase diversity through forest management techniques such as group selection or tree planting will be attempted in forest stands which have low diversity. Where feasible, GSCA will implement strategies to preserve tree species at risk of disappearing from southern Ontario forests.

Wildlife Habitat
GSCA will maintain or enhance all known wildlife species and their respective habitats before, during and after all forest management operations on their properties. As part of the management planning process, valuable input was obtained from the Forestry Advisory Committee, which resulted in the development of comprehensive wildlife policies. These policies address wildlife habitat requirements such as the availability of nesting habitat, food sources, cover, and water, and are used to guide all forest management operations on GSCA properties.

Invasive Species
GSCA will identify, monitor and control invasive species on their properties where feasible and report locations of known invasive species to local municipalities. Staff will attend workshops and meetings to keep up to date on the latest information regarding invasive species.

GSCA will also map populations of known invasive species on GSCA properties which will assist with management planning to control infestations. New populations will also be mapped as they are discovered. Control measures may be implemented as time and money permit.

Management Strategies to Achieve Social/Cultural Objectives
Natural Heritage Features
Natural heritage features and areas are features and areas which are important for their environmental and social values as a legacy of the natural landscapes of an area (Provincial Policy Statement. 1997). Natural heritage features include significant wetlands, fish habitat, significant woodlands south and east of the Canadian Shield, significant valley lands south and east of the Canadian Shield, significant portions of the habitat of endangered and threatened species, significant wildlife habitat, and significant areas of natural and scientific interest. GSCA will protect natural heritage features before, during and after all forest management operations on their properties.

Populations of significant flora and fauna will be located through GSCA's inventory process or with the assistance of local naturalists. These areas will be identified as AOC's during management operations, and access by logging equipment will be restricted.

GSCA will continue to document all known provincially, regionally, or locally rare, threatened or endangered species of flora and fauna and their respective habitats on each property. This information will be passed on to the Ministry of Natural Resources Natural Heritage Information Centre. The locations of significant species will not be released to the public.

New wildlife habitat guidelines will be added to the Wildlife policies as they become available through OMNR's Science and Technology Unit. GSCA will partner with local naturalist and sportsmen's groups on wildlife habitat projects.

GSCA will work cooperatively with local First Nations groups on special project requests. For example, GSCA has occasionally been requested to provide tree saplings for ceremonial purposes. These requests have been granted to show GSCA's support for the social and cultural significance of the First Nations communities in this area.

Recreation
GSCA will provide a wide variety of recreational opportunities on their lands. Some activities may be restricted to designated trails (i.e. snowmobiles), and other activities may be restricted to specific sites (i.e. rock climbing at Old Baldy). All existing trails will be maintained, and new trails will be established through the continued management of GSCA's forested lands. Risk management assessments will be carried out to evaluate and remove hazard trees along trails to ensure public safety. GSCA will maintain or enhance all recreational values before and after all their forest management operations. Signs warning of forestry operations will be posted where active management is taking place. Visual impacts of forest operations will be minimized as much as possible.

Education
GSCA will provide workshops, seminars, and woodlot tours to the public which will promote sustainable forest management practices. Where feasible, GSCA will partner with other organizations such as the Grey County Woodlot Association, Grey-Bruce Woodlot Conference Committee, Grey County Forest Stewardship Network, Bruce Resource Stewardship Network, and Bruce County Woodlot Association to deliver information on sustainable forest management.

GSCA will use their forest management operations as an educational tool to demonstrate sustainable forest management practices to watershed residents.

Communication
GSCA will issue a news release about this Forest Management Plan upon its approval. Copies of this plan will be available at the GSCA Administration Office for review and comment. A wide variety of organizations, clubs, and interest groups will be notified including neighbouring Conservation Authorities, Grey Sauble Conservation Foundation, Grey and Bruce Counties, GSCA Municipalities, Grey Association for Better Planning, Grey County Forest Stewardship Network, Bruce Resource Stewardship Network, Grey County Woodlot Association, Bruce County Woodlot Association, Ducks Unlimited, Owen Sound Field Naturalists, Saugeen Field Naturalists, The Bruce Trail Association and local Bruce Trail clubs, OMNR, OMAF, University of Guelph - Centre for Land and Water Stewardship, Niagara Escarpment Commission, The Nature League, local trusts and foundations, local Sportsmen's Associations, and local snowmobile and ski Clubs.

GSCA will provide an open-ended commenting process for this Forest Management Plan. All groups or individuals, including First Nations, may provide a written submission to GSCA at any time during this 20 year management period. All submissions will be given due consideration by GSCA directors.

Adaptive Management
All on-going operations will be monitored to identify procedures that would improve the efficiency and effectiveness of GSCA's forest management program. In cooperation with OMNR, the Growth and Yield plots established on GSCA properties will be monitored and maintained to track growth

rates and assist in predicting future management needs. GSCA will also monitor climate changes to determine how these changes will affect our forests.

Management Strategies to Achieve Economic Objectives

Forest Products

Forest management is a continuous process, and trees are a crop with a rotation period of years instead of months. GSCA will implement the most effective silvicultural system for each forest cover type to be managed according to the silvicultural ground rules outlined in GSCA's Forest Management Program. Management activities will be undertaken based on the individual silvicultural prescriptions set for each stand.

'Good forestry practices' will be utilized in all forest management operations to minimize residual stand and site damage. Through GSCA's Forestry Advisory Committee, a comprehensive set of forest management policies have been established which will guide all future management. Other forest values will be considered in the planning of all forest management operations.

GSCA's management timeline is outlined in the forest management program. This timeline will require flexibility and periodic modification to account for unexpected occurrences, weather extremes or adverse site conditions.

GSCA will establish and maintain interior road systems to facilitate wood extraction, minimize stand damage and increase the future value of GSCA managed stands.

Income

GSCA promotes the local economy by awarding tenders to local companies and/or individuals. GSCA will sell all wood products produced from forest management operations for a reasonable price. Most forest management operations will be publicly tendered. In some instances, small operations may be sold directly to a contractor.

SECTION 5: SUMMARY OF GSCA FOREST INVENTORY

5.1 GSCA FOREST INVENTORY METHODOLOGY

The inventory of GSCA lands began with properties which were eligible for the Managed Forest Tax Incentive Program. Once the initial MFTIP plan was completed, GSCA continued the inventory process on the remaining area. The inventory was completed in early 2002, although since then, GSCA has acquired several new parcels of land which have also been inventoried. A complete summary of GSCA's inventory is presented by property in Appendix E.

Under MFTIP, GSCA properties were grouped by assessment roll number for each Township and County. This grouping has been provided as part of this plan for ease of administrative reporting for the MFTIP program; however, for forest management planning purposes, GSCA properties are presented alphabetically by property name. Each roll number within a GSCA property was given a compartment number and name. Table 5 provides a complete list of compartment numbers, compartment names and acreages for each GSCA property. The stands were delineated using a combination of aerial photographs and inventory data collected in the field. The air photos used for this project were taken in the spring of 1991 by Airborne Sensing Corporation. These photos were excellent for identifying wet areas and interpreting differences between hardwood and conifer stands.

Prior to completing the field inventory, technicians used aerial photographs to plot transect lines through the property. The transect lines were spaced 100 metres apart and plots were spaced either 100 metres or 200 metres along the transect lines. A plot was also completed where there was an identifiable change in a stand.

A stand analysis data sheet was used for recording data in the field. Technicians noted the property location, compartment number, date, plot number and the names of the inspectors. The overall health, quality and age of the trees in each plot were visually estimated. Data was collected on tree species, diameter at breast height (dbh), average stand height, and merchantable sawlog length. Tree quality was assessed using the Acceptable Growing Stock (AGS) and Unacceptable Growing Stock classification system.

Due to the large amount of area to be inventoried and manpower required, the sampling intensity was variable. A metric wedge prism with a BAF = 2 was used in most stands, except young plantations where a circular fixed area plot of 200 m^2 (7.99 metres radius) was used. For most upland hardwood or mixed stands, one plot was completed per hectare. For lowland hardwood or cedar stands, one plot was completed for every two hectares. A minimum of three plots per stand was used for stands over three hectares in size. However, only one plot was completed for small stands less than three hectares in size.

In regeneration areas, a circular fixed area plot of 100 m^2 (5.64 metres radius) was used. In these plots, the species were noted and trees were counted. This data was then used to determine species composition and density for the regeneration area. In some cases, a visual estimation was used when regeneration stands were very variable in density (i.e. higher numbers of trees near the seed source, and less trees further away).

The early and advanced tree regeneration was noted in each plot along with the shrubs present. Herbaceous vegetation was noted depending upon the timing of the inventory. Technicians also noted access, drainage, topography, the presence of water, and any physical features at each plot.

Wildlife signs and/or sightings were recorded for each plot along with the presence or absence of wildlife habitat features including standing dead snags; cavity trees – nesting/roosting, feeding, or escape; stick nests; fallen dead trees (woody debris); mast trees; super canopy trees; conifer thickets; other food sources; surface water – year-round creek or pond, seasonal run-off, or seasonal pond; and dens or dug holes. Space was also provided for additional comments or other wildlife habitat features not mentioned above.

Once the field work was completed, the stands were delineated using air photos and the plot data. Once delineated, the stands were numbered starting with '1' for each compartment on each property. Where a stand overlapped into another compartment (roll number), the stand was given a number and a letter code (ie. 1a for one compartment, 1b for the second compartment), so that the stand areas could be kept separate for MFTIP purposes. Stand area was broken down according to which property tax programs apply to it such as the Conservation Land Tax Incentive Program, Managed Forest Tax Incentive Program, and the Farm Property Class Tax Rate Program. All agricultural land is assigned DAL as a stand number.

The data from all plots within each stand were combined and then summarized into four size classes – polewood (10-24 cm dbh), small sawlog (26-36 cm dbh), medium sawlog (38-48 cm dbh, and large sawlog (50+ cm dbh). The basal area was determined for each size class as well as the total basal area for the stand. The stand was classed as understocked, fully stocked, or overstocked. The age estimation in conjunction with stand height data was used to determine a site class from Plonski's Tables for each stand.

Table 5. Assigned Compartment Names and Numbers for Grey Sauble Conservation Properties.

Property Name	Compartment Number	Compartment Name	Total Area (acres)
Ainslie Wood C. A.	2	Ainslie Wood	25.00
Leith Spit C.A.	3	Leith Spit	0.68
Albemarle Brook M.A.	4	Albemarle Brook - A	635.00
Albemarle Brook M.A.	5	Albemarle Brook - B	110.50
Arran Lake C.A.	6	Arran Lake	3.00
Arran Lake M.A.	7	Arran Lake	50.00
Beaver Valley Lowlands M.A.	8	Beaver Valley Lowlands - A	95.00
Beaver Valley Lowlands M.A.	9	Beaver Valley Lowlands - B	100.00
Beaver Valley Lowlands M.A.	10	Beaver Valley Lowlands - C	343.00
Beaver Valley Lowlands M.A.	11	Beaver Valley Lowlands - D	36.00
Berford Lake Dam	12	Berford Lake Dam	0.08
Big Mud Lake M.A.	13	Big Mud Lake	394.00
Bighead Headwaters M.A.	14	Bighead Headwaters	204.70
Bighead River M.A.	15	Bighead River	37.80
Boat Lake M.A.	16	Boat Lake - A	127.00
Boat Lake M.A.	17	Boat Lake - B	75.00
Boat Lake M.A.	18	Boat Lake - Wood Island	4.80
Boat Lake M.A.	19	Boat Lake - C	175.00
Boat Lake M.A.	20	Boat Lake - D	393.00
Boat Lake M.A.	21	Boat Lake - F	84.42
Boat Lake M.A.	22	John's Lake	599.40
Boat Lake M.A.	23	Boat Lake - H	113.71
Bognor Marsh M.A.	24	Bognor Marsh - A	6.92
Bognor Marsh M.A.	25	Bognor Marsh - B	60.00
Bognor Marsh M.A.	26	Bognor Marsh - C	100.00
Bognor Marsh M.A.	27	Bognor Marsh - D	1,486.00
Brookholm M.A.	28	Brookholm	25.00
Bruce's Caves C.A.	29	Bruce's Caves	237.00
Christie Beach C.A.	30	Christie Beach	2.25
Clendenan C.A.	31	Clendenan	115.77

Table 5. Assigned Compartment Names and Numbers for Grey Sauble Conservation Properties.

Property Name	Compartment Number	Compartment Name	Total Area (acres)
Clarksburg M.A.	32	Clarksburg	13.00
Clarksburg M.A.	33	Clarksburg	2.80
Haines Dam M.A.	34	Haines Dam	21.22
Colpoy's Lookout C.A.	35	Colpoy's Lookout - A	3.00
Colpoy's Lookout C.A.	36	Colpoy's Lookout - B	19.00
Epping-John Muir Lookout C.A.	37	Epping-John Muir Lookout	12.19
Eugenia Falls C.A.	38	Eugenia Falls	56.87
Feversham M.A.	39	Feversham	195.46
Madeleine Graydon C.A.	40	Madeleine Graydon	36.53
Fishing Islands N.P.	41	Fishing Islands - A	6.80
Fishing Islands N.P.	42	Fishing Islands - B	1.54
Fishing Islands N.P.	43	Fishing Islands - C	12.00
Fishing Islands N.P.	44	Fishing Islands - D	5.50
Fishing Islands N.P.	45	Fishing Islands - E	6.20
Fishing Islands N.P.	46	Fishing Islands - F	15.60
Fishing Islands N.P.	47	Fishing Islands - G	7.23
Fishing Islands N.P.	48	Fishing Islands - H	7.75
Flesherton M.A.	49	Flesherton - A	45.00
Flesherton M.A.	50	Flesherton - B	26.90
Gleason Brook M.A.	51	Gleason Brook	154.00
Gleason Brook M.A.	52	Gleason Brook	49.00
Oxenden Creek C.A.	53	Oxenden Creek	3.45
Gowan Lake M.A.	54	Gowan Lake	200.00
Griersville M.A.	55	Griersville - A	100.00
Rocklyn Creek M.A.	56	Rocklyn Creek - D	34.00
Griersville M.A.	57	Griersville - B	190.17
Hibou C.A.	58	Hibou	328.50
Bayshore	59	East Bayshore	39.50
Hodgins Lake M.A.	60	Hodgins Lake - A	93.00
Hodgins Lake M.A.	61	Hodgins Lake - B	225.00
Holland Centre M.A.	62	Holland Centre	47.00
Holmes Lookout C.A.	63	Holmes Lookout	0.10
Indian Creek M.A.	64	Indian Creek	55.00
Indian Falls C.A.	65	Indian Falls	28.50
Inglis Falls C.A.	66	Inglis Falls	503.85
Isaac Lake M.A.	67	Isaac Lake - A	36.20
Isaac Lake M.A.	68	Isaac Lake - B	148.50
Isaac Lake M.A.	69	Isaac Lake - C	71.91
Isaac Lake M.A.	70	Isaac Lake - D	96.00
Kemble Mountain M.A.	71	Kemble Mountain - A	155.00
Kemble Mountain M.A.	72	Kemble Mountain - B	110.00
Kemble Mountain M.A.	73	Kemble Mountain - C	52.50
Kemble Mountain M.A.	74	Kemble Mountain - D	150.00
Shouldice Wetland M.A.	75	Shouldice Wetland	98.00
Hepworth Creek M.A.	76	Hepworth Creek	95.00
Hepworth Creek M.A.	77	Hepworth Creek	50.00
Keppel Forest M.A.	78	Keppel Forest	100.00
Black's Creek M.A.	79	Black's Creek	79.00
Little Germany M.A.	80	Little Germany	161.50
Little Germany M.A.	81	Little Germany	107.00
Little Germany M.A.	82	Little Germany	54.00
Kolapore Uplands M.A.	83	Kolapore Uplands	112.00
Kolapore Uplands M.A.	84	Kolapore Uplands	110.00
Rob Roy M.A.	85	Rob Roy	117.00
Black's Creek M.A.	86	Black's Creek	50.00
Black's Creek M.A.	87	Black's Creek	300.00

Table 5. Assigned Compartment Names and Numbers for Grey Sauble Conservation Properties.

Property Name	Compartment Number	Compartment Name	Total Area (acres)
Little Germany M.A.	88	Little Germany	53.50
Little Germany M.A.	89	Little Germany	106.00
Little Germany M.A.	90	Little Germany	327.00
Little Germany M.A.	91	Four Corners	500.00
Kolapore Uplands M.A.	92	Gibraltar	100.00
Kolapore Uplands M.A.	93	Kolapore Uplands	100.00
Kolapore Uplands M.A.	94	Kolapore Uplands	50.00
Kolapore Uplands M.A.	95	Kolapore Uplands	175.00
Kolapore Uplands M.A.	96	Kolapore Uplands	100.00
Kolapore Uplands M.A.	97	Kolapore Uplands	88.50
Little Germany M.A.	98	Little Germany	100.00
Little Germany M.A.	99	Little Germany	100.00
Lake Charles C.A.	100	Lake Charles	6.00
Bass Lake M.A.	101	Bass Lake - A	100.00
Bass Lake M.A.	102	Bass Lake - B	110.00
Bass Lake M.A.	103	Bass Lake - C	50.00
Bass Lake M.A.	104	Bass Lake - D	194.00
Bass Lake M.A.	105	Bass Lake - E	150.00
Bass Lake M.A.	106	Bass Lake - G	190.00
Massie Hills M.A.	107	Massie Hills - A	350.00
Massie Hills M.A.	108	Massie Hills - B	225.00
Skinner Marsh - McNab Lake M.A.	109	Skinner McNab - A	454.00
Skinner Marsh - McNab Lake M.A.	110	Skinner McNab - B	50.00
Skinner Marsh - McNab Lake M.A.	111	Skinner McNab - C	91.00
Skinner Marsh - McNab Lake M.A.	112	Skinner McNab - D	880.70
Skinner Marsh - McNab Lake M.A.	113	Skinner McNab - E	263.50
Skinner Marsh - McNab Lake M.A.	114	Skinner McNab - F	4.80
Mill Dam	115	Mill Dam	1.50
Bayshore	116	Soccer Fields	3.42
Old Baldy C.A.	117	Old Baldy - A	3.40
Old Baldy C.A.	118	Old Baldy - B	50.00
Old Baldy C.A.	119	Old Baldy - C	94.00
Old Baldy C.A.	120	Old Baldy - D	34.00
Peasemarsh N.P.	121	Peasemarsh	58.50
Pottawatomi Wetlands M.A.	122	Pottawatomi - A	103.00
Pottawatomi Wetlands M.A.	123	Pottawatomi - B	120.00
Pottawatomi Wetlands M.A.	124	Pottawatomi - C	49.80
Pottawatomi Wetlands M.A.	125	Pottawatomi - D	78.75
Pottawatomi C.A.	126	Pottawatomi	2.00
Pottawatomi C.A.	127	Pottawatomi	290.80
Pottawatomi River M.A.	128	Pottawatomi River - A	0.21
Pottawatomi River M.A.	129	Pottawatomi River - B	0.25
Red Bay N.P.	130	Red Bay - A	3.00
Red Bay N.P.	131	Red Bay - B	41.00
Robson Lakes M.A.	132	Robson Lakes - A	160.00
Robson Lakes M.A.	133	Robson Lakes - B	100.75
Robson Lakes M.A.	134	Robson Lakes - C	200.00
Rocklyn Creek M.A.	135	Rocklyn Creek - E	97.00
Rocklyn Creek M.A.	136	Rocklyn Creek - A	262.54
Rocklyn Creek M.A.	137	Rocklyn Creek - B	115.00
Rocklyn Creek M.A.	138	Rocklyn Creek - C	121.00
Sauble River M.A.	139	Sauble River	10.00
Shallow Lake M.A.	140	Shallow Lake - A	160.00
Shallow Lake Dam	141	Shallow Lake - B	0.37
Shallow Lake M.A.	142	Shallow Lake - C	301.00
Shallow Lake M.A.	143	Shallow Lake - D	48.00
Shallow Lake M.A.	144	Shallow Lake - E	11.22

Table 5. Assigned Compartment Names and Numbers for Grey Sauble Conservation Properties.

