Northern Superior Uplands

Section Forest Resources Management Plan

Preliminary Issues and Assessment Chapter 9: Appendices to the Assessment

MNDNR

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Northern Superior Uplands SFRMP
Information about the Section Resource Management Plan (SFRMP) process can be found at:
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Appendices to the Northern Superior Uplands SFRMP

Appendix A: Background on DNR Forest Inventory

The Minnesota Department of Natural Resources (DNR) uses a forest stand mapping and information system to classify the approximately 5 million acres (7,800 sq. mi.) owned and administered by the state. The system is designed to be a coarse classification of forest stands adequate to guide management decisions. It is commonly referred to as the "forest inventory".

The forest inventory system maps the boundaries and tabulates the contents of all forest stands five acres and larger on state-owned land. A forest stand is a group of trees uniform enough in composition to be managed as a unit. Boundaries are drawn by interpretation of aerial photographs. All other stand data are collected in the field on plots within each stand and boundaries may be adjusted at the time of the field visit.

The general descriptive term for the content of a stand is "cover-type". Although cover-types commonly bear the name of the primary tree species, they are usually an association of multiple tree species along with shrubbery and herbaceous plants.

When it originated in 1952, the forest inventory was called the Cooperative Stand Assessment (CSA) and was based on pencil-drawn maps with a computer punch-card database. Over the years, the system matured into a geographic information system (GIS) database accessible to DNR forest managers online. Forest inventory is now managed using a computer program called the Forest Inventory Module (FIM). Consequently, the inventory is now referred to as "FIM" rather than "CSA".

FIM data are not compatible with the previous CSA layers. FIM follows an internal DNR Division of Forestry classification and attribute-coding scheme not used by CSA. Also, comparisons between past inventory data (CSA) and current conditions (FIM) encounter some difficulty due to CSA stands being limited by Public Land Survey (PLS) section lines. This limitation does not exist with FIM data and stand boundaries can extend all the way to a township line if the stand characteristics warrant it.

The accuracy of forest inventory is limited by the method used to establish stand boundaries. Features are digitized on screen over standard electronic topographical maps [24k Digital Raster Graphic (DRG) images] and electronic aerial photography [USGS Digital Orthophoto Quads (DOQs)] and inherit the horizontal positional accuracy of these products.

FIM allows foresters to update data as changes to stands occur due to the passage of time, natural events, or management activities. However, many stands do not receive field visits or re-measurement for 20 years or more if they are established but not approaching maturity. These stands have their age brought up-to-date by computer calculation, but other attributes such as volume, disease, and understory composition are not updated until a field visit. Attempts to model these attributes forward have met with some success, but they have not become standard practice.

Appendix B: Ecological Classification System (ECS)

Definition

The ECS is part of a nationwide mapping initiative developed to improve our ability to manage all natural resources on a sustainable basis.

ECS is a method to identify, describe, and map units of land with different capabilities to support natural resources. This is done by integrating climatic, geologic, hydrologic, and topographic, soil, and vegetation data.

In Minnesota, the classification and mapping is divided into six levels of detail. These levels are:

Province: Largest units representing the major climate zones in North America, each covering several states. Minnesota has three provinces: Eastern Broadleaf Forest, Northern Boreal Forest and Prairie.

Section: Divisions within provinces that often cross state lines. Sections are defined by the origin of glacial deposits, regional elevation, distribution of plants, and regional climate. Minnesota has 10 sections (e.g., Red River Valley).

Subsection: County-sized areas within sections that are defined by glacial land-forming processes, bedrock formations, local climate, topographic relief, and the distribution of plants. Minnesota has 24 subsections (e.g., Mille Lacs Uplands).

Land Type Associations are units within subsections that are defined using glacial landforms, bedrock types, topographic roughness, lake and stream distributions, wetland patterns, depth to ground water table, soil parent material, and pre-European settlement vegetation PDF. Minnesota has 291 land type associations. Though not described here, a GIS cover of land type associations is available on the DNR Data Deli http://deli.dnr.state.mn.us/index.html

Land Types are units within Land Type Associations that are defined using pre-European settlement vegetation PDF, historic disturbance regime, associations of native plant communities (the System level of Native Plant Community Classification), wetland distribution, and soil types. Land Type maps have been made for the Chippewa National Forest.

Land Type Phases are units within Land Types that are defined using a native plant community class, soil type, and topography. Land Type Phase maps exist for portions of the Chippewa National Forest and several State Parks.

Native Plant Community is a group of native plants that interact with each other and with their environment in ways not greatly altered by modern human activity or by introduced organisms. These groups of native plants form recognizable units, such as an oak forest, prairie, or marsh that tend to reoccur over space and time. Native plant communities are classified and described by physiognomy, hydrology, landforms, soils, and natural disturbance regimes (e.g., wild fires, wind storms, normal flood cycles).

Purpose of an Ecological Classification System

- Defines the units of Minnesota's landscape using a consistent methodology.
- Provides a common means for communication among a variety of resource managers and with the public.
- Provides a framework to organize natural resource information.
- Improves predictions about how vegetation will change over time in response to various influences.
- Improves our understanding of the interrelationships between plant communities, wildlife habitat, timber production, and water quality.

End Products

- Maps and descriptions of ecological units for provinces through land types.
- Field keys and descriptions to determine which communities are present on a parcel of land.
- Applications for management for provinces through communities.
- Mapping of province, section, subsection, and land-type association boundaries is complete throughout Minnesota (See map on next page).

Figure 9.1: Ecological Provinces, Sections, and Subsections of Minnesota, 1999