Property Name	Compartment Number	Compartment Name	Total Area (acres)
Skinner's Bluff M.A.	145	Skinner's Bluff - A	25.00
Skinner's Bluff M.A.	146	Skinner's Bluff - B	1,100.40
Skinner's Bluff M.A.	147	Skinner's Bluff - E	173.50
Beattie Lake M.A.	148	Beattie Lake	100.00
Sky Lake M.A.	149	Sky Lake - B	98.00
Sky Lake M.A.	150	Sky Lake - C	283.00
Slough of Despond M.A.	151	Slough of Despond - A	450.00
Spey River M.A.	152	Spey River - A	100.00
Spey River M.A.	153	Spey River - B	85.00
Spey River M.A.	154	Spey River - C	110.00
Rockford M.A.	155	Rockford	49.13
Spirit Rock C.A.	156	Spirit Rock	216.50
St. Jean Point N.P.	157	St. Jean Point	14.70
Sucker Creek M.A.	158	Sucker Creek - A	299.66
Sucker Creek M.A.	159	Sucker Creek - B	837.60
Sucker Creek M.A.	160	Sucker Creek - C	198.00
Sullivan Forest M.A.	161	Sullivan Forest	150.00
Sheppard Lake M.A.	162	Sheppard Lake	49.00
Telfer Creek M.A.	163	Telfer Creek	43.00
Sydenham Forest M.A.	164	Sydenham Forest	80.00
Sydenham Lowlands M.A.	165	Sydenham Lowlands - A	71.00
Sydenham Lowlands M.A.	166	Sydenham Lowlands - B	333.50
Tara Dam C.A.	167	Tara	5.00
Taylor St. Detention Pond	168	Taylor St. Detention Pond	0.76
The Glen M.A.	169	Keppel Forest (Glen) - A	37.00
The Glen M.A.	170	Keppel Forest (Glen) - B	346.00
The Glen M.A.	171	Keppel Forest (Glen) - C	100.00
The Glen M.A.	172	The Glen - A	1,585.00
The Glen M.A.	173	The Glen - B	30.00
The Glen M.A.	174	The Glen - C	16.50
Skinner's Bluff M.A.	175	Skinner's Bluff - C	149.00
Walker Woods N.P.	176	Walker Woods	34.00
Walter's Creek M.A.	177	Walter's Creek - A	14.90
Walter's Creek M.A.	178	Walter's Creek (Holland AF)	289.00
Walter's Creek M.A.	179	Walter's Creek - B	146.34
West Rocks M.A.	180	West Rocks	16.08
West Rocks M.A.	181	West Rocks	2.28
West Rocks M.A.	182	West Rocks	143.57
Williams Lake M.A.	183	Williams Lake	148.00
Wodehouse M.A.	184	Wodehouse - A	50.00
Wodehouse M.A.	185	Wodehouse - B	150.00
Wodehouse M.A.	186	Beaverdale	50.00
Wodehouse M.A.	187	Beaverdale	398.50
Wodehouse M.A.	188	Sinkhole	75.00
Wodehouse M.A.	189	Wodehouse - F	200.00
Wodehouse M.A.	190	Wodehouse - G	289.00
Wodehouse M.A.	191	Beaverdale	100.00
West Rocks M.A.	192	West Rocks	15.25
Sydenham Lowlands M.A.	193	Sydenham Lowlands - C	38.89
Slough of Despond M.A.	194	Slough of Despond - B	164.00
Slough of Despond M.A.	195	Slough of Despond - C	60.95
Skinner's Bluff M.A.	196	Skinner's Bluff - D	190.50
McNab Lake Bottom M.A.	197	McNab Lake Bottom	480.00
Cape Commodore M.A.	198	Cape Commodore	171.00
Bass Lake M.A.	199	Bass Lake - F	50.00
		Total Area	**28,292.32**

The Gross Merchantable Volume (GMV) in m^3/ha was calculated for each stand. In some stands, the merchantable log length was also recorded which allowed an estimation of sawtimber volume in m^3/ha. Merchantable log lengths were not collected from stands inventoried earlier in the process. In these cases, a sawtimber volume is not currently available, but this information will be collected in future inventories.

5.2 FOREST COVER TYPES

Each forest stand was assigned a forest cover type based on such factors as species composition, soil and drainage conditions, and natural versus planted stands. A stand that contained 80% or greater of deciduous trees on a well drained site was classed as an Upland Deciduous (UD) stand. A stand that contained 80% or greater coniferous tree species on a lowland site was classed as a Lowland Coniferous (LC) stand. A stand composed of trees that were either hand or machine planted was classed as a plantation (P). Table 6 summarizes all the forest cover types, their criteria and the corresponding total areas for each cover type that has been assigned to GSCA stands.

Non-forested land and wetland areas were also assigned a classification such as marsh (MA), fen (FE), bog (BO), open land (OL), open water (OW), and developed agricultural land (DAL). Other land (OTH) includes dams, picnic areas, parking lots & the Fishing Islands. Table 7 describes all the non-forested land and wetland designations that have been assigned to GSCA stands.

Table 6: Summary of Forest Cover Types assigned to GSCA stands.

Forest Cover Types	Code	Criteria	Total Area (acres)
Lowland Deciduous	LD	Species composition equal to or greater than 80% of deciduous trees on imperfect to poorly drained sites	3,524.81
Upland Deciduous	UD	Species composition equal to or greater than 80% of deciduous trees on an upland well drained site	10,904.96
Lowland Coniferous	LC	Species composition equal to or greater than 80% of coniferous trees on imperfect to poorly drained sites	1,203.78
Upland Coniferous	UC	Species composition equal to or greater than 80% of coniferous trees on an upland well drained site	1,618.76
Lowland Mixed	LM	Species composition less than 80% of deciduous or coniferous trees on imperfect to poorly drained sites	2,296.33
Upland Mixed	UM	Species composition less than 80% of deciduous or coniferous trees on an upland well drained site	1,402.56
Plantation	P	Artificially reforested areas established by machine or hand planting using a variety of coniferous and/or deciduous tree species	2,298.57
Total Area			**23,249.77**

Table 7: Summary of Non-forested or Unmanageable Cover Types assigned to GSCA stands.

Non-forested Classifications	Code	Criteria	Total Area (Acres)
Farmland	DAL	Open land being used for agricultural purposes	555.86
Open Land	OL	Open non-forested land not being used for agricultural purposes	114.72
Open Water	OW	Open water	1,297.08
Dead Tree Swamp	TS	Wetlands where 100% of the trees have died due to elevated water levels, nutrient-rich water flow through substrate of mineral sediments and organic materials	1,585.35
Marsh	MA	Non-forested, poorly drained land with mineral based soils, seasonally or permanently flooded with water; dominated by emergent, non-woody vegetation such as rushes, reeds, cattails and sedges	1,160.77
Fen	FE	Low-lying peat land, water at or near surface and fed by fast-moving, nutrient-rich groundwater, usually neutral or alkaline and rich in calcium, vegetation dominated by sedges, and occasionally slow growing cedar or tamarack	94.76
Bog	BO	Wetlands with accumulations of peat, derived from sphagnum moss, water is acidic, at or very near the surface, vegetation is dominated by ericaceous shrubs, sedges, peat moss, and some trees	4.30
Other Land	OTH	Includes dams, picnic areas, parking lots & the Fishing Islands	229.71
Total Non-Forested Area			**5,042.55**

SECTION 6: GSCA FORESTRY DATABASE AND MAPPING

6.1 DATABASE DEVELOPMENT

During the forest management planning process, a forestry database was developed in-house using Microsoft Access, and the data was entered. Although the initial development of this database was time-consuming, it has saved a considerable amount of time, since it can be queried and used to generate reports.

GSCA's forestry database was set up based on the assessment roll number for each property. Since the assessment roll numbers represent a unique identifier for each property, these numbers were used to designate GSCA's forest compartments. Each compartment has a name and number and is part of a Management Area, Conservation Area, or Nature Preserve.

For each compartment, there is a form which contains general data about each property. Another form contains details about the purchase history of that property. The database then goes to the stand level and divides into general stand details, inventories, management activities, and Permanent Sample Plots (PSP). A copy of all the forms in the forestry database may be found in Appendix G.

Compartment Information Form

The Compartment Information form contains information which identifies the location of each property. This form contains the roll number, the compartment name, compartment number, lot, concession, municipality, and county for each property. Space is also provided to give a description and details about access; property tax information and acreages; former agreement forest designations; air photo number(s); the presence of permitted use, property, and Ducks Unlimited signs; and the presence and length of trails in the compartment.

Purchase History Form

The Purchase History form contains data about the sale of the property to GSCA including the vendor, instrument number, acquisition cost, grant rates, donor contributions, acreage, and registered agreements or easements. It also contains information about the taxes (as of 1995) and tax classifications; Agreement Forest properties; ANSI, Wetland, and Escarpment Natural designations; rental agreements, and master plans proposed for the property.

Stand Information Form

The Stand Information form lists all the stands for each compartment and indicates the cover type, growth stage, management designation and area for each stand. From here, it is possible to look at the stand details, inventories, and management activities for any of the stands. There is also a sub-form for Permanent Sample Plots (PSP), although the data in this form is, as yet, incomplete.

Detailed Stand Information Form

The Detailed Stand Information form provides general details for each stand, including property tax information, acreages by tax program, access, topography, soil type, drainage, cover type, growth stage, and management designation.

Stands are classified as 'forest management' if the stand has current or future potential for forest management. An unmanageable classification – 'not suitable for forest management' was assigned to stands that do not have reasonable access or the potential to produce marketable forest products. A 'nature preserve' designation was used for GSCA's existing nature preserve areas. These stands will be left in a natural state. A 'no forest management' designation was used for stands where 'no forest management' will be allowed.

At the stand level, there are tick boxes to indicate the presence of Permanent Sample Plots, significant species, wetlands, ANSI's, Escarpment Natural, old growth, and riparian or seepage areas. The tick box for wetland represents Provincially Significant Wetlands (PSW) – Class 1-3 only. Other wetlands were included as a growth stage.

Each stand was assigned a growth stage, these being 'open', 'regeneration', 'even-aged', 'all-aged', 'old growth' or 'wetland'. Stands were classed as regenerating when the majority of trees were less than 10 cm in diameter at breast height. Stands were classed as even-aged in second growth stands where the majority of trees were close to the same size. Stands which contained trees in all size classes were classed as all-aged. Stands which exhibit old growth characteristics including pit and mound topography, very large trees, canopy gaps, lots of down woody debris, cavity trees, snags, super canopy trees, and lots of ground cover, were classed as old growth. The open classification was assigned to areas that have no trees growing in them. A wetland category was added to account for wetlands that are not provincially significant. If the growth stage was left blank, it meant that the area has a dam, parking area, recreation area, or other use.

The area for each stand was entered according to the property tax program that applies to it. The property tax programs include the Managed Forest Tax Incentive Program, Conservation Land Tax Incentive Program, and the Farm Class Property Tax Program. An 'Other' (OTH) designation which includes dams, ineligible areas under the MFTIP program, recreational areas, open land and open water, was created for lands which were not eligible for any of the above noted programs. The sum of all these designations equaled the total area of the stand. The AF (agreement forest) area is a layer that overlaps the above layers.

6.2 GSCA PROPERTY MAPPING

The property maps for this Forest Management Plan were originally done in CorelDraw (Version 8 or 12) using 1991 air photos by Airborne Sensing Corporation as the base map. However, GSCA now has the capability to generate maps using a Geographical Information System (GIS), and the maps in this plan have been completed using a GIS format.

The Forest Compartment Maps delineate all the stands which have been identified on each GSCA property. These maps are essential for locating stands which have been targeted for management. The Forest Compartment Maps have been arranged according to property name and may be found in Appendix F. There are some corrections necessary on GSCA's stand boundaries due to inconsistencies in the 1991 air photos and the most recent photography. The GIS mapping system has also revealed that the areas for some GSCA properties do not match the areas provided by the Municipal Property Assessment Corporation (MPAC). MPAC areas have been used for the purposes of this forest management plan.

Map Disclaimer

The included mapping has been compiled from various sources and is for information purposes only. Grey Sauble Conservation Authority (GSCA) is not responsible for, and cannot guarantee, the accuracy of all the information contained within the map.

By accepting this map the user agrees not share or edit the map or disclaimer without the explicit written permission of Grey Sauble Conservation. The user also agrees to inform GSCA of any errors in mapping or missing base features.

Maps are produced by GSCA with Data supplied under Licence by Members of the Ontario Geospatial Data Exchange.

This map contains products of the South Western Ontario Orthophotography Project (SWOOP).
The 2006 images were taken in at 30cm resolution by First Base Solutions Inc © 2006 and the 2010 images were taken at 20cm.

SECTION 7: GSCA AREAS OF CONCERN

7.1 AREAS OF CONCERN

An Area of Concern (AOC) refers to an area of value to users/uses which may be affected by forest management activities (OMNR, 1996).

7.2 GSCA VALUES

In relation to forest management, a value is defined as "a benefit or condition of the forest that is linked to a specific geographic area, that could be of interest from various points of view, and which may need to be protected as a result of timber management activities"(OMNR, 1996). The following values require protection on GSCA properties:

Unique Niagara Escarpment features

GSCA owns 13,798.57 acres of land within the Niagara escarpment control area. Of this total, 8,970.63 acres are located within the Escarpment Natural Area designation. This designation includes escarpment features and associated stream valleys, wetlands and forests which are in a relatively natural state and relatively undisturbed (NEP, 1990). Table 8 indicates all the GSCA properties and their acreages which are located within the Niagara Escarpment Planning area.

Table 8: GSCA Properties located within the Niagara Escarpment Planning Area.

[4]

Property Name	Escarpment Natural Area (Acres)	Escarpment Protection Area (Acres)	Escarpment Rural Area (Acres)	Urban Area (Acres)	Escarpment Recreation Area (Acres)
Bass Lake	429.80	432.25	--	--	--
Beaver Valley Lowlands	555.04	25.28	--	--	--
Bognor Marsh	1,086.83	549.16	2.05	--	--
Brookholm	9.50	15.50	--	--	--
Bruce's Caves	184.89	55.24	1.85	--	--
Colpoy's Lookout	37.55	--	--	--	--
Eugenia Falls	56.80	0.03	1.07	--	--
Gowan Lake	200.00	--	--	--	--
Griersville	94.83	211.82	--	--	--
Indian Creek	35.76	8.47	--	--	--
Indian Falls	16.56	8.98	--	--	--
Inglis Falls	314.85	169.81	2.28	--	--
Kemble Mountain	470.70	17.85	0.59	--	--
Kolapore Uplands	126.73	--	157.89	--	--
Little Germany	685.00	667.45	19.23	--	--
Massie Hills	137.50	--	92.32	--	--
Old Baldy	101.46	44.88	43.33	--	--
Peasemarsh	--	--	--	--	14.48
Pottawatomi	212.15	81.69	2.33	2.41	--
Rob Roy	--	123.63	0.03	--	--
Robson Lakes	102.69	--	--	--	--
Rocklyn Creek	418.45	217.64	--	--	--
Skinner's Bluff	1,269.27	268.17	126.75	--	--
Slough of Despond	417.29	177.84	--	--	--
Spirit Rock	222.23	0.10	0.34	0.05	--
Sydenham Forest	86.20	0.28	--	--	--
Telfer Creek	45.26	0.66	--	--	--
The Glen	1,379.57	397.96	366.15	--	--
Walter's Creek	26.23	133.67	9.44	--	--
West Rocks	165.29	--	--	5.11	--
Wodehouse	82.20	63.49	323.89	--	--
Total Area	**8,970.63**	**3,656.35**	**1,149.54**	**7.57**	**14.48**

Areas of Natural and Scientific Interest (ANSI's)

There are eleven provincially significant and twelve regionally significant ANSI's on GSCA properties, comprising approximately 9,362 acres. The land within these ANSI's represents either significant geological (earth science) or biological (life science) features that are important for natural heritage protection, appreciation, scientific study or education (Riley et al., 1996). Table 9 lists the ANSI's located on GSCA properties along with their corresponding acreages.

Table 9: Summary of Regionally and Provincially Significant ANSI's on GSCA Properties.

GSCA Property Name	ANSI Name	Type of ANSI	GSCA Area in ANSI (Acres)
Bass Lake	Bass Lake Escarpment	Life Science	708.00
Beaver Valley Lowlands	**Beaver Valley Lowlands**	**Earth Science** **Life & Earth Science** **Life Science**	**2.43** **531.14** **43.81**
Boat Lake	Sauble Falls North	Life Science	4.23
Bognor Marsh	Bognor Marsh & Escarpment	Life Science	1,303.00
Bruce's Caves	**Skinner's Bluff**	**Life Science**	**152.11**
Eugenia Falls	Upper Beaver Valley	Life Science	53.60
Fishing Islands	Fishing Islands	Life Science	62.61
Gowan Lake	Kemble Wetlands	Life Science	4.27
Inglis Falls	Inglis Falls	Life Science	269.96
Kemble Mountain	Kemble Forest	Life Science	417.50
Kolapore Uplands	**Gibraltar Moraine** **Kolapore Swamp**	**Earth Science** **Life Science**	**34.45** **242.09**
Little Germany	**Kolapore Uplands**	**Earth Science** **Life & Earth Science**	**26.91** **79.26**
Massie Hills	**McGill Lake**	**Life Science**	**284.28**
Old Baldy	**Kimberly Creek**	**Life Science**	**98.25**
Rob Roy	**Pretty River Valley**	**Life Science**	**50.11**
Robson Lakes	**Lily Oak Forest** **Robson Lakes**	**Life Science** **Life Science**	**34.94** **285.74**
Skinner's Bluff	**Skinner's Bluff**	**Life Science**	**1,239.42**
Slough of Despond	**Slough of Despond**	**Earth Science** **Life & Earth Science** **Life Science**	**61.18** **414.81** **28.54**
St. Jean Point	Sucker Creek	Life Science	27.97
Sucker Creek	Sucker Creek	Life Science	1,062.79
The Glen	**Mud Creek Escarpment (The Glen)**	**Life Science**	**1,512.73**
Walter's Creek	Walter's Creek	Life Science	274.78
Wodehouse	Wodehouse Creek Sinkholes and Karst	Earth Science	51.59
Total ANSI Area on GSCA Lands			**9,362.50**

Note: Provincially significant ANSI's are indicated in **bold** type.

Wetlands

GSCA has a large amount of swamp on their property with lesser amounts of marshes, fens, and bogs. There is a total of 7,038.41 acres of swamp and 1,592.98 acres of dead tree swamp. Marshes comprise a total of 1,160.77 acres, and fens make up 94.76 acres. There is only one small bog, 4.3 acres in size, which is located at the Red Bay Nature Preserve. Some wetlands also contain areas of open water which do not fall into one of the four wetland types mentioned above. There are 1,290.03 acres of open water on GSCA properties.

In all, GSCA has a total of 11,181.25 acres of wetland on their properties. The proportion of wetland types on GSCA properties and the total number of acres for each wetland type are indicated in Figure 5. Table 10 lists the wetland types and corresponding acreages for each GSCA property. In this table, Provincially significant wetlands are indicated in bold type.

Figure 5. Proportion of Wetland Types on GSCA Properties (acres).

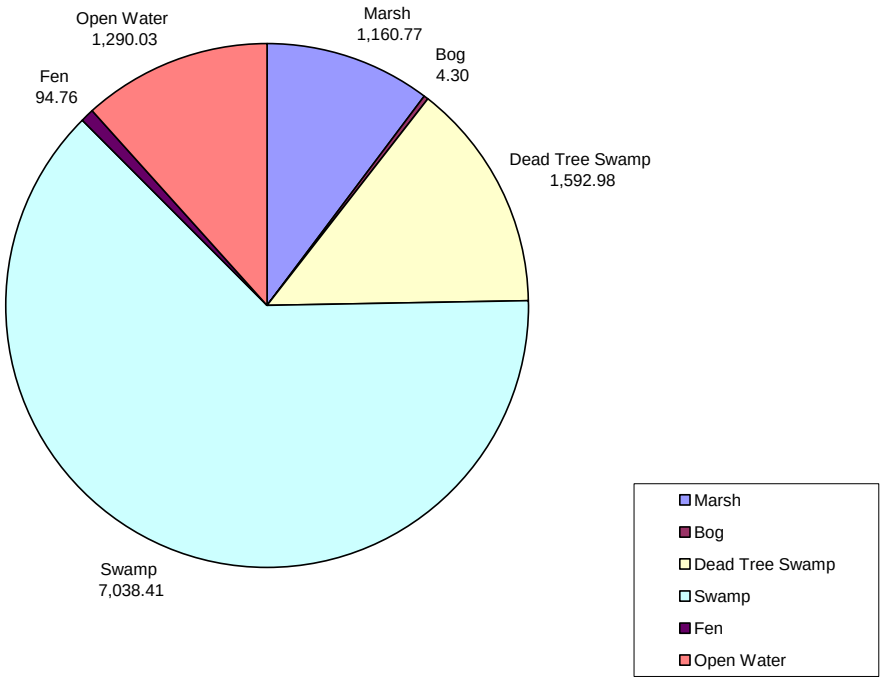

Table 10: Summary of Wetland Types and acreages on GSCA Properties.

GSCA Property Name	Wetland Type (Bog, Fen, Marsh, Dead Tree Swamp, Swamp, Open Water)	Area (Acres)
Albemarle Brook	**Dead Tree Swamp**	**272.50**
Arran Lake	**Swamp – Lowland Deciduous Forest**	**44.70**
Bass Lake	**Dead Tree Swamp**	**37.00**
	Swamp – Lowland Deciduous Forest	**4.00**
Beaver Valley Lowlands	**Swamp – Lowland Deciduous & Mixed Forests**	**554.50**
Big Mud Lake	**Fen**	**2.86**
	Marsh	**86.95**
	Dead Tree Swamp	**104.49**
	Swamp – Lowland Deciduous Forest	**60.80**
	Open Water	**60.90**
Bighead Headwaters	**Swamp – Lowland Deciduous & Mixed Forests**	**150.20**
Black's Creek	**Marsh**	**15.09**
	Swamp – Lowland Coniferous, Deciduous & Mixed Forests	**333.71**
Boat Lake	**Marsh**	**270.10**
	Dead Tree Swamp	**178.70**
	Swamp – Lowland Coniferous, Deciduous & Mixed Forests	**305.50**
	Open Water	**28.80**
Bognor Marsh	**Marsh**	**141.48**
	Dead Tree Swamp	**29.90**
	Swamp – Lowland Coniferous, Deciduous & Mixed Forests	**350.83**
Cape Commodore	Dead Tree Swamp	8.80
Clarksburg	Swamp – Lowland Deciduous Forest	5.20
Clendenan	Swamp – Lowland Deciduous Forest	3.04
	Open Water	52.85
Feversham	Dead Tree Swamp	10.09
	Swamp – Lowland Coniferous Forest	78.87
Flesherton	Swamp – Lowland Coniferous Forest	4.08
Gleason Brook	Marsh	43.90
	Dead Tree Swamp	29.4
	Swamp – Lowland Coniferous & Deciduous Forests	26.00
Haines Dam	Swamp – Lowland Deciduous & Mixed Forests	11.56
Hepworth Creek	**Dead Tree Swamp**	**47.00**
	Swamp – Lowland Deciduous & Mixed Forests	**82.92**
Hibou	Dead Tree Swamp	8.17
	Swamp – Lowland Deciduous & Mixed Forests	210.01
Hodgins Lake	**Marsh**	**7.40**
	Dead Tree Swamp	**15.40**
	Swamp – Lowland Deciduous & Mixed Forests	**67.70**
	Open Water	**30.30**
Indian Creek	Swamp – Lowland Deciduous Forest	24.60
Inglis Falls	Marsh	9.77
	Swamp – Lowland Deciduous Forest	15.77
	Open Water	4.18
Isaac Lake	**Marsh**	**47.60**
	Dead Tree Swamp	**25.49**
	Swamp – Lowland Deciduous Forest	**49.30**
Kemble Mountain	Swamp – Lowland Deciduous Forest	20.20
Keppel Forest	Swamp – Lowland Mixed Forest	31.64
Kolapore Uplands	**Marsh**	**3.40**
	Swamp – Lowland Coniferous, Deciduous & Mixed Forests	**177.46**

Note: Provincially significant wetlands are indicated in **bold** type.

Table 10 cont'd. Summary of Wetland Types and acreages on GSCA Properties.

GSCA Property Name	Wetland Type (Bog, Fen, Marsh, Dead Tree Swamp, Swamp, Open Water)	Area (Acres)
Little Germany	**Marsh**	**15.49**
	Dead Tree Swamp	**34.45**
	Swamp – Lowland Coniferous, Deciduous & Mixed Forests	**723.90**
Massie Hills	Dead Tree Swamp	131.80
	Swamp – Lowland Deciduous Forest	72.40
Peasemarsh	Swamp – Lowland Coniferous & Deciduous Forests	26.00
Pottawatomi Wetlands	**Fen**	**8.30**
	Marsh	**8.99**
	Dead Tree Swamp	**73.29**
	Swamp – Lowland Deciduous Forest	**240.50**
Red Bay	Bog	4.30
	Swamp – Lowland Deciduous & Mixed Forests	22.80
Robson Lakes	**Dead Tree Swamp**	**29.00**
	Swamp – Lowland Coniferous, Deciduous & Mixed Forests	**87.65**
Rockford	Dead Tree Swamp	9.69
Rocklyn Creek	Swamp – Lowland Coniferous, Deciduous & Mixed Forests	78.70
Shallow Lake	**Dead Tree Swamp**	**110.90**
	Swamp – Lowland Coniferous & Deciduous Forest	**136.06**
	Open Water	**177.00**
Sheppard Lake	Swamp – Lowland Deciduous Forest	3.55
Shouldice Wetland	**Dead Tree Swamp**	**27.70**
	Swamp – Lowland Deciduous Forest	**3.20**
Skinner Marsh – McNab Lake	**Marsh**	**252.20**
	Dead Tree Swamp	**4.50**
	Swamp – Lowland Deciduous Forest	**209.70**
	Open Water	**720.60**
Skinner's Bluff	**Dead Tree Swamp**	**8.50**
	Swamp – Lowland Deciduous Forest	**47.50**
Sky Lake	**Dead Tree Swamp**	**28.70**
	Swamp – Lowland Coniferous, Deciduous & Mixed Forests	**93.00**
	Open Water	**89.00**
Slough of Despond	Marsh	56.50
	Swamp – Lowland Deciduous Forest	283.10
	Open Water	33.50
Spey River	Swamp – Lowland Deciduous & Mixed Forests	123.72
	Open Water	10.30
Spirit Rock	Dead Tree Swamp	11.00
	Swamp – Lowland Coniferous Forest	8.00
Sucker Creek	**Fen**	**74.40**
	Marsh	**124.70**
	Swamp – Lowland Coniferous, Deciduous & Mixed Forests	**608.10**
	Open Water	**7.10**
Sullivan Forest	Swamp – Lowland Coniferous & Deciduous Forests	144.55
Sydenham Lowlands	Swamp – Lowland Coniferous, Deciduous & Mixed Forests	321.27
Telfer Creek	Swamp – Lowland Coniferous Forest	23.20
The Glen	**Fen**	**9.20**
	Marsh	**77.20**
	Dead Tree Swamp	**212.40**
	Swamp – Lowland Coniferous, Deciduous & Mixed Forests	**518.90**
Walker Woods	Swamp – Lowland Mixed Forest	34.00
Walter's Creek	Dead Tree Swamp	9.83
	Swamp – Lowland Coniferous, Deciduous & Mixed Forests	195.01
Wodehouse	Dead Tree Swamp	134.28
	Swamp – Lowland Coniferous, Deciduous & Mixed Forests	412.93
	Open Water	68.60
Total Wetland Area on GSCA Properties		**11,181.25**

Note: Provincially Significant Wetlands are indicated in **bold** type**.**

Species at Risk

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) assesses species considered to be at risk. Each year, the list of species at risk is updated as new species are assessed. This list includes both flora and fauna species. There are several categories under which a species may be listed. An Extinct species is a species that no longer exists. An Extirpated species is one that no longer exists in the wild in Canada, but occurs elsewhere. Endangered species are species which face imminent extirpation or extinction. A Threatened species is likely to become endangered if limiting factors are not reversed. A Special Concern species is one that is particularly sensitive to human activities or natural events but is not an endangered or threatened species. Data deficient refers to a species for which there is inadequate information to make a direct, or indirect, assessment of its risk of extinction. A Not At Risk species is a species that has been evaluated and found to be not at risk.

Species at risk are protected under the regulations of various Acts, including the federal Migratory Birds Convention Act and the Fish and Wildlife Conservation Act, and Ontario's Endangered Species Act. Recovery plans have been prepared for some species at risk. The Natural Heritage component of the Provincial Policy Statement under Ontario's Planning Act also provides protection for the habitat of species at risk listed in regulation under the Endangered Species Act. Species at risk are also protected by forest management guidelines set out by the Ontario Ministry of Natural Resources in A Silvicultural Guide to Managing Southern Ontario Forests (OMNR, 2000).

GSCA's watersheds fall within the Mixed Forest Region of Canada. Across this entire region, COSEWIC lists 86 species at risk. Of these, the range maps indicate that there are 34 species at risk within GSCA's watersheds or in Lake Huron and Georgian Bay. Table 11 summarizes the species at risk in this area.

Table 11. Summary of COSEWIC Species at Risk in GSCA's Watersheds.

Class	Species	Scientific Name	Current Status
Amphibians	Jefferson Salamander	*Ambystoma jefferonianum*	Threatened
Birds	Yellow-breasted Chat	*Icteria virens virens*	Special Concern
	Barn Swallow	*Hirundo rustica*	Threatened
	Bobolink	*Dolichonyx oryzivorus*	Threatened
	Canada Warbler	*Wilsonia canadensis*	Special Concern
	Chimney Swift	*Chaetura pelagica*	Threatened
	Common Nighthawk	*Chordelies minor*	Special Concern
	Short-eared Owl	*Asio flammeus*	Special Concern
	Eastern Meadowlark	*Sturnella magna*	Threatened
	Golden-winged Warbler	*Vermicora chrysoptera*	Special Concern
	Hooded Warbler	*Wilsonia citrina*	Special Concern
	Red-headed Woodpecker	*Melanerpes erythrocephalus*	Special Concern
	Louisiana Waterthrush	*Seiurus motacilla*	Special Concern
	Oliver-sided Flycatcher	*Contopus cooperi*	Special Concern
	Cerulean Warbler	*Dendroica cerulean*	Special Concern
	Black Tern	*Chilidonias niger*	Special Concern
	Least Bittern	*Ixobrychus exilis*	Threatened
	Peregrine Falcon	*Falco peregrinus*	Threatened
	Loggerhead Shrike	*Lanius ludovicianus*	Endangered
	Kirtland's Warbler	*Dendroica kirtlandii*	Endangered
	Bald Eagle	*Haliaeetus leucocephalus alascanus*	Special Concern
	Henslow's Sparrow	*Ammodramus henslowii*	Endangered

Table 11 Cont'd. Summary of COSEWIC Species at Risk in GSCA's Watersheds.

Class	Species	Scientific Name	Current Status
Birds	Whip-poor-will	*Caprimulgus vociferus*	Threatened
	King Rail	*Rallus elegans*	Endangered
	Yellow Rail	*Coturnicops noveboracensis*	Special Concern
	Piping Plover	*Charadrius melodus*	Endangered
Fish	Shortnose Cisco	*Coregonus reighardi*	Endangered
	Shortjaw Cisco	*Coregonus zenithicus*	Threatened
	Redside Dace	*Clinostomus elongates*	Endangered
	Deepwater Sculpin	*Myoxocephalus thompsoni*	Threatened
	Northern Brook Lamprey	*Ichthyomyzon fossor*	Special Concern
	Pugnose Shiner	*Notropis anogenus*	Endangered
Insects	Monarch Butterfly	*Danaus plexippus*	Special Concern
	West Virginia White	*Artogeia virginiensis*	Special Concern
	Hungerford's Crawling Water Beetle	*Brychius hungerfordi*	Endangered
Lichens	Flooded Jellyskin	*Leptogium rivulare*	Threatened
Mammals	Eastern Cougar	*Felis concolor couguar*	Endangered
	American Badger	*Taxidea taxus*	Endangered
	Common Grey Fox	*Urocyon cinereoargenteus*	Threatened
	Tri-coloured Bat	*Perimyotis subflavus*	Endangered
	Little Brown Myotis	*Myotis lucifugus*	Endangered
	Northern Myotis	*Myotis septentrionalis*	Endangered
Molluscs	Rainbow Mussel	*Villosa iris*	Threatened
	Fawnsfoot	*Truncilla donaciformis*	Endangered
Plants	American Ginseng	*Panax quinquefolium*	Endangered
	Butternut	*Juglans cinerea*	Endangered
	Gattinger's Agalinis	*Agalinis gattingeri*	Endangered
	Dwarf Lake Iris	*Iris lacustris*	Special Concern
	Eastern Prairie Fringed-orchid	*Platanthera leucophaea*	Endangered
	Hill's Pondweed	*Potamogeton hillii*	Special Concern
	Hill's Thistle	*Circium hillii*	Threatened
	Houghton's Goldenrod	*Solidago houghtonii*	Threatened
	Lakeside Daisy	*Hymenoxys herbacea*	Threatened
	Pitcher's Thistle	*Cirsium pitcheri*	Endangered
	American Hart's-tongue Fern	*Asplenium scolopendrium americanum*	Special Concern
	Broad Beech Fern	*Phegopteris hexagonoptera*	Special Concern
	Tuberous Indian-plantain	*Arnoglossum plantagineum*	Special Concern
	Small White Lady's-slipper	*Cypripedium candidum*	Endangered
Reptiles	Eastern Massasauga Rattlesnake	*Sistrurus catenatus catenatus*	Threatened
	Eastern Milksnake	*Lampropeltis triangulum triangulum*	Special Concern
	Eastern Ribbonsnake	*Thamnophis sauritus*	Special Concern
	Spotted Turtle	*Clemmys guttata*	Endangered
	Blanding's Turtle	*Emydoidea blandingii*	Threatened
	Snapping Turtle	*Chelydra serpentina*	Special Concern

Old growth forests

Much of the old growth forests in Ontario were destroyed approximately 100-150 years ago by logging, settlers and forest fires (OMNR, 1996). Old growth forests are important for their diversity and undisturbed state. They contain more tree species in different proportions than the second growth forests of today. An old growth forest has trees of all sizes and ages, including supercanopy trees, large mature trees, and younger understory trees. There are canopy gaps created by large trees which have died and fallen over. At ground level, there are many saplings, shrubs and lots of ground cover. Old growth forests have ample decaying wood matter and organic litter which provides moist conditions in which fungi, reptiles, amphibians, invertebrates, bacteria, and some tree species can survive. They also exhibit pits and mounds which are formed when large trees are uprooted. The pits are the depressions left by the tree's roots and soil, and the mounds are formed by the decaying tree and its roots. Old growth forests also contain snags and cavity trees which provide valuable habitat for many wildlife species.

GSCA has two properties, Marshall Woods and Walker Woods, which have examples of true old growth forest in this area. However, there are several other properties including Ainslie Wood, Sucker Creek, Eugenia Falls, Inglis Falls, Peasemarsh, The Glen, and Bass Lake, with forests that also exhibit many older growth features.

Forest interior habitat

Forests in southern Ontario have become increasingly broken and fragmented which affects the quality of habitat available for forest-dependent wildlife species. The term 'forest interior' refers to habitat which is deep within a forest, at least 100 metres from the forest edge and away from the influence of environmental changes. The forest interior is buffered against extreme weather, outside disturbances and predators. Forest edges are more susceptible to drying winds, warmer temperatures, invasive plants, and disturbances outside the forest. There is usually a higher density of predators in forest edge areas as well.

Forests with greater than 250 acres of forest interior habitat are considered to provide habitat for forest-dependent wildlife. However, those forests with more than 500 acres of forest interior habitat are considered to be the most valuable. These forests are healthier and support larger and more stable populations of wildlife species.

GSCA owns more than 22,820.28 acres of land which are part of larger contiguous forests. After a 100 metre buffer was applied, it was determined that GSCA has approximately 13,332.17 acres of forest interior habitat, although many properties have only very small amounts of forest interior habitat. Table 12 summarizes the total forest cover and the estimated amount forest interior habitat on all GSCA properties. Bass Lake, Black's Creek, Boat Lake, Bognor Marsh, Little Germany, Massie Hills, Skinner Marsh – McNab Lake, Skinner's Bluff, Slough of Despond, Sucker Creek and The Glen, each contain more than 250 acres of forest interior habitat.

Table 12: Summary of Forest Interior Habitat and Total Forest Cover on GSCA Properties.

Property Name	Compartment Numbers	Forest Interior Habitat (Acres)	Total Forest Cover (Acres)
Ainslie Wood	2	0.03	18.29
Albemarle Brook	4, 5	396.09	669.43
Arran Lake	6, 7	16.23	47.22
Bass Lake	101, 102, 103, 104, 105, 106, 199	593.01	792.94
Beattie Lake	148	50.81	79.71
Beaver Valley Lowlands	8, 9, 10, 11	262.75	507.31
Big Mud Lake	13	55.76	211.14
Bighead Headwaters	14	76.70	176.97
Bighead River	15	--	24.33
Black's Creek	79, 86, 87	370.93	407.41
Boat Lake	16, 17, 19, 20, 21, 22, 23	507.35	1,324.61
Bognor Marsh	24, 25, 26, 27	971.01	1,411.12
Brookholm	28	--	25.00
Bruce's Caves	29	79.10	182.72
Cape Commodore	198	7.00	64.00
Clarksburg	32, 33	--	15.80
Clendenan	31	9.60	73.45
Colpoy's Lookout	35, 36	--	27.65
Epping – John Muir Lookout	37	--	12.19
Eugenia Falls	38	26.68	56.36
Feversham	39	4.14	94.54
Flesherton	49, 50	--	71.90
Gleason Brook	51, 52	72.18	170.16
Gowan Lake	54	140.35	192.47
Griersville	55, 57	6.61	63.07
Haines Dam	34	--	7.00
Hepworth Creek	76, 77	110.73	141.12
Hibou	58	144.91	234.56
Hodgins Lake	60, 61	249.76	340.45
Holland Centre	62	30.74	47.00
Indian Creek	64	--	19.28
Indian Falls	65	--	16.18
Inglis Falls	66	155.69	347.90
Isaac Lake	67, 68, 69, 70	85.67	266.90
Kemble Mountain	71, 72, 73, 74	302.38	440.16
Keppel Forest	78	30.14	87.71
Kolapore Uplands	83, 84, 92, 93, 94, 95, 96, 97	441.95	780.28
Little Germany	80, 81, 82, 88, 89, 90, 91, 98, 99	1,059.76	1,430.46
Madeleine Graydon	40	--	36.53
Massie Hills	107, 108	402.76	572.84
Old Baldy	117, 118, 119, 120	76.61	104.50
Peasemarsh	121	--	36.69
Pottawatomi	127	30.30	175.40
Pottawatomi Wetlands	122, 123, 124, 125	235.49	342.36
Red Bay	130, 131	--	44.00

Table 12 cont'd: Summary of Forest Interior Habitat and Total Forest Cover on GSCA Properties.

Property Name	Compartment Numbers	Forest Interior Habitat (Acres)	Total Forest Cover (Acres)
Rob Roy	85	81.79	117.00
Robson Lakes	132, 133, 134	301.46	447.15
Rockford	155	16.81	49.13
Rocklyn Creek	56, 135, 136, 137, 138	141.19	370.28
Shallow Lake	140, 142, 143, 144	338.44	468.77
Sheppard Lake	162	13.66	44.67
Shouldice Wetland	75	65.61	95.93
Skinner Marsh – McNab Lake	109, 110, 111, 112, 113, 114	543.66	1,116.19
Skinner's Bluff	145, 146, 147, 196, 175	1,127.94	1.396.62
Sky Lake	149, 150	182.21	264.19
Slough of Despond	151, 194, 195	378.77	573.23
Spey River	152, 153, 154	197.68	286.75
Spirit Rock	156	81.27	189.79
St. Jean Point	157	--	9.68
Sucker Creek	158, 159, 160	831.10	1,205.55
Sullivan Forest	161	67.62	134.39
Sydenham Forest	164	55.08	80.00
Sydenham Lowlands	165, 166, 193	60.24	304.16
Telfer Creek	163	12.81	44.40
The Glen	169, 170, 171, 172, 173, 174	1,186.98	1,956.35
Walker Woods	176	0.54	30.44
Walter's Creek	177, 178, 179	86.01	308.08
West Rocks	180, 181, 182, 192	92.04	158.29
Williams Lake	183	18.58	82.93
Wodehouse	184, 185, 186, 187, 188, 189, 190, 191	447.46	895.20
Total Area		**13,332.17**	**22,820.28**

Wildlife Habitat

The forests of GSCA's watershed provide habitat for a wide variety of forest dependant species. The combination of different forest cover types and wetlands creates a diverse landscape capable of supporting a rich mix of species. Virtually all of the habitat characteristics required to sustain healthy wildlife populations are present within GSCA's management areas.

Mast trees and shrubs provide food for wildlife and should be retained. Large trees used by raptors for nesting are found throughout the watershed. Trees with cavities or the potential to become cavity trees are important to nesting birds and mammals. Supercanopy trees, trees that extend far above the canopy of the forest, are important habitat features for migrating birds and can be found at properties such as The Glen. Downed woody debris and snags provide habitat for birds, mammals, reptiles and amphibians. Large tracts of interior forest provide habitat for significant species such as the red-shouldered hawk, cerulean warbler and American ginseng. Shallow, wet depressions or ponds within forested areas provide critical breeding habitat for reptiles and amphibians. The fractured bedrock landscape of the Niagara Escarpment provides denning sites for large mammals like the Black Bear. Forest management activities will identify significant wildlife habitats and protect them with buffers or modified management areas. Forest management prescriptions will also target areas in need of habitat improvements or restoration.

Lake Huron/Georgian Bay shoreline
GSCA has eight properties – St. Jean's Point, The Fishing Islands, Spirit Rock, Colpoy's Look-out, Hibou, Ainslie Wood, Christie Beach, and Peasemarsh, which abut either the Lake Huron or Georgian Bay shorelines. These properties are either nature preserves or conservation areas which are used mainly for recreational activities. There are no forest management activities planned along the shorelines of any GSCA properties.

Fish Habitat
The federal Fisheries Act provides for the protection of fish habitat which is defined as any component of an aquatic system that provides cover, food, reproduction opportunities, water quality, and migration routes (DFO). Under this Act, no one may carry out any work that results in the harmful alteration, disruption or destruction of fish habitat (HADD), unless authorized by the Minister of Fisheries and Oceans Canada. This Act also states that no one is permitted to deposit a deleterious or harmful substance into water containing fish. Violations of the Fisheries Act can result in substantial fines and/or imprisonment, and violators may also be required to cover the costs of restoring the habitat at the site and/or be required to fulfill other court ordered remedies. GSCA has entered into an agreement with the Department of Fisheries and Oceans to administer the federal Fisheries Act in the GSCA watershed.

Streams are managed as cold water systems if they maintain stable water temperatures which do not rise above 14^{o}C, even on very hot days. According to the Owen Sound District Fisheries Management Plan, cold water fish populations include species of the Salmonidae (trout, salmon, and whitefish) family, Gadidae (burbot) family, and the Clupeidae (herring) family (OMNR, 1986). Streams are managed as cool water systems if they have daily maximum water temperatures which do not exceed 18^{o}C. Cool water streams support fish populations of the Esocidae (pike and muskellunge) family and the Percidae (perch and walleye) family. Streams which have daily maximum water temperatures which often reach highs of 23^{o}C are considered to be warm water streams. Warm water streams support fish populations of the Centrarchidae (bass) family.

Many streams have not been recently assessed as to whether they are cold, cool or warm water systems. The information currently available indicates that GSCA has sections of cold water streams at Albemarle Brook, Bighead Headwaters, Black's Creek, Bognor Marsh, Eugenia Falls, Feversham, Kolapore Uplands, Little Germany, Massie Hills, Old Baldy, Rocklyn Creek, Shallow Lake, Spey River, Sucker Creek, Walter's Creek, and Wodehouse. Watercourses will be protected during any forest management activities.

Watercourses and riparian areas

GSCA has many year-round and intermittent streams on their properties. These streams vary widely in their flows, gradients and water quality. There are more than 171 km of streams on GSCA properties as indicated in Table 13.

The riparian area is the land along creeks and streams where the vegetation is influenced by perennial and/or intermittent water, associated high water tables and soils that exhibit some wetness. The riparian areas are influenced by the aquatic ecosystem, and they in turn influence the aquatic ecosystem. Buffers of varying widths depending on site conditions will be established along riparian areas to protect aquatic ecosystems.

Table 13: GSCA Properties Containing Watercourses.

Property Name	Watercourse (s)	Total Stream Length (metres)
Ainslie Wood	Keefer Creek, Shoreline G18	243.4
Albemarle Brook	Albemarle Brook, Rankin River	6,161.2
Arran Lake	Sauble River	713.9
Bass Lake	Indian Creek	2,044.2
Beaver Valley Lowlands	Beaver River	9,513.8
Big Mud Lake	Big Mud Lake, Rankin River, Sauble River	2,763.3
Bighead Headwaters	Massie Creek/Bighead Headwaters	1,641.0
Bighead River	Bighead River	1,313.5
Black's Creek	Beaver River, Black's Creek	4,370.6
Boat Lake	Clavering Creek, Rankin River, Sauble River	5,534.8
Bognor Marsh	Bighead River, Keefer Creek	11,263.6
Cape Commodore	Shoreline G31, Shoreline G32	2,372.4
Christie Beach	Shoreline G10	195.3
Clarksburg	Beaver River	331.4
Clendenan	Beaver River, Grier Creek	1,675.3
Colpoy's Lookout	Shoreline G34	163.1
Eugenia Falls	Eugenia Falls	737.1
Feversham	Beaver River	2,590.2
Flesherton	Flesherton Creek	481.2
Gleason Brook	Gleason Brook	2,208.6
Griersville	East Minniehill Creek, Grier Creek	1,084.0
Haines Dam	Beaver River	1,109.0
Hepworth Creek	Hepworth Creek, Spring/Hepworth Creek	838.9
Hibou	Shoreline G19, Shoreline G20	3,843.5
Hodgins Lake	Shoreline H13	716.4
Holland Centre	Sydenham River/Martin's Creek	551.0
Indian Creek	Indian Creek	589.4
Indian Falls	Indian Creek	584.3
Inglis Falls	Sydenham River	4,715.5
Isaac Lake	Rankin River	4,333.9
Kemble Mountain	Shoreline G32	7.7
Kolapore Uplands	Beaver River, Kolapore Creek	3,597.3
Little Germany	Beaver River, Kolapore Creek	9,336.6
Madeleine Graydon	Beaver River	757.8
Massie Hills	Bighead River, North Spey River, Sydenham River, Young's Lake	5,345.6
Old Baldy	Beaver River	572.7
Peasemarsh	Indian Brook, Shoreline G5	1,362.3
Pottawatomi	Pottawatomi River	3,348.4
Pottawatomi Wetlands	Pottawatomi River, Sauble River	1,600.4
Robson Lakes	Spring Hill/Bighead Headwaters	1,211.9
Rockford	Bothwell's Creek	377.7
Rocklyn Creek	Bighead River, Minniehill Creek, Rocklyn Creek	4,463.5
Sauble River (island)	Sauble River	

Table 13: GSCA Properties Containing Watercourses.

Property Name	Watercourse (s)	Total Stream Length (metres)
Shallow Lake	Cashore Creek, Davidson Creek, Sauble River	3,940.7
Skinner Marsh – McNab Lake	Hepworth Creek, Sauble River, Spring/Hepworth Creek	12,762.3
Skinner's Bluff	Gleason Brook	790.8
Sky Lake	Beattie Lake	437.6
Slough of Despond	Big Bay Creek	3,916.9
Spey River	North Spey River, Sydenham River	1,754.4
Sucker Creek	Sucker Creek	6,729.3
Sullivan Forest	Sauble River	513.0
Sydenham Lowlands	North Spey River, Sydenham River	2,925.7
Tara	Sauble River	522.0
Telfer Creek	Bothwell's Creek	414.4
The Glen	Indian Creek, Sauble River Shallow Lake	12,651.6
Walker Woods	Shoreline H1	791.9
Walter's Creek	Bighead River/Walter's Creek, Spring Hill/Bighead Headwaters, Walter's Creek	5,999.4
West Rocks	Sydenham River Headwater	213.0
Williams Lake	Sydenham River	354.6
Wodehouse	Beaver River, Wodehouse Creek	9,892.4
Total Stream Length on GSCA Properties		**171,722.7**

Steep slopes

Slopes with grades greater than 33% are generally considered steep and are prone to erosion if disturbed. Many GSCA properties have steep talus slopes which are associated with the Niagara Escarpment. Forest management activities will be modified or restricted on steep slopes.

Springs/seepage areas

Springs or seeps are areas where water is found at or very near the surface of the ground throughout all or much of the year (OMNR, 2000). These areas are very important because they may provide habitat for rare flora and fauna, and they may maintain or influence the hydrological regime of adjacent areas. Forest management activities will be modified or restricted around springs and seepage areas.

Significant trails

The Bruce Trail Conservancy is a charitable, membership based, volunteer organization that maintains the Bruce Trail. The Beaver Valley Bruce Trail Club, the Sydenham Bruce Trail Club and the Peninsula Bruce Trail Club, maintain sections of The Bruce Trail which pass through GSCA's watersheds and properties. Where necessary, forest management activities will be modified or restricted along the Bruce Trail.

Many local trails systems also provide significant recreation opportunities such as Hepworth, Massie and Kolapore Management Areas. In many cases the trails may be multi-jurisdictional, as the trails encompass Crown, County and private land. The trails are managed by local trail organizations with agreements and insurance in place.

SECTION 8: GSCA'S FOREST MANAGEMENT PROGRAM

8.1 GSCA FORESTRY ADVISORY COMMITTEE

As part of the planning process, GSCA formed a Forestry Advisory Committee in 1998 and developed a set of forest management policies for their properties. Representatives from a variety of interest groups and the forest industry were invited to participate on this committee. Through this committee, a set of forest management policies were developed which were adopted by the GSCA directors in December, 1998. These policies have been updated for this management plan.

The Forestry Advisory Committee also examined the issue of 'No Forest Management' on GSCA lands. Committee members were asked to nominate properties for 'No Forest Management'. This designation was established as part of the forest management planning process to set aside some forested areas that could otherwise have been managed. The resultant list of nominated properties was summarized according to cover type, mapped and reviewed by the committee. Table 14 summarizes the properties, compartments, stands and total areas that have been nominated for 'no forest management'. Table 15 summarizes the cover types and total acreages that are designated as 'no forest management'. These properties have been mapped and included as part of Appendix G. This list will be approved upon acceptance of this forest management plan by the GSCA directors.

Table 14. Summary of Properties, Compartments, and Stands Nominated for 'No Forest Management'.

Property Name	Compartment Number	Stand Numbers	Total Area (Acres)
Ainslie Wood	2	1	24.00
Bognor Marsh	27	9, 10, 11, 13, 14, 15, 16, 17, 18, 19, 20, 22, 24, 25, 26-NM, 27-NM, 29	224.12
Clendenan	31	1, 2, 3, 4, 5, 6, 7, 8	62.92
Hibou	58	1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 14, 15, 16, 17, 18	315.13
Inglis Falls	66	1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 26, 27, 28, 31, 32, 33, 34, 35, 36, 37	305.72
Old Baldy	119	9	48.51
Rocklyn Creek	138	5, 6, 7, 8, 9, 10, 11, 12, 13, 14	81.70
Skinner Marsh – McNab Lake	109, 112, 113	20a-DU, 20b-DU, 49-DU, 53, 54, 56-NM, 58-NM, 61, 61-NM, 63, 64a, 64b, 65, 66, 67, 71a, 71b, 72, 73, 87, 88	260.00
Total Area			**1,322.10**

Table 15. Summary of Cover Types Nominated for 'No Forest Management'.

Cover Types	Total Area (Acres)
Lowland Deciduous	355.84
Upland Deciduous	553.54
Lowland Coniferous	11.00
Upland Coniferous	121.67
Lowland Mixed	78.55
Upland Mixed	183.28
Plantation	18.22
Total Area	**1,322.10**

8.2 SILVICULTURAL GROUND RULES

A silvicultural system is a planned program of silvicultural treatments during the entire life of a stand and is the process by which the forest is tended, harvested and replaced by a new one (OMNR, 1998). There are three basic silvicultural systems: the selection, shelterwood and clearcut systems. Each system has several variations, but the basic principles are the same. The management system applied to each forest cover type depends upon such factors as species composition, shade tolerance, site conditions, present stand structure, and the desired management condition. Each silvicultural system is briefly described below. Further information may be found in 'A Silvicultural Guide for Managing Southern Ontario Forests' (OMNR, 2000). To assist readers with understanding forestry terminology, a Glossary of Forest Terminology (OMNR, 2000) has been provided in Appendix G.

Uneven-aged Management

Uneven-aged management refers to forest stands which contain trees of all ages. These stands contain tree species that are capable of regenerating under a residual canopy and show a good growth response when released through an improvement or harvest operation. The selection system is used to reach this stand condition.

Selection System

Single tree or group selection is the silvicultural system used to reach and maintain an uneven-aged condition. This system involves selecting individual trees or a group of trees for removal based upon such characteristics as their health, form, growth potential and degree of risk.

Under this system, forest cover is maintained at all times, and through the removal of individual or small groups of trees, natural regeneration of tolerant and semi-tolerant hardwoods is encouraged. Management using this system eventually produces a steady supply of quality hardwood trees at regular intervals.

GSCA will manage all upland and lowland deciduous stands, and upland and lowland mixed stands using the selection silvicultural system. Small upland or lowland coniferous stands and some advanced plantation thinning will also be managed using this system.

Even-aged Management

Forests containing trees with small age differences (< 20 years) are managed as even-aged stands. There are two silvicultural systems applied to even-aged stands, namely the shelterwood and clearcut silvicultural systems. Plantations are also managed as even-aged stands.

Shelterwood System

Forests managed using shelterwood systems promote the establishment of natural regeneration under the protection of an older canopy. This system is used when it is desirable to encourage the development of mid-tolerants such as red oak or white pine in a stand. Through a series of partial harvests, the entire overstory is removed and replaced by natural regeneration or through planting.

Shelterwood silvicultural systems have three phases. The first phase is the preparatory cut in which undesirable species are removed to release more desirable seed trees. The second phase is a seeding cut which is a thinning from below. The remaining trees provide a seed source for regeneration and some partial shade. Once regeneration is well established, the third phase involves removing the mature trees in one or more harvests. The removal of the overstory provides the new even-aged stand with the sunlight and space needed for growth.

GSCA does not currently have any forest stands which will be managed using the shelterwood silvicultural system.

Clearcut System
The clearcut silvicultural system involves the complete clearing of areas followed by either natural regeneration or planting. This system is applied to stands containing species which are intolerant of shade such as poplar or white cedar. Intolerant species do not reproduce well under shade and can be susceptible to windthrow. This system is also used in tolerant hardwood stands which have an established understory of desirable species but do not have an adequate level of acceptable growing stock or any poplar in the overstory.

Patch or strip cuts are small clearcuts of variable size and pattern, scattered throughout a stand at regular intervals until the entire area is cut. The number of cuts is spread over the rotation period of the stand, so that it is a continuous process. In Southern Ontario, patch cuts approximately 0.08 ha in size (30 m by 30 m) are recommended in stands that are 4 to 10 ha in size or strip cuts approximately 0.16 ha (20 m by 80 m) are recommended in stands that are greater than 10 ha in size. This method results in patches of even-aged trees, but as a whole, the stand is somewhat uneven-aged.

When using patch cuts, it is important to orient them perpendicular to the prevailing wind direction to maximize seed dispersal and protect the stand against wind, insect and animal damage. Harvesting should begin away from the prevailing winds and work progressively towards them. Slash is left to decay. The timing of successive cuts should be based on the success of the regeneration. The stand may be allowed to regenerate naturally or it may be achieved by planting.

GSCA will manage all upland and lowland white cedar stands using the clearcut silvicultural system. In some instances, patch cuts may not be practical; therefore, some white cedar stands may be managed using the selection silvicultural system.

Plantation Management
In Southern Ontario, plantations were established to accelerate the natural succession process and provide a nurse crop under which hardwoods can become established. Coniferous species such as white pine, red pine, white spruce or Norway spruce were used to establish plantations, either as a monoculture or as a mixture of species. Trees were planted at high densities (up to 2,500 trees/ha) to promote good height growth and form, shade out grass and weed competition, and prepare a seedbed for the natural regeneration of hardwood species. More recent plantations contain a mixture of coniferous and/or deciduous species and are planted at densities of 1,500 – 1,700 trees/ha.

Plantations are thinned at regular 10-15 year intervals starting at approximately 30 years of age. The first thinning is usually a 1 in 4 row removal combined with the selection of diseased or poor quality trees from the remaining rows. All thinning operations will target the removal of no more than 33% the stand's basal area. Subsequent thinning operations may involve the removal of additional rows, or trees will be selected for removal using the selection management system.

White pine and red pine plantations may also be managed using Density Management Diagrams. The Density Management Diagrams provide a management tool which can be used to maximize stand production by examining the relationships between density, mortality and yield. Further information may be found in 'A Silvicultural Guide for the Great Lakes – St. Lawrence Conifer Forest in Ontario (OMNR. 1998).

GSCA will manage all plantation stands using one of the above plantation management guidelines.

8.3 PROJECTED HARVEST AREAS

Maximum Allowable Depletion

The projected harvest area or Maximum Allowable Depletion (MAD) represents the total area from each forest cover type which is available for forest management activities over a defined period of time, known as the cutting cycle. The MAD is used as a planning guide in determining the renewal, tending and harvesting activities for each cover type. The cutting cycle is the amount of time that a forest is allowed to grow between harvests. GSCA's cutting cycle has been set at 15 years based on current silvicultural standards and practices.

The area available for management is derived by deducting all other land classifications including all areas that have been designated for no forest management, plus protection forest and Nature Preserve areas. The following factors were also taken into consideration when planning the management program:

a) Many agreement forest properties were previously managed by the Ministry of Natural Resources, and it was important to maintain this continuity,
b) It was felt that where possible, entire properties should be managed at the same time to minimize the intrusion into the property for forest management purposes,
c) GSCA's properties are spread throughout the GSCA watershed, and it was felt that management should be somewhat evenly distributed to provide a steady supply of wood products to local forest operators on a regular basis,
d) It was important that GSCA's management program be flexible and adaptable, allowing for additions to or deletions from the management cycle as necessary. For example, impacts on the forests from biotic factors such as insect / disease outbreaks or abiotic factors such as wind, drought or fire events are unpredictable and may require adjustments in the management schedule, and
e) The inventory information in GSCA's database may be outdated and may misrepresent the actual condition of a stand. Therefore, in some cases, a stand that has been targeted for management during this planning period, in reality may not be ready for the management that has been specified. In these cases, stands are either delayed until later in the management cycle or they are placed in the commercially inoperable category.

Table 16 indicates the MAD calculations for each cover type that has been designated as manageable for forestry purposes and also indicates the total areas for all other classifications which fall into an unmanageable classification. According to this table, the total amount of land available for forest management activities is 16,242.06 acres which represents 57% of GSCA's total land base. However of this amount, there are 3,762.66 acres of land which are commercially inoperable at this time due to age or current stand conditions. Inoperable stands are incorporated into the management program as they become ready for management.

As noted below, GSCA's management program is based on a 15 year cutting cycle; however, this management plan covers a 20 year period. Therefore, the stands that are managed in the first five years of this plan are also scheduled for management in the last five years of this plan. Throughout this planning period, some forest stands that have not been previously managed will be added to the management cycle. While GSCA is not currently managing the maximum area that is available for forest management, over time, all stands designated for management will be managed as they are added to the management timeline.

Table 16. Maximum Allowable Depletion (MAD) Calculations for GSCA's Total Area.

Classification / Cover Types	Area (acres)	Total Area Currently Available for Forest Management
Total Unmanageable Classifications (includes DAL, Open Land, Other, Marsh, Open Water, Bogs, Fens, & Dead Tree Swamps)	**5,042.55**	**--**
Lowland Deciduous		
Total Lowland Deciduous Area	3,524.81	
Minus Designated No Forest Management Area	355.84	
Minus Nature Preserve Area	30.40	
Minus Protection Forest Area	2,137.67	
Total Lowland Deciduous Area Available for Forest Management	**1,000.90**	
Minus Commercially Inoperable Area	214.76	
Total Lowland Deciduous Area Currently Available for Forest Management	**786.14**	**786.14**
Upland Deciduous		
Total Upland Deciduous Area	10,904.96	
Minus Designated No Forest Management Area	553.54	
Minus Nature Preserve Area	1.10	
Minus Protection Forest Area	542.59	
Total Upland Deciduous Area Available for Forest Management	**9,807.73**	
Minus Commercially Inoperable Area	1,693.68	
Total Upland Deciduous Area Currently Available for Forest Management	**8,114.05**	**8,114.05**
Lowland Coniferous		
Total Lowland Coniferous Area	1,203.78	
Minus Designated No Forest Management Area	11.00	
Minus Nature Preserve Area	15.40	
Minus Protection Forest Area	893.55	
Total Lowland Coniferous Area Available for Forest Management	**283.83**	
Minus Commercially Inoperable Area	32.00	
Total Lowland Coniferous Area Currently Available for Forest Management	**251.83**	**251.83**
Upland Coniferous		
Total Upland Coniferous Area	1,618.76	
Minus Designated No Forest Management Area	121.67	
Minus Nature Preserve Area	52.00	
Minus Protection Forest Area	436.38	
Total Upland Coniferous Area Available for Forest Management	**1,008.71**	
Minus Commercially Inoperable Area	272.00	
Total Upland Coniferous Area Currently Available for Forest Management	**736.71**	**736.71**

Table 16 cont'd. Maximum Allowable Depletion (MAD) Calculations for GSCA's Total Area.

Classification / Cover Types	Area (acres)	Total Area Currently Available for Forest Management
Lowland Mixed		
Total Lowland Mixed Area	2,296.33	
Minus Designated No Forest Management Area	78.55	
Minus Nature Preserve Area	37.00	
Minus Protection Forest Area	1,257.18	
Total Lowland Mixed Area Available for Forest Management	**923.60**	
Minus Commercially Inoperable Area	612.59	
Total Lowland Mixed Area Currently Available for Forest Management	**311.01**	**311.01**
Upland Mixed		
Total Upland Mixed Area	1,402.56	
Minus Designated No Forest Management Area	183.28	
Minus Nature Preserve Area	--	
Minus Protection Forest Area	280.59	
Total Upland Mixed Area Available for Forest Management	**938.69**	
Minus Commercially Inoperable Area	387.14	
Total Upland Mixed Area Currently Available for Forest Management	**551.55**	**551.55**
Plantation		
Total Plantation Area	2,298.57	
Minus Designated No Forest Management Area	18.22	
Minus Nature Preserve Area	--	
Minus Protection Forest Area	1.75	
Total Plantation Area Available for Forest Management	**2,278.60**	
Minus Commercially Inoperable Area	550.49	
Total Plantation Area Currently Available for Forest Management	**1,728.11**	**1,728.11**
Total Area – All Cover Types – Currently Available for Forest Management		**12,479.40**

The total area available for forest management must be spread over the management cycle. Table 17 indicates that there are approximately 831.96 acres of forest that are currently available for management on an annual basis and over time, there will be another 251.83 acres of area added to the management cycle. Therefore, the total area available for management on an annual basis will increase to approximately 1,083.79 acres over time as commercially inoperable stands are added to the management cycle.

The majority of management will take place in the Upland Deciduous and Plantation cover types with smaller amounts in the other cover types. Since there are only small amounts of area available in the Lowland Deciduous, Lowland and Upland Coniferous, and Lowland and Upland Mixed cover types, there are some years when there will be no forest management activity in these cover types.

Table 17. GSCA Forest Area Available Annually for Forest Management Now and in the Future.

Cover Type	Area Currently Available For Forest Management			Area Available for Forest Management in the Future		
	Area	Length of Cutting Cycle	Area Available Annually (acres)	Area	Length of Cutting Cycle	Area Available in Future (acres)
Lowland Deciduous	786.14	15	52.41	214.76	15	14.31
Upland Deciduous	8,114.05	15	540.94	1,693.68	15	112.91
Lowland Coniferous	251.83	15	16.79	32.00	15	2.13
Upland Coniferous	736.71	15	49.11	272.00	15	18.13
Lowland Mixed	311.01	15	20.73	612.59	15	40.84
Upland Mixed	551.55	15	36.77	387.14	15	25.81
Plantation	1,728.11	15	115.21	550.49	15	37.70
Total Area			**831.96**			**251.83**

Table 18 provides a summary of GSCA's forest management program for the next 20 years by cover type. As indicated previously, the planning period for this forest management plan is 20 years, but the cutting cycle is 15 years. Therefore, the first five year management cycle (2013-2017) starts to repeat in 2028. In 2027, the commercially inoperable stands will be assessed to determine their readiness for management and those that are ready will be added to the management cycle.

It is important to note that the total number of acres being managed in the first operating period of this plan is lower than the target level. For many years, forest management activities on GSCA lands were limited to about 300-400 acres per year. This management activity took place mostly in upland deciduous stands and plantations. However the amount of forest management activity will steadily increase in each operating period, because forest stands that have not been previously managed are being added to the management cycle. However, the annual area to be managed in the third operating period exceeds the target level, because stands were placed in the management time line where it was felt that they would be ready for management. Many of these stands have not been previously managed. It may be necessary to delay management in some of the stands in this operating period, for one or more of the following reasons:

a) There may be quite a bit of variability within a stand resulting from a low inventory intensity,
b) There may be access or stand size issues,
c) There may be insufficient volume present due to previous management completed,
d) There may be problems with current site conditions, or
e) There may be environmental impacts such as tornado damage which will delay management.

New stands which are currently part of this cutting cycle but have not been previously managed, will be assessed as the management year approaches and may or may not need to be delayed due to the reasons mentioned above. Similarly, commercially inoperable stands are scheduled to be inventoried at the end of this first cutting cycle, and some new stands may be added to the management cycle. Over time, the management target levels will continue to increase, but the placement of the stands on the time line will be balanced out across the management cycle.

Table 18. GSCA's Forest Management Program by Cover Type (2013-2032).

Target Year	Lowland Deciduous	Upland Deciduous	Lowland Coniferous	Upland Coniferous	Lowland Mixed	Upland Mixed	Plantation	Total Area (acres)
2013	--	393.01	--	55.10	--	12.60	149.13	**609.84**
2014	67.40	259.76	60.80	52.45	--	31.32	197.51	**669.24**
2015	53.40	446.14	--	25.46	35.23	6.70	99.95	**666.88**
2016	4.30	349.63	--	118.20	--	--	191.15	**663.28**
2017	--	425.04	7.56	5.50	1.83	47.66	166.90	**654.49**
							5 year Total	**3,263.73**
2018	--	530.94	37.38	88.20	29.90	--	101.40	**787.82**
2019	--	396.25	21.90	65.40	--	167.10	142.70	**793.35**
2020	--	567.00	--	39.60	66.79	9.81	107.20	**790.40**
2021	--	634.05	--	33.35	31.64	12.76	91.70	**803.50**
2022	19.32	643.18	21.69	17.81	30.73	7.91	85.10	**825.74**
							5 year Total	**4,000.81**
2023	43.00	645.75	--	100.82	83.52	50.49	42.40	**965.98**
2024	142.19	727.47	15.10	10.40	8.62	--	77.40	**981.18**
2025	98.33	560.72	--	--	18.45	187.40	110.47	**975.37**
2026	196.50	734.22	--	36.50	4.30	17.80	--	**989.32**
2027	38.00	771.40	--	9.20	--	--	165.10	**983.70**
							5 year Total	**4,895.55**
15 year Cutting Cycle Complete – 2013-2017 repeats in 2028-2032 plus any new stands to be managed have been added to the cycle. Commercially inoperable stands will be re-assessed at this time, and any stands that are ready for management will be added to the management time line.								
2028	--	405.80	4.08	133.82	--	12.60	149.13	**705.43**
2029	191.10	276.46	65.25	52.45	--	31.32	197.51	**814.09**
2030	53.40	446.14	78.87	25.46	35.23	6.70	99.95	**745.75**
2031	4.30	349.63	--	118.20	--	--	191.15	**663.28**
2032	--	425.04	7.56	5.50	1.83	47.66	166.90	**654.49**
							5 year Total	**3,583.04**

8.4 VOLUME AND REVENUE PROJECTIONS

In the early 1990s, GSCA established several Permanent Sample Plots (PSPs) on GSCA land through OMNR's Growth and Yield Program. Some growth models have been developed, and this program is now providing important growth data for forests in this area. The data from some GSCA PSP plots have been incorporated into these growth models.

According to Scott McPherson from OMNR's Growth & Yield Program, there is a strong relationship between volume and basal area growth, and this relationship is expressed as a ratio, known as VBAR (personal communication, December 6, 2012). Scott also indicated that the VBAR ratio for Site Class 1 upland deciduous stands in this area would be ~5.5. This number is multiplied by the basal area growth for the 15 year cutting cycle and gives a volume in m^3/ha. This volume is 30 m^3/ha and has been used as an indication of growth in all GSCA cover types. Since there are many factors such as site and stand conditions which would affect both volume and basal area growth, it is important to note that this volume is an estimation only. As more data is collected and input into the Growth & Yield models, VBAR ratios should be available for other cover types, and volume predictions should be more reliable.

The volume and revenue projections for GSCA's forests are presented in Table 19. As indicated above, the volume used was 30 m^3/ha. It was multiplied by the area in hectares that is available for management in each cover type to give a total volume. The total volume (m^3) was then split as a percentage by the wood products that would be cut – sawlogs, firewood, posts or pulp. These percentages were then converted to foot board measure for sawlogs and full cords for firewood, posts and pulpwood. The volumes were then divided by 20 years to estimate the annual volumes by cover type. These volumes were multiplied by a dollar value based on past sales to estimate the projected revenue/year.

The following values were used to estimate the total projected revenue/year for each cover type:

Lowland Deciduous: Sawlogs ($100.00/1,000 fbm)
Firewood ($20.00/full cord)

Upland Deciduous: Sawlogs ($500.00/1,000 fbm)
Firewood ($25.00/full cord)

Lowland Coniferous: Sawlogs ($100.00/1,000 fbm)
Posts ($20.00/full cord)

Upland Coniferous: Sawlogs ($300.00/1,000 fbm)
Posts ($50.00/full cord)

Lowland Mixed: Sawlogs ($100.00/1,000 fbm)
Firewood ($15.00/full cord)

Upland Mixed: Sawlogs ($150.00/1,000 fbm)
Firewood ($20.00/full cord)

Plantation: Sawlogs ($100.00/1,000 fbm)
Pulpwood ($25.00/full cord)

Table 19. Volume and Revenue Projections for GSCA's Forest Management Program (2013-2032).

Cover Type	Total Actual Volume Cut 2003-2012 (m3)	Projected Volume to Cut (m3/ha)	Projected Area to Cut (Ha)	Total Projected Volume to Cut 2013-2032 (m3)		Total Projected Revenue/Year ($)
Lowland Deciduous	n/a*	30.00	368.77	11,063.21		$10,974.00
				Sawlogs (80%) (fbm)	Firewood (20%) (Full Cords)	
				~2,009,080 (100,454 fbm/year)	~929 (46 full cords/year)	
Upland Deciduous	47,127.67 (based on 1,653.9 ha)	30.00	4,041.94	121,258.15		$188,556.00
				Sawlogs (20%) (fbm)	Firewood (80%) (Full Cords)	
				~5,505,120 (275,256 fbm/year)	~40,743 (2,037 full cords/year)	
Lowland Coniferous	n/a*	30.00	129.58	3,887.37		$2,189.00
				Sawlogs (20%) (fbm)	Posts (80%) (Full Cords)	
				~176,487 (8,824 fbm/year)	~1,306 (65 full cords/year)	
Upland Coniferous	n/a*	30.00	402.03	12,060.95		$18,345.00
				Sawlogs (20%) (fbm)	Posts (80%) (Full Cords)	
				~547,567 (27,378 fbm/year)	~4,052 (203 full cords/year)	
Lowland Mixed	n/a*	30.00	140.86	4,225.86		$4,103.00
				Sawlogs (80%) (fbm)	Firewood (20%) (Full Cords)	
				~767,416 (38,371 fbm/year)	~355 (18 full cords/year)	
Upland Mixed	n/a*	30.00	262.98	7,889.48		$5,337.00
				Sawlogs (20%) (fbm)	Firewood (80%) (Full Cords)	
				~358,182 (17,909 fbm/year)	~2,651 (133 full cords/year)	
Plantation	7,085.26 (based on 444.0 ha)	30.00	1,024.99	30,749.70		$29,274.00
				Sawlogs (70%) (fbm)	Pulpwood (30%) (Full Cords)	
				~4,886,127 (244,306 fbm/year)	~3,874 (194 full cords/year)	
		Total	6,371.16	191,134.72		$258,778.00

***Note:** There is very little data for actual volumes cut in the lowland deciduous, upland & lowland coniferous, upland & lowland mixed stands.

Conversions: 1 m^3 = 227 fbm (foot board measure)
1 m^3 = 0.42 full cord

8.5 MANAGEMENT ON CONSERVATION LAND

GSCA has 15,426.65 acres of land that are eligible for the Conservation Land Tax Incentive Program (CLTIP). Of this amount, there are 8,109.72 acres in the CLTIP that are not designated for any forest management which leaves a total of 7,316.93 acres that are part of GSCA's forest Management Program. Of the CLTIP area to be managed, there are 5,749.17 acres that are currently part of GSCA's management cycle, and 1,567.76 acres of CLTIP land that is commercially inoperable. The commercially inoperable stands will remain in the CLTIP program until some management takes place.

According to the CLTIP policy which was updated on July 5th, 2010, landowners who choose to participate in the CLTIP are not allowed to sell wood products. If management occurs on Conservation Land, the entire property must be removed from CLTIP for a ten year period. After 10 years, it could be switched back into the CLTIP program for five years as long as there are no other forest management activities scheduled on this property. However, it is more likely that when a property is moved to the MFTIP program, it will remain in the MFTIP program because management activities in some stands may be spread out over several years. Table 20 indicates all the forest stands that will need to be moved from the CLTIP to the MFTIP as management is completed.

Table 20. GSCA Stands in the Conservation Land Tax Incentive Program (CLTIP).

Target Year	Management Area: Compartment # - Stand #	CLTIP Area
2013	Robson Lakes: 132-4, 132-7 The Glen: 172-4, 172-5 Walter's Creek: 178-30 Wodehouse: 189-6	**340.44**
2014	Bruce's Caves: 29-5, 29-6, 29-9 Kolapore Uplands: 96-3 Little Germany: 90-19, 90-20, 90-21, 90-22, 90-29 Sky Lake: 150-10, 150-4a	**125.20**
2015	Brookholm: 28-2 Little Germany: 91-5, 91-6 Massie Hills: 107-5, 107-11a, 107-13a; 108-11b, 108-13b	**275.80**
2016	Bognor Marsh: 27-26, 27-27 Kolapore Uplands: 95-3, 95-5, 95-7 Little Germany: 99-1 Skinner's Bluff: 146-17, 146-19	**302.78**
2017	Bass Lake: 102-11b, 102-13 Bognor Marsh: 27-38, 27-47, 27-50, 27-66 Kolapore Uplands: 93-7, 93-8 Skinner's Bluff: 146-18, 146-20, 146-21 Sydenham Forest: 164-2, 164-3, 164-4, 164-5, 164-6	**387.57**
2018	Bognor Marsh: 27-32, 27-34, 27-35, 27-36, 27-42, 27-43, 27-45, 27-48, 27-51, 27-55 Hodgins Lake: 60-7 Kemble Mountain: 73-1a Little Germany: 81-9 Massie Hills: 108-12, 108-14, 108-22 Sucker Creek: 159-6, 159-7, 159-14a; 160-14b The Glen: 172-20, 172-21	**559.78**

Table 20 cont'd. GSCA Stands in the Conservation Land Tax Incentive Program (CLTIP).

Target Year	Management Area: Compartment # - Stand #	CLTIP Area
2019	Little Germany: 90-32 Old Baldy: 118-11 Robson Lakes: 134-1, 134-2, 134-3 Rocklyn Creek: 136-2 Skinner Marsh–McNab Lake: 109-74, 109-83, 109-86	**91.25**
2020	Griersville: 57-1, 57-3, 57-4, 57-5 Kemble Mountain: 71-1b Little Germany: 80-5 Massie Hills: 108-18, 108-23 Skinner's Bluff: 145-9; 146-3, 146-5 The Glen: 172-25 Wodehouse: 184-1	**505.50**
2021	Griersville: 57-2 Skinner's Bluff: 146-2, 146-3, 146-4, 146-5, 146-6, 146-7, 146-8 Telfer Creek: 163-4	**451.36**
2022	Bruce's Caves: 29-4, 29-7, 29-11 Griersville: 55-7, 55-8, 55-9 Little Germany: 98-1, 98-2; 99-3, 99-4, 99-5, 99-6 Old Baldy: 118-16 Robson Lakes: 134-5, 134-6, 134-7, 134-8, 134-9, 134-10, 134-12 Rocklyn Creek: 137-5, 137-6, 137-15, 137-18 Spirit Rock: 156-4, 156-10 Walter's Creek: 178-25, 178-28	**522.66**
2023	Bass Lake: 105-9c; 106-8, 106-9a Pottawatomi: 124-2 Rob Roy: 85-1, 85-2 Spirit Rock: 156-1, 156-5, 156-7, 156-9, 156-11 Sucker Creek: 158-1 The Glen: 169-16b; 172-23, 172-24, 172-45	**603.10**
2024	Bognor Marsh: 25-1, 25-3; 27-6 Kemble Mountain: 72-7 Pottawatomi: 123-1; 127-5 Rocklyn Creek: 56-1, 56-2, 56-5; 138-2, 138-4 Skinner's Bluff: 146-10, 146-11, 146-12, 146-13	**426.57**
2025	Kemble Mountain: 72-4b; 74-4a Little Germany: 81-1, 81-4 Slough of Despond: 194-1; 195-2 The Glen: 172-27, 172-28	**315.86**
2026	Gowan Lake: 54-1 Slough of Despond: 151-1, 151-3, 151-4, 151-5, 151-6, 151-7; 195-1 The Glen: 170-1, 170-16a	**457.60**
2027	Bass Lake: 103-11c, 104-9b, 104-10, 104-11a Kolapore Uplands: 96-1, 96-4 Robson Lakes: 132-4, 132-5, 132-6, 132-7 Skinner's Bluff: 175-2, 175-3, 175-7; 196-8 The Glen: 172-38	**383.70**
	Total Area	**5,749.17**

8.6 SUMMARY OF GSCA'S FOREST MANAGEMENT ACTIVITIES

A summary of GSCA's Forest Management activities is provided in Table 21. These activities will be monitored on a regular basis. This Forest Management Plan will be submitted to the Ministry of Natural Resources for the Managed Forest Tax Incentive Program. A five year progress report will be required in the fifth year, and a new plan will be submitted in ten years.

Table 21. Summary of GSCA's Forest Management Activities (2013-2032).

Objective	Activity	Target	Year
Forest health	Inspect GSCA forests annually. Undertake control measures, if feasible.	Inspect all properties annually.	2013-2032
	Attend seminars to learn about new & existing forest pests.	Attend the Forest Health Review annually.	2013-2032
	Resolve unauthorized uses of GSCA properties.		As necessary
	Monitor and map locations of known invasive species.	GPS locations of invasive species.	2013-2032
	Send information about the spread of specific invasive species to local municipalities.	Send notices to local municipalities.	2013-2032
Environmental Protection	Determine Areas of Concern during forest management activities.	Modify operations to minimize damage to the environment or wildlife habitat.	2013-2032
	Minimize stand and site damage during forest management activities.	Follow guidelines set out in the technical guide – Forest Management Guide for Conserving Biodiversity at the Stand and Site Scales (OMNR, 2010).	2013-2032
Wildlife Habitat	Maintain species diversity during forest management activities.	Retain all species present. Increase species diversity through planting (i.e. Eastern hemlock.) Implement strategies to preserve Species at Risk, where feasible.	2013-2032
	Maintain or enhance wildlife species and their habitats during forest management activities.	Follow GSCA Wildlife Policies and wildlife habitat features. Apply for grants and partner with other organizations on specific wildlife habitat enhancement projects.	2013-2032
Recreation	Maintain or enhance recreational values during forest management activities.	Permit recreational activities according to the Conservation Areas Act / Regulations (Section 29). Erect signs warning of forestry operations or occasionally close trails where active management is taking place.	2013-2032
Education	Promote good forestry practices to the public.	Provide workshops, seminars and woodlot tours in partnership with local organizations (i.e. Grey County Woodlot Association, Bruce County Woodlot Association..	2013-2032

Table 21 cont'd. Summary of GSCA's Forest Management Activities (2013-2032).

Objective	Activity	Target	Year
Education	Educate young people about the value of forests.	Participate in the Bruce-Grey Forest Festival to educate young people about forest values.	2013-2032
Natural Heritage Features	Protect natural heritage features during forest management activities.	Identify Areas of Concern and modify forest management operations as necessary.	2013-2032
	Protect Species at Risk during forest management activities.	Document known locations of Species at Risk and their habitats. Send information to the Natural Heritage Information Centre. Do not disclose locations of Species at Risk to the public.	2013-2032
Communication	Provide an open-ended commenting process for this Forest Management Plan.	Allow written submissions to GSCA throughout this management period. Submissions to be given due consideration by GSCA's Board of Directors.	2013-2032
Adaptative Management	Improve the efficiency and effectiveness of GSCA's forest management program.	Develop a protocol for awarding tenders & grading logger performance.	2013-2032
	Monitor the effects of climate change that could affect tree growth and survival.	Note drought, wind events, temperature extremes, invasive species threats, etc.	2013-2032
	Use Growth & Yield growth data to track growth rates & predict future management needs.	Continue re-measurements of GSCA's Growth & Yield plots.	2013-2032
Forest Products	Implement GSCA's forest management program.	Include a stand inventory, boundary line marking, adjacent landowner notification, tree marking (Certified Tree Markers), tendering, & monitoring with each forest management operation. Use good forestry practices in all forest management activities. Be flexible with the management cycle to allow for unexpected occurrences (weather or site conditions). Establish and maintain interior road systems to facilitate wood extraction, and minimize stand and site damage.	2013-2032
	Afforestation – plant trees on open land not being used for agricultural purposes.	Plant trees under the 50 Million Tree Program or other tree planting programs. Determine area to be planted on an annual basis.	2013-2032
Income	Sell all wood products from forest management operations for a reasonable price.	Sell wood products by public tender except small operations which may be sold directly to a contractor.	2013-2032

8.7 RECOMMENDATIONS

1. That GSCA's Forestry Committee meet quarterly to discuss forestry operations as per the Terms of Reference.

2. That GSCA update the inventory of their forest stands, since it is outdated and was sometimes done at a low intensity.

3. That GSCA adjust the stand boundaries and stand areas to align with the newest air photography.

4. That GSCA stands be combined where possible to reduce the total number of GSCA forest stands. Each stand was originally separated on the basis of shade tolerance (i.e. Upland & Lowland Deciduous stands were classed as intolerant, semi-tolerant or tolerant).

5. That GSCA re-assess commercially inoperable stands on or before 2027 and move all stands that are ready for management into GSCA's forest management cycle.

6. That GSCA move CLTIP stands into MFTIP for the required ten years as management is completed. At the end of ten years, move these stands back into the CLTIP for five years. Repeat this cycle for affected stands on an annual basis.

7. That GSCA consider improving access to properties that have access issues. GSCA's Acquisition and Disposition Policy supports acquisitions for access and filling out properties.

8. That GSCA investigate protocols for awarding forestry tenders and grading logger performance to ensure that GSCA properties are treated with respect.

9. That GSCA evaluate the merits of continuing with a 15 year cutting cycle versus a 20 year cutting cycle during this 20 year management plan.

SECTION 9: THE ANNUAL PLAN FOR 2013

The management scheduled for 2013 may be found in Section 10: GSCA's Operating Periods (Table 25).

Forest management activities include:

a) Plantation thinning at Bognor Marsh, Flesherton, Walter's Creek and Wodehouse,
b) Stand improvement operations in upland deciduous stands at Robson Lakes, Spey River, The Glen, and Wodehouse,
c) Patch Cut in an upland coniferous stand at Spey River, and
d) Stand improvement operation in an upland mixed stand at Spey River

Detailed prescriptions will be prepared and approved for each forest stand that is scheduled for management. The stands will be marked by Certified Tree Markers, and the standing volume estimated. The operations will be publicly tendered and awarded by GSCA's Board of Directors.

Other management activities planned include:

a) Tree planting at Compartment 135 under the 50 Million Tree Program,
b) Forest Health Monitoring
c) Invasive Species Mapping.

SECTION 10: GSCA OPERATING PERIODS

10.1 OPERATIONAL GUIDELINES AND ASSUMPTIONS

Selection Silvicultural Operations

GSCA's upland deciduous, lowland deciduous, upland mixed and lowland mixed stands will be managed using the selection silvicultural system. There are 9,762.75 acres of these forest cover types which are currently available for management.

The stands to be managed using the selection system will be quite variable, but the long-term objective will be to have trees of all ages throughout and maintain species diversity. To reach and maintain this condition, improvement and harvesting operations will be scheduled as part of the management cycle.

The management history, present stand structure, and present Basal Area will be used to prescribe the management needs of each individual stand. A prescription will be prepared for each stand when it is scheduled for management. Table 22 indicates the size classes into which trees are grouped for management purposes plus the recommended or 'ideal' Basal Areas for each size class. GSCA's management prescriptions will target the removal of 33% of the Basal Area in the size classes prescribed. Diseased and poor form trees will be removed, and healthy, good quality trees will be spaced out throughout the stand, while maintaining a minimum Basal Area of 20 m^2/ha. Since many hardwood stands in this area are even-aged from previous clearing or cutting practices, it often takes several operations for a stand to reach an uneven-aged condition.

Table 22. Recommended Basal Area & Trees per Hectare by Size-class.

Size Classes	**Diameter Class** DBH (cm**)**	**Recommended Basal Area** (m^2/ha)	**Trees per Hectare** (ha)
Polewood	10 – 24	4	254
Small Sawlog	26 – 36	5	73
Medium Sawlog	38 – 48	6	43
Large Sawlog	50 +	5	20
Total		**20**	**390**

Stands to be managed will be marked according to the prescription. A standing volume will be estimated, and the wood products will be sold, usually by tender. During the removal process, the operation will be closely monitored by forestry staff to ensure a minimum of residual stand and site damage.

Shelterwood Silvicultural Operations

The first phase of the shelterwood system is the preparatory cut which removes undesirable species and individuals which are competing with seed trees. The second phase is a seeding cut in which trees are thinned from below. The best quality trees are left, providing a seed source for regeneration and some partial shade. Once regeneration is well established, the third phase involves the removal of the overstory in a series of one or more harvests. The removal of the overstory provides the new even-aged stand with the sunlight and space needed for growth.

At this time, GSCA does not have any stands which will be managed under the shelterwood silvicultural system but may use this system in future to manage white pine or red oak.

Clearcut Silvicultural Operations

In southern Ontario, clear cutting usually takes the form of patch or strip cuts. Patch cuts are small clear cuts of variable size and pattern scattered throughout a stand at regular intervals until the entire area is cut. Ideally, the number of cuts is spread over the rotation period of the crop, so that it is a continuous process. This method results in patches of even-aged trees, but as a whole, the stand is somewhat uneven-aged.

When using patch cuts, it will be important to protect the stand against wind, insect and animal damage. Harvesting will begin away from the prevailing winds and work progressively towards them. Slash will be left to decay, and these areas will be left to regenerate naturally unless identified for artificial planting.

In some instances, it will be possible to use the selection silvicultural system in a particular stand; however, the selection system will not promote regeneration of intolerant species and may require some artificial planting to establish sufficient regeneration of desirable species.

Patch cuts or the selection silvicultural system will be used to manage upland or lowland coniferous stands. These forest cover types represent 988.54 acres of GSCA land which is currently available for management. The patch cut size used on GSCA lands will not exceed sizes recommended in A Silvicultural Guide to Managing Southern Ontario Forests (OMNR, 2000).

Plantation Silvicultural Operations

Initial plantation management will target removal of 33% of the Basal Area, consisting of one-in-four row removal plus selection of poor quality trees in the remaining rows. Occasionally, rows are not evident or survival has been poor, and the trees will have had more growing room. In these instances, diseased and poor form trees will be marked using the selection silvicultural system. Subsequent thinnings will employ the selection silvicultural system and will target a maximum of 33% of the basal area. As all plantations mature, they will be converted to mixed stands and managed using the selection silvicultural system. All stands will maintain a conifer component to increase the diversity of the stand and improve wildlife habitat. GSCA has 1,728.11 acres of plantation which are currently being managed.

Other tending operations will include crop tree marking, lower limb pruning, and possibly insect or disease control measures. In mixed plantations, species diversity will be protected as much as possible during management operations.

10.2 SCHEDULE OF OPERATING PERIODS.

First Operating Period

The first five year operating period is presented in Table 23 below, and each subsequent five year operating period is presented in Tables 24, 25, & 26, respectively. These tables indicate the actual forest management operations scheduled during this 20 year management plan. Each forest management activity includes inventory, boundary line marking, adjacent landowner notification, tree marking, tendering & monitoring (cut inspections & damage assessments).

Table 23. First Operating Period (2013-2017).

Target Year	Management Activity	Compartment Name: Compartment #-Stand #	Total Area (acres)
2013	Plantation Thinning	Bognor Marsh: 27-2 Flesherton: 49-1, 49-7a; 50-7b Walters Creek: 178-27, 178-29, 178-30, 178-31, 178-32 Wodehouse: 190-3, 190-5	**149.13**
	Stand Improvement – Upland Deciduous	Robson Lakes: 132-4, 132-7, 132-5 Spey River: 153-6 The Glen: 172-4, 172-5 Wodehouse: 189-3, 189-5, 189-6	**393.01**
	Patch Cuts – Upland Coniferous	Spey River: 153-1, 153-5	**55.10**
	Stand Improvement – Upland Mixed	Spey River: 153-2	**12.60**
		Total Area	**609.84**

Target Year	Management Activity	Compartment Name: Compartment #-Stand #	Total Area (acres)
2014	Plantation Thinning	Holland Centre: 62-1, 62-3 Little Germany: 90-13, 90-15, 90-24, 90-26, 90-28, 90-29; 91-3, 91-8, 91-11, 91-12 Kolapore Uplands: 93-1, 93-2, 93-3, 93-4, 93-5, 93-6; 96-3, 96-6, 96-7 Sky Lake: 150-11, 150-13, 150-42 The Glen: 172-42	**197.51**
	Stand Improvement – Upland Deciduous	Little Germany: 90-16, 90-17, 90-19, 90-20 Sky Lake: 149-4ab; 150-2, 150-4a Walters Creek: 179-11	**259.76**
	Stand Improvement – Lowland Deciduous	Sky Lake: 149-14b; 150-3, 150-5, 150-12, 150-14a	**67.40**
	Patch Cut or Selection – Upland Coniferous	Bruce's Caves: 29-1, 29-3, 29-6 Holland Centre: 62-2 Little Germany: 90-21, 90-27	**52.45**
	Patch Cut or Selection – Lowland Coniferous	Little Germany: 90-22 Sky Lake: 150-10 Walters Creek: 179-5	**60.80**
	Stand Improvement – Upland Mixed	Bruce's Caves: 29-5, 29-9 Walters Creek: 179-9	**31.32**
		Total Area	**669.24**

Table 23 cont'd. First Operating Period (2013-2017).

Target Year	Management Activity	Compartment Name: Compartment #-Stand #	Total Area (acres)
2015	Plantation Thinning	Little Germany: 82-2 Massie Hills: 107-2, 107-5, 107-6, 107-7, 107-8 Sullivan Forest: 161-3 Wodehouse: 184-3, 184-4	**99.95**
	Stand Improvement – Upland Deciduous	Rocklyn Creek: 136-8, 136-13 Brookholm: 28-2 Little Germany: 82-1; 91-5, 91-7, 91-10 Massie Hills: 107-11a; 108-11b Rocklyn Creek: 136-9, 136-15 Rockford: 155-3	**446.14**
	Stand Improvement – Lowland Deciduous	Massie Hills: 107-3, 107-13a; 108-13b	**53.40**
	Patch Cut or Selection – Upland Coniferous	Bighead Headwaters: 14-11 Little Germany: 82-3 Massie Hills: 107-4	**25.46**
	Stand Improvement – Upland Mixed	Bighead Headwaters: 14-9	**6.70**
	Stand Improvement – Lowland Mixed	Little Germany: 91-6, 91-9	**35.23**
		Total Area	**666.88**

Target Year	Management Activity	Compartment Name: Compartment #-Stand #	Total Area (acres)
2016	Plantation Thinning	Little Germany: 99-1 Robson Lakes: 132-1, 132-2, 132-3 Spey River: 154-3 Sheppard Lake: 162-1 Walters Creek: 178-1, 178-2, 178-4, 178-5, 178-6, 178-8, 178-9, 178-12, 178-15, 178-18, 178-19, 178-20 Wodehouse: 190-9, 190-12	**191.15**
	Stand Improvement – Upland Deciduous	Boat Lake: 20-42 Bognor Marsh: 26-59; 27-26, 27-27 Madeleine Graydon: 40-2,40-3 Kolapore Uplands: 95-3, 95-7 Skinners Bluff: 146-17, 146-19 Spey River: 154-4, 154-5 Slough of Despond: 195-1	**349.63**
	Stand Improvement – Lowland Deciduous	Kolapore Uplands: 95-5	**4.30**
	Patch Cut or Selection – Upland Coniferous	Boat Lake: 19-38	**118.20**
		Total Area	**663.28**

Table 23 cont'd. First Operating Period (2013-2017).

Target Year	Management Activity	Compartment Name: Compartment #-Stand #	Total Area (acres)
2017	Plantation Thinning	Bognor Marsh: 27-7, 27-30, 27-38, 27-47, 27-50, 27-66 Skinners Bluff: 146-20, 146-21, 146-22, 146-23 Rockford: 155-4 Telfer Creek: 163-2, 163-3, 163-5 Sydenham Lowlands: 166-4 Wodehouse: 185-4, 185-5, 185-8, 185-11, 185-13, 185-14; 191-25, 191-26, 191-27, 191-28	**166.90**
	Stand Improvement – Upland Deciduous	Kolapore Uplands: 83-1, 83-2; 93-7 Bass Lake: 102-9e, 102-11b Sydenham Forest: 164-2, 164-3, 164-4, 164-5, 164-6 West Rocks: 182-5 Wodehouse: 185-10, 185-16	**425.04**
	Patch Cut or Selection – Upland Coniferous	Skinners Bluff: 146-18	**5.50**
	Patch Cut or Selection – Lowland Coniferous	Sydenham Lowlands: 166-8	**7.56**
	Stand Improvement – Upland Mixed	Bass Lake: 102-13 Rockford: 155-2	**47.66**
	Stand Improvement – Lowland Mixed	Kolapore Uplands: 93-8	**1.83**
		Total Area	**654.49**

Second Operating Period

Each forest management activity includes inventory, boundary line marking, adjacent landowner notification, tree marking, tendering & monitoring (cut inspections & damage assessments).

Table 24. Second Operating Period (2018-2022).

Target Year	Management Activity	Compartment Name: Compartment #-Stand #	Total Area (acres)
2018	Plantation Thinning	Shouldice Wetland: 75-8 Keppel Forest: 78-10 Little Germany: 81-6, 81-7, 81-8; 89-11 Kolapore Uplands: 84-2; 92-2; 95-4, 95-10 Sucker Creek: 159-6, 159-8; 160-17	**101.40**
	Stand Improvement – Upland Deciduous	Big Mud Lake: 13-1 Bognor Marsh: 27-32, 27-33, 27-34, 27-35, 27-36, 27-43, 27-45, 27-51, 27-55 Hodgins Lake: 60-2; 61-6 Kemble Mountain: 73-1a Shouldice Wetland: 75-1, 75-4, 75-9 Massie Hills: 108-12, 108-14, 108-21, 108-22 Skinner Marsh-McNab Lake: 111-5 The Glen: 172-20, 172-21	**530.94**
	Stand Improvement – Lowland Mixed	Bognor Marsh: 27-42, 27-48 Hodgins Lake: 60-7	**20.90**
	Patch Cut or Selection – Upland Coniferous	Sucker Creek: 159-7, 159-14a; 160-14b	**88.20**
	Patch Cut or Selection – Lowland Coniferous	Little Germany: 81-9	**37.38**
		Total Area	**787.82**

Target Year	Management Activity	Compartment Name: Compartment #-Stand #	Total Area (acres)
2019	Plantation Thinning	Skinner Marsh-McNab Lake: 109-77, 109-79, 109-80, 109-81, 109-83, 109-86, 109-89; 112-47, 112-48; 113-68a; 114-68b Robson Lakes: 134-1, 134-2	**142.70**
	Stand Improvement – Upland Deciduous	Arran Lake: 7-2 Gleason Brook: 51-1, 51-7, 51-12; 52-1 Hodgins Lake: 61-3, 61-7, 61-13, 61-15 Little Germany: 90-32 Skinner Marsh-McNab Lake: 109-78, 109-82; 110-14b; 112-14a, 112-21, 112-22, 112-24, 112-29 Old Baldy: 118-11 Beattie Lake: 148-1, 148-5	**396.25**
	Stand Improvement – Upland Mixed	Albemarle Brook: 4-12, 4-13a; 5-13b, 5-19 Gleason Brook: 51-2, 51-6 Robson Lakes: 134-3	**167.10**
	Patch Cut or Selection – Upland Coniferous	Albemarle Brook: 4-11 Skinner Marsh-McNab Lake: 109-74	**65.40**
	Patch Cut or Selection – Lowland Coniferous	Rocklyn Creek: 136-2	**21.90**
		Total Area	**793.35**

Table 24 cont'd. Second Operating Period (2018-2022).

Target Year	Management Activity	Compartment Name: Compartment #-Stand #	Total Area (acres)
2020	Plantation Thinning	Griersville: 57-4 Massie Hills: 108-18, 108-19, 108-23 Shallow Lake: 140-8, 140-10 The Glen: 170-2; 172-25	**107.20**
	Stand Improvement – Upland Deciduous	Griersville: 57-1, 57-3, 57-5 Isaac Lake: 67-2 Kemble Mountain: 71-1b Little Germany: 80-3, 80-6, 80-8 Skinner's Bluff: 145-9; 146-3, 146-5 Wodehouse: 184-1	**567.00**
	Stand Improvement – Upland Mixed	Little Germany: 80-1	**9.81**
	Stand Improvement – Lowland Mixed	Little Germany: 80-2, 80-4, 80-5, 80-7	**66.79**
	Patch Cut or Selection – Upland Coniferous	Bighead Headwaters: 14-5 Hodgins Lake: 61-2, 61-16, 61-17	**39.60**
		Total Area	**790.40**

Target Year	Management Activity	Compartment Name: Compartment #-Stand #	Total Area (acres)
2021	Plantation Thinning	Bognor Marsh: 26-62 Feversham: 39-6, 39-7, 39-10, 39-13	**91.70**
	Stand Improvement – Upland Deciduous	Boat Lake: 22-22, 22-24, 22-26 Feversham: 39-1, 39-5 Holland Centre: 62-4, 62-5 Keppel Forest: 78-5, 78-7, 78-12 Skinner's Bluff: 146-2, 146-3, 146-4, 146-5, 146-6, 146-7, 146-8 Spey River: 152-9, 152-11, 152-13 Telfer Creek: 163-4	**634.05**
	Stand Improvement – Upland Mixed	Griersville: 57-2	**12.76**
	Stand Improvement – Lowland Mixed	Keppel Forest: 78-2	**31.64**
	Patch Cut or Selection – Upland Coniferous	Keppel Forest: 78-1, 78-3, 78-6 Spey River: 152-8, 152-14	**33.35**
		Total Area	**803.50**

Table 24 cont'd. Second Operating Period (2018-2022).

Target Year	Management Activity	Compartment Name: Compartment #-Stand #	Total Area (acres)
2022	Plantation Thinning	Griersville: 55-8 Old Baldy: 118-12, 118-13, 118-15, 118-16 Rocklyn Creek: 136-3, 136-5; 137-5, 137-6, 137-10, 137-11, 137-13, 137-14, 137-15, 137-18	**85.10**
	Stand Improvement – Upland Deciduous	Bruce's Caves: 29-4, 29-7, 29-11 Griersville: 55-7, 55-9 Black's Creek: 79-1 Kolapore Uplands: 84-3, 84-7 Little Germany: 89-7; 98-1, 98-5, 98-7; 99-6 Skinner Marsh-McNab Lake: 109-92 Robson Lakes: 134-5, 134-6, 134-7, 134-8, 134-10, 134-12 Spirit Rock: 156-4, 156-10 Walter's Creek: 178-25	**643.18**
	Stand Improvement – Lowland Deciduous	Kolapore Uplands: 84-4, 84-6 Little Germany: 98-2 Robson Lakes: 134-9	**19.32**
	Stand Improvement – Upland Mixed	Walter's Creek: 178-28	**7.91**
	Stand Improvement – Lowland Mixed	Kolapore Uplands: 84-1, 84-5 Little Germany: 89-6; 99-5	**30.73**
	Patch Cut or Selection – Upland Coniferous	Little Germany: 89-10	**17.81**
	Patch Cut or Selection – Lowland Coniferous	Little Germany: 98-9; 99-2, 99-4	**21.69**
		Total Area	**825.74**

Third Operating Period

Each forest management activity includes inventory, boundary line marking, adjacent landowner notification, tree marking, tendering & monitoring (cut inspections & damage assessments).

Table 25. Third Operating Period (2023-2027).

Target Year	Management Activity	Compartment Name: Compartment #-Stand #	Total Area (acres)
2023	Plantation Thinning	Spirit Rock: 156-5 Sucker Creek: 158-3	**42.40**
	Stand Improvement – Upland Deciduous	Bognor Marsh: 26-63 Rob Roy: 85-1, 85-2 Bass Lake: 105-9c; 106-8, 106-9a Pottawatomi Wetlands: 124-1 Sucker Creek: 158-6, 158-9 The Glen: 169-9b, 169-21b; 172-23, 172-24, 172-45	**645.75**
	Stand Improvement – Lowland Deciduous	Pottawatomi Wetlands: 124-2	**43.00**
	Stand Improvement – Upland Mixed	Bognor Marsh: 26-65 Spirit Rock: 156-1, 156-7 The Glen: 169-16b	**50.49**
	Stand Improvement – Lowland Mixed	Spey River: 154-1	**83.52**
	Patch Cut or Selection – Upland Coniferous	Spey River: 154-2 Spirit Rock: 156-9, 156-11 Sucker Creek: 158-1, 158-5, 158-10	**100.82**
		Total Area	**965.98**

Target Year	Management Activity	Compartment Name: Compartment #-Stand #	Total Area (acres)
2024	Plantation Thinning	Rocklyn Creek: 56-5 Skinner Marsh: 112-25, 112-26 Wodehouse: 187-1, 187-5, 187-7, 187-8, 187-10, 187-11, 187-12, 187-16	**77.40**
	Stand Improvement – Upland Deciduous	Bognor Marsh: 25-1, 25-3; 27-1, 27-3, 27-6, 27-8 Rocklyn Creek: 56-1, 56-2; 138-4 Kemble Mountain: 72-7 Pottawatomi Wetlands: 123-2, 123-6 Pottawatomi: 127-5 Skinners Bluff: 146-10, 146-11, 146-12, 146-13 Wodehouse: 187-17	**727.47**
	Stand Improvement – Lowland Deciduous	Bognor Marsh: 27-4 Pottawatomi Wetlands: 123-1 Wodehouse: 185-2	**142.19**
	Stand Improvement – Lowland Mixed	Bognor Marsh: 27-5	**8.62**
	Patch Cut or Selection – Upland Coniferous	Wodehouse: 184-29	**10.40**
	Patch Cut or Selection – Lowland Coniferous	Rocklyn Creek: 138-2	**15.10**
		Total Area	**981.18**

Table 25 cont'd. Third Operating Period (2023-2027).

Target Year	Management Activity	Compartment Name: Compartment #-Stand #	Total Area (acres)
2025	Plantation Thinning	Epping Lookout: 37-1 The Glen: 172-27, 172-28 Walters Creek: 179-1, 179-4, 179-7, 179-13, 179-17, 179-18, 179-19, 179-21 Wodehouse: 188-1	**110.47**
	Stand Improvement – Upland Deciduous	Kemble Mountain: 72-4b; 74-4a Little Germany: 81-1, 81-3, 81-5 Kolapore Uplands: 94-1; 97-1 Skinner Marsh: 109-85; 113-57, 113-58, 113-69; 114-62b Wodehouse: 190-1, 190-8	**560.72**
	Stand Improvement – Lowland Deciduous	Kolapore Uplands: 94-2; 97-2 Slough of Despond: 194-1; 195-2	**98.33**
	Stand Improvement – Upland Mixed	Boat Lake: 20-47	**187.40**
	Stand Improvement – Lowland Mixed	Little Germany: 81-4	**18.45**
		Total Area	**975.37**

Target Year	Management Activity	Compartment Name: Compartment #-Stand #	Total Area (acres)
2026	Stand Improvement – Upland Deciduous	Gown Lake: 54-1 Kolapore Uplands: 92-1, 92-3 Skinner Marsh: 112-39, 112-40, 112-46, 112-50 Slough of Despond: 151-1, 151-3, 151-4, 151-5, 151-6 The Glen: 170-1, 170-9a, 170-21a, 170-15 Williams Lake: 183-14	**734.22**
	Stand Improvement – Lowland Deciduous	Kolapore Uplands: 92-4 Slough of Despond: 151-7	**196.50**
	Stand Improvement – Upland Mixed	Skinner Marsh: 112-30, 112-31, 112-43	**17.80**
	Stand Improvement – Lowland Mixed	The Glen: 170-16a	**4.30**
	Patch Cut or Selection – Upland Coniferous	Skinner Marsh: 112-32, 112-35, 112-37	**36.50**
		Total Area	**989.32**

Table 25 cont'd. Third Operating Period (2023-2027).

Target Year	Management Activity	Compartment Name: Compartment #-Stand #	Total Area (acres)
2027	Plantation Thinning	Skinner Marsh: 111-1, 111-3, 111-4, 111-6 The Glen: 170-12, 170-13, 170-17, 170-19, 170-22	**165.10**
	Stand Improvement – Upland Deciduous	Kolapore Uplands: 96-1, 96-4, 96-8 Bass Lake: 101-1a; 103-9d, 103-11c; 104-10, 104-11a; 199-1b Robson Lakes: 132-4, 132-5, 132-7 The Glen: 172-38, 172-39, 172-40 Skinners Bluff: 175-3, 175-7; 196-8 Williams Lake: 183-7, 183-8, 183-10, 183-12, 183-13, 183-15	**771.40**
	Stand Improvement – Lowland Deciduous	Robson Lakes: 132-6	**38.00**
	Patch Cut or Selection – Upland Coniferous	Skinners Bluff: 175-2 Williams Lake: 183-15	**9.20**
		Total Area	**983.70**

Fourth Operating Period (2028-2032)

Each forest management activity includes inventory, boundary line marking, adjacent landowner notification, tree marking, tendering & monitoring (cut inspections & damage assessments).

Table 26. Fourth Operating Period (2028-2032).

Target Year	Management Activity	Compartment Name: Compartment #-Stand #	Total Area (acres)
2028	Plantation Thinning	Bognor Marsh: 27-2 Flesherton: 49-1, 49-7a; 50-7b Walters Creek: 178-27, 178-29, 178-30, 178-31, 178-32 Wodehouse: 190-3, 190-5	**149.13**
	Stand Improvement – Upland Deciduous	Boat Lake: 17-35b Flesherton: 50-9 Robson Lakes: 132-4, 132-7, 132-5 Spey River: 153-6 The Glen: 172-4, 172-5 Wodehouse: 189-3, 189-5, 189-6; 190-10	**406.80**
	Patch Cuts – Upland Coniferous	Boat Lake: 17-34b Flesherton: 49-6; 50-8 Spey River: 153-1, 153-5	**133.82**
	Stand Improvement – Upland Mixed	Spey River: 153-2	**12.60**
	Patch Cut or Selection – Lowland Coniferous	Flesherton: 49-3	**4.08**
		Total Area	**706.43**

Target Year	Management Activity*	Compartment Name: Compartment #-Stand #	Total Area (acres)
2029	Plantation Thinning	Holland Centre: 62-1, 62-3 Little Germany: 90-13, 90-15, 90-24, 90-26, 90-28, 90-29; 91-3, 91-8, 91-11, 91-12 Kolapore Uplands: 93-1, 93-2, 93-3, 93-4, 93-5, 93-6; 96-3, 96-6, 96-7 Sky Lake: 150-11, 150-13, 150-42 The Glen: 172-42	**197.51**
	Stand Improvement – Upland Deciduous	Black's Creek: 86-1, 86-4 Little Germany: 90-16, 90-17, 90-19, 90-20 Sky Lake: 149-4ab; 150-2, 150-4a Walters Creek: 179-11	**276.46**
	Stand Improvement – Lowland Deciduous	Sky Lake: 149-14b; 150-3, 150-5, 150-12, 150-14a Sullivan Forest: 161-2	**191.10**
	Patch Cut or Selection – Upland Coniferous	Bruce's Caves: 29-1, 29-3, 29-6 Holland Centre: 62-2 Little Germany: 90-21, 90-27 Sullivan Forest: 161-4	**56.90**
	Patch Cut or Selection – Lowland Coniferous	Little Germany: 90-22 Sky Lake: 150-10 Walters Creek: 179-5	**60.80**
	Stand Improvement – Upland Mixed	Bruce's Caves: 29-5, 29-9 Walters Creek: 179-9	**31.32**
		Total Area	**814.09**

Table 26 cont'd. Fourth Operating Period (2028-2032).

Target Year	Management Activity	Compartment Name: Compartment #-Stand #	Total Area (acres)
2030	Plantation Thinning	Little Germany: 82-2 Massie Hills: 107-2, 107-5, 107-6, 107-7, 107-8 Sullivan Forest: 161-3 Wodehouse: 184-3, 184-4	**99.95**
	Stand Improvement – Upland Deciduous	Rocklyn Creek: 136-8, 136-13 Brookholm: 28-2 Little Germany: 82-1; 91-5, 91-7, 91-10 Massie Hills: 107-11a; 108-11b Rocklyn Creek: 136-9, 136-15 Rockford: 155-3	**446.14**
	Stand Improvement – Lowland Deciduous	Massie Hills: 107-3, 107-13a; 108-13b	**53.40**
	Patch Cut or Selection – Upland Coniferous	Bighead Headwaters: 14-11 Little Germany: 82-3 Massie Hills: 107-4 Feversham: 39-4, 39-8	**104.33**
	Stand Improvement – Upland Mixed	Bighead Headwaters: 14-9	**6.70**
	Stand Improvement – Lowland Mixed	Little Germany: 91-6, 91-9	**35.23**
	Patch Cut or Selection – Lowland Coniferous	Feversham: 39-4, 39-8	**78.87**
		Total Area	**824.62**

Target Year	Management Activity	Compartment Name: Compartment #-Stand #	Total Area (acres)
2031	Plantation Thinning	Little Germany: 99-1 Robson Lakes: 132-1, 132-2, 132-3 Spey River: 154-3 Sheppard Lake: 162-1 Walters Creek: 178-1, 178-2, 178-4, 178-5, 178-6, 178-8, 178-9, 178-12, 178-15, 178-18, 178-19, 178-20 Wodehouse: 190-9, 190-12	**191.15**
	Stand Improvement – Upland Deciduous	Boat Lake: 20-42 Bognor Marsh: 26-59; 27-26, 27-27 Madeleine Graydon: 40-2,40-3 Kolapore Uplands: 95-3, 95-7 Skinners Bluff: 146-17, 146-19 Spey River: 154-4, 154-5 Slough of Despond: 195-1	**349.63**
	Stand Improvement – Lowland Deciduous	Kolapore Uplands: 95-5	**4.30**
	Patch Cut or Selection – Upland Coniferous	Boat Lake: 19-38	**118.20**
		Total Area	**663.28**

Table 26 cont'd. Fourth Operating Period (2028-2032).

Target Year	Management Activity	Compartment Name: Compartment #-Stand #	Total Area (acres)
2032	Plantation Thinning	Bognor Marsh: 27-7, 27-30, 27-38, 27-47, 27-50, 27-66 Skinners Bluff: 146-20, 146-21, 146-22, 146-23 Rockford: 155-4 Telfer Creek: 163-2, 163-3, 163-5 Sydenham Lowlands: 166-4 Wodehouse: 185-4, 185-5, 185-8, 185-11, 185-13, 185-14; 191-25, 191-26, 191-27, 191-28	**166.90**
	Stand Improvement – Upland Deciduous	Kolapore Uplands: 83-1, 83-2; 93-7 Bass Lake: 102-9e, 102-11b Sydenham Forest: 164-2, 164-3, 164-4, 164-5, 164-6 West Rocks: 182-5 Wodehouse: 185-10, 185-16	**425.04**
	Patch Cut or Selection – Upland Coniferous	Skinners Bluff: 146-18	**5.50**
	Patch Cut or Selection – Lowland Coniferous	Sydenham Lowlands: 166-8	**7.56**
	Stand Improvement – Upland Mixed	Bass Lake: 102-13 Rockford: 155-2	**47.66**
	Stand Improvement – Lowland Mixed	Kolapore Uplands: 93-8	**1.83**
		Total Area	**654.49**

Forest Renewal

Most GSCA properties have been planted to trees; however, some agricultural properties may be available for planting over time. Each planting site will be evaluated to determine the most appropriate species that should be planted. A mixture of tree species (white and/or red pine, white and/or Norway spruce, and European larch will be planted on upland well drained sites while white cedar, tamarack, or silver maple will be planted on poorly drained sites. Small quantities of hardwood species such as white and/or red oak, sugar maple, black walnut, and black cherry, may also be mixed into plantings to add diversity.

GSCA will pre-spray planting sites to obtain more effective vegetation control. As much as possible, trees will be planted using 8' x 8' spacing. This spacing is larger than earlier plantations which were planted at a 6' x 6' or 6' x 8' spacing. By increasing the spacing, more ground is covered with less trees which results in lower establishment costs, plus it provides more maneuvering room at the first thinning. If sites are not pre-sprayed, simazine or round-up is sprayed after planting at appropriate rates for soil conditions to control competing vegetation. Tree survival is checked in the first, second and fifth year to determine if any refill is required and ensure that the trees are well established.

Tending Activities

Pruning

Many GSCA plantations have had lower limbs pruned to improve future tree quality. White pine trees are also pruned to control insect or disease problems and correct form. Crop trees are selected and eventually pruned to 17 feet. In younger plantations, GSCA will prune all trees of good quality as time and money permit, so that there will be a good selection of future crop trees.

Plantation Thinning

GSCA plantations are targeted for a first thinning at about 30 years of age. The first thinning is often systematic, with every fourth row removed followed by selective thinning in the remaining three rows. When rows are not evident access must be forced through the stand while maintaining the desired spacing between rows. A maximum of 33% of the existing basal area will be removed in one thinning. Ideally the best quality trees will be retained and the smaller diameter, poorly formed and diseased trees will be removed. Subsequent thinnings will be applied 10 to 15 years after the first thinning. Second thinning will usually involve a selective thinning as access will have already been established. Thinning from below or low thinning targets the lower crown classes in the stand which are usually the smaller diameter and suppressed trees. The second thinning should remove all or most of the poor quality trees. Subsequent thinnings should produce high quality sawlog sized products. A maximum of 33% of the basal area will be removed in any subsequent thinning. Density Management Diagrams may be used to determine the optimum timing for subsequent thinning operations. Natural regeneration will be ongoing as the stand matures and careful logging practices will need to be employed to ensure minimal damage to the residual stand. A plantation will usually support three and sometimes four thinnings before the conversion to a mixed natural stand is complete. The final harvest should retain some residual conifers to add diversity to the stand.

Harvesting Procedures

GSCA will continue to conduct stand improvement and harvesting operations on the properties identified for management. The forest products produced from these activities will include all grades of sawlogs plus firewood, posts, poles and pulpwood. Forest products from all activities will be sold by tender, and the revenues generated will be used to offset GSCA's forestry program expenses and other GSCA projects.

Management Prescriptions

GSCA will prepare prescriptions for properties identified for management. The prescription will indicate the location – compartment number and stand number, and the timing of the operation to be completed. The prescription will also indicate the specific short-term and long-term silvicultural objectives identified for this stand. All prescriptions will be approved by a full member or associate member of the Ontario Professional Foresters Association.

GSCA prescriptions will identify any AOC's identified during the inventory process. The prescription will indicate the implications for management such as establishing 'no cutting' reserves, modifying operations through the placement of restrictions or special conditions on the operation or proceeding with a regular operation. The prescription will take into consideration the high conservation value forests (HCV's) that have been identified in the HCV report submitted as part of the forest certification process. GSCA staff will identify HCV's within compartments that are ready for management. GSCA will monitor the effectiveness of the measures being employed for their maintenance and/or restoration. The HCV report is found in Appendix F.

The prescription will record the actual Basal Area along with the amount of Basal Area to cut from each size class. It will also indicate who prepared the prescription, who marked the stand, and the approximate timing of the next operation.

Tree Marking
GSCA will use certified tree markers to mark their forest stands. Prior to any marking being started, the property boundaries will be identified and marked. The adjacent landowners will be notified, especially where the property boundary is unclear. The trees to be harvested will be marked with tree paint (i.e. orange, blue, etc.). All trees will be marked with a butt mark, and a slash for firewood or a dot for sawlogs. A standing volume will be estimated from the marked trees, and the operation will be tendered.

Tender Sale Process
GSCA will sell all forest products by tender. A tender notice will be placed in local papers. Tender packages will be prepared and sent out to interested operators. These tender packages will include a map showing the location of the stand, the type of operation, the species and number of trees marked, an estimated volume, an agreement outlining the terms and conditions of the sale, and the tender closing date. Tenders will be awarded by GSCA's Board of Directors. Small volumes of wood products, less than $3,000.00 in value, may be sold directly to interested buyers.

Agreements
Once a tender has been awarded, and prior to any operations beginning on GSCA lands, the successful bidder will be required to sign an agreement which will outline the Terms and Conditions of the sale. As part of the agreement, the successful bidder will be allowed one year to complete the operation. Full payment must be made prior to starting any operation. Any changes in completion dates or payment schedules must be approved by the Authority at which time a new agreement would be signed. An example of GSCA's agreement has been included in this forest management plan as Appendix H.

The agreement will include the location of the operation, details of the sale, and the general terms and conditions of the sale. The location of the operation will include such information as the compartment number, stand number, lot, concession, municipality (former township), and County. The details of the sale will include the species, number of trees marked, and standing volume estimate; purchase price and payment schedule; details on paint colour, butt marks, maximum stump heights; the length of the operating period; and the signatures of both parties. The general terms and conditions section of the agreement includes the purchaser's responsibilities; GSCA's responsibilities; shared responsibilities, and any special provisions.

The Purchaser will be responsible for providing liability and property damage insurance coverage; WSIB insurance; compliance with all municipal, provincial and federal statutes; and a hold harmless clause. The Purchaser will also be responsible for following all GSCA terms and conditions in regards to chemicals, containers, liquid and solid non-organic wastes including fuel and oil and any accidents or spills that may occur during the operation. The agreement will also contain a clause regarding the assignment of an agreement to a third party.

The purchaser will be responsible for notifying GSCA about intended start dates; ensuring safety during the operation; using sound forestry practices when felling, skidding, and processing trees to minimize the damage to residual trees and the site; maintaining skid trails and landings; and ceasing operations during unsuitable periods. It will also be the purchaser's responsibility to remove garbage and debris from logging roads and report suspected incidences of theft or trespass at the site.

GSCA will be responsible for allowing extensions or refunds, determining the timing of operations, and establishing tolerance limits for damage to remaining trees and the site. GSCA will also be

responsible for issuing work stoppages, setting penalties for unauthorized cutting and/or requiring restoration of a site.

GSCA will also monitor all operations, terminate an Agreement if necessary, and determine an operator's eligibility for future contracts.

GSCA and the purchaser will share responsibility for costs associated with access improvements, installing culverts, and determining the locations of landings or new skid trails.

The agreement will also indicate any special provisions relating to the operation such as identifying Areas of Concern and any restrictions on an operation.

Timing of Operations
To minimize damage to residual trees during actively growing periods and disturbances to wildlife nesting activities, GSCA will schedule all operations between August and March of each year depending upon weather conditions. All operations will be suspended during unsuitable periods (i.e. heavy rain events). GSCA may place further restrictions on the timing of operations in an AOC. For example, an operation may be modified to occur in winter only or when a nesting period is over.

Access
Many properties already have established roads which will be used when conducting forest management operations. Where necessary, new roads will be established or culverts installed as a shared cost with the operator.

Roads will be designed in conjunction with the operator, to minimize the potential for erosion, rutting, compaction, and damage to residual trees. Operators will be required to maintain roads free of logging debris. At the end of an operation, roads must be left in the same or better condition.

Occasionally, it will be necessary to access a property through an adjacent landowner.

Landing Areas
GSCA will establish and maintain landing areas limited in size in easy-to-access, logical locations minimizing negative environmental impacts. Landings will be established in conjunction with the operator and kept clear of garbage and debris.

Skidding
GSCA will require operators to adhere to a maximum log skidding length of 24 feet and to use marked 'bumper' trees along skid trails to avoid damage to remaining trees.

Felling
GSCA will ensure that operators fell trees in a responsible manner away from recognized trails, property boundaries, and water which will minimize damage to the residual stand and regeneration. Tops will be processed where they lay unless an operator can demonstrate that they can be removed with minimal damage to the residual stand.

Safety
GSCA will ensure that operators comply with all Municipal By-laws and Provincial regulations such as the Trees Act, Worker's Compensation Act, and Occupational Health & Safety Act. GSCA staff will also adhere to GSCA's Health and Safety Policy and Work Place Procedures.

Penalties

GSCA has set penalties for any unauthorized cutting on GSCA properties and/or requirements for restoration measures. The penalty is $1,000.00 plus the value of the tree or recovery of all costs plus the value of the tree, whichever is greater.

Public Notification / Signage

GSCA will keep a notice of all active operations at the front desk in the office and post signs warning of forestry operations at all entrances. In some instances, trails may be closed to the public until the operation is completed.

Monitoring

GSCA will monitor all operations on all properties on a regular basis. An initial site inspection will be set up to mutually agree on landing areas and main skid trails. Once the operation is underway, a cut inspection form is used to track the progress of operations and pinpoint potential problems. The cut inspection form records residual basal area, stand and site damage, number of skid trails, and also checks for butt marks. Table 27 indicates the Minimum Acceptable Damage Standards and the Criteria used for assessing both logging damage and site damage. An operator will be notified immediately of any infractions. Cut inspection reports will be recorded and made available to the public upon request. Conflicts will be resolved at the staff level as much as possible.

Forest Protection

GSCA forestry staff will monitor most of their forest areas on a yearly basis. Any forest health concerns will be noted and passed along to the Forest Health Monitoring Technician for the Ontario Ministry of Natural Resources. Each fall, staff will attend the annual forest health review which provides forestry workers with information on current forest health problems.

Insects

It may be necessary for GSCA to protect some forests from insect pests such as the forest tent caterpillar. There are also some new insect threats on the horizon which will be monitored closely. The Emerald Ash Borer has invaded southern Ontario, killing ash trees. These insect pests could cause significant tree mortalities and loss of revenue if GSCA's forests are infested.

White pine weevil has caused problems in many of GSCA's white pine plantations. A program of pruning and burning infected leaders plus pruning to correct form has been on-going for many years in young plantations.

Pine false webworm has also caused defoliation of white pine trees in localized areas.

Diseases

Eutypella canker *Eutypella parasitica* (R.W. Davidson & R. C. Lorenz) is very common in many hardwood forests in GSCA's watersheds. Trees with this disease are targeted for removal during improvement operations.

Nectria canker *Nectria galligena* (Bres.) is another common fungal disease which infects several species of hardwood trees. Non-retainable trees with this canker are targeted for removal during improvement operations. A GPS reading will be taken where healthy butternut trees are found.

Butternut is listed as an endangered species. Many trees in this area have been killed by Butternut canker *Sirococcus clavigignenti-juglandacearum* (V.M.G. Nair, Kostichka & Kuntz). When butternut trees are found on GSCA properties, they will be assessed, and the location of healthy trees will be recorded with a GPS unit.

Beech bark disease is a combination of a scale insect *Cryptococcus fagisuga* followed by an invasion of the nectria fungus, *Neonectria faginata* (Lohman, Watson & Ayers). This disease is killing our native beech trees. Trees with beech bark disease are targeted for removal during improvement operations.

White pine blister rust *Cronartium ribicola* (J.C. Fisch) is a disease problem in some GSCA plantations. Trees with white pine blister rust are targeted for removal during improvement operations.

Nuisance Wildlife
Occasionally, it may be necessary to protect trees by controlling wildlife activity such as beaver or porcupine through trapping or hunting.

Abiotic Agents
Abiotic agents such as frost, winter drying, snow loads, drought, high temperatures, high winds (tornadoes), and salt can cause tree damage or even tree mortality. Some GSCA white pine plantations have been affected by winter drying and/or road salt, although this type of damage has not usually been severe enough to kill trees. Early spring frosts will occasionally kill new growth.

Many GSCA hardwood forests on shallow soils have been affected by drought and increasingly high temperatures. Trees in these forests have shown signs of die-back and mortality. Tornadoes have periodically touched down in GSCA's watershed, causing wind throw and severe tree breakage in some forests, notably Williams Lake and Walters Creek Management Areas.

Table 27. Minimum Acceptable Damage Standards.

Minimum Acceptable Damage Standards	
Damage to Residual Trees	After harvesting, 85% of residual basal area (10 cm + DBH) should be free of major damage and 90% of Acceptable Growing Stock (AGS) should be free of major damage.
Damage to Regeneration	After harvesting, 85% of residual basal area (< 10 cm DBH) should be free of major damage.
Skid Trail Coverage	A minimum of 80% of the ground area to be free of skid trails. Main skid trail must be delineated. Parallel skid trails should be no closer than 60 metres apart.
Damage to Physical Environment	Trees felled over a watercourse. Debris not cleared. Major/Extreme Ruts are greater than 30 metres in length. No ruts should be deeper than 15 cm on spur trails. No ruts should be deeper than 30 cm on main skid trails.
Logging Damage Assessment Criteria	
Type of Damage	**Unacceptable Level of Damage**
Stem Wounds - Trees 10 – 31 cm DBH - Trees > 32 cm DBH	Gouging, scraping and peeling of the bark (can occur at the ground level due to skidding or higher in the tree as a result of felling impacts). Any wound greater than the square of the Diameter at Breast Height (DBH) – i.e. a 10 cm DBH tree – major wound is greater than 100 cm^2 Any wound greater than 1,000 cm^2 Note: If there is Ground Contact, a major wound is considered to be 60% of the size indicated for all size classes.
Broken Branches	More than 33% of the crown is destroyed.
Root Damage	More than 25% of the root area is exposed or severed.
Broken Stems	Primary stem or any other major limb is broken.
Uprooted Trees	More than one-half of tree roots are broken and/or exposed.
Girdled Trees	Area where bark has been removed encircles tree or is at least 50% of the circumference of the tree.
Leaning Tree	Tree is leaning 10 degrees or more because of logging damage.
Site Damage Assessment Criteria	
Type of Damage	**Unacceptable Level of Damage**
Skid Trail Ruts	Minor (acceptable) – ruts 15 cm or less in depth & < 30 metres in length. Moderate (unacceptable) – ruts 16 – 30 cm in depth & > 30 metres in length. Major (unacceptable) – ruts 31 – 60 cm in depth & > 30 metres in length. Extreme (unacceptable) – ruts > 61 cm in depth & > 30 metres in length.
Excessive Number of Skid Trails	Skid trails less than 60 metres apart.
Logging Debris	No tops blocking trails. No debris leaning against any trees. No limbs or tree tops left higher than 1 metre above the ground. No logs that have slipped out of the choker and are lying on the trail.
Excessive Skid Trail Width	No skid trail wider than 3 metres (10 feet).

Wildlife Habitat Considerations

GSCA tree markers will adhere to the following wildlife habitat guidelines taken from A Silvicultural Guide to Managing Southern Ontario Forests (OMNR, 2000) and the Forest Management Guide for Conserving Biodiversity at the Stand and Site Scales (OMNR, 2010):

Amphibian Breeding Ponds

Maintain integrity of amphibian breeding ponds and surrounding amphibian summer forest habitat. Maintain downed woody debris and a closed canopy around amphibian breeding ponds to ensure that the moisture regime remains constant. Activities should not sever travel corridors from breeding ponds to summer habitat. Logging roads should be located at least 20 m from potential breeding ponds.

Cavity Trees

Retain an average of ≥ 10 living cavity trees or large stubs/ha with a minimum of 5 living cavity trees on each ha of at least 25 cm DBH. Give preference to trees that will last at least 25 years with holes in the upper bole, are ≥ 38 cm DBH, and have multiple benefits for a wide variety of wildlife species. Retain cavity trees in the following order of priority:

- Pileated woodpecker roost or nest trees,
- Swift roost cavities
- trees with cavities of other woodpeckers or natural nest or den cavities,
- escape cavities
- trees with feeding excavations,
- trees with the potential to develop cavities.

Downed Woody Debris (DWD)

Process tree tops and branches at the felling site. Downed trees (or parts of trees) present prior to harvest will be left on site. Do not disturb large rotting and hollow logs. Ensure skid trails are laid out to minimize damage to downed woody debris and organic soils.

Forest Fragmentation

Retain 70% canopy closure in core forest areas. Maintain overall forest area.

Forest Interior Habitat

Where possible, retain clumps of larger diameter trees for forest interior bird species, especially if the stand is part of a core forest area with more than 40 ha of forest interior. Avoid forestry activities during the breeding season (March 20 to August 31)(OMNR, 2000).

Mast Trees

Retain an average of ≥ 10 healthy, mature mast trees/ha with a DBH > 25 cm. Good mast species include beech, oak, basswood, black cherry, butternut, and any ironwood at least 10 cm DBH. Give preference to trees ≥ 38 cm DBH.

Seeps, Springs and Streams

Retain high canopy closure, at least 70% around seeps, springs, and streams. Avoid marking trees that will fall into these areas. Trees accidentally felled into these areas will be left where they fall. Avoid locating roads or landings in these areas or crossing these areas with heavy equipment.

Snags
Leave as many snags as possible exhibiting various stages of decay. Retain at least four smaller (<50 cm DBH) and one larger snag (>50 cm DBH) for a total of 5 snags/ha, keeping in mind the regulations of the Occupational Health and Safety Act and the need to maintain safe trails on GSCA properties.

Stick Nests
Retain all trees with stick nests. If a nest is active, retain surrounding trees within a radius of 150 metres. Schedule harvesting activities between August and the end of February. Retain at least 70% canopy closure. Avoid locating roads or landings within 200 metres of stick nests. If species can be identified, follow species specific guidelines found in the Stand and Site Guide.

Supercanopy Trees
Retain at least one supercanopy tree ≥60 cm DBH (preferably a cluster of three) per four ha. White Pine or Hemlock are preferred supercanopy trees. Around wetlands, try to retain at least one supercanopy tree (pine, hemlock or spruce) per 500 m of shoreline.

Scattered Conifers
Scattered conifers are very valuable to wildlife. Retain an average of ≥ 10 scattered coniferous trees/ha. If there are less than ten conifers/ha remove conifers only if they are high risk trees. Preference is given to long lived, large diameter, highly vigorous trees.

Receational Considerations
Several recreational groups have agreements for the use of trails on different GSCA properties. When forest management activities are scheduled for a stand, all groups involved with that property will be notified, and the operations will be timed so that disruptions of recreational uses are minimized. Occasionally, it will be necessary to close trails during forest management operations.

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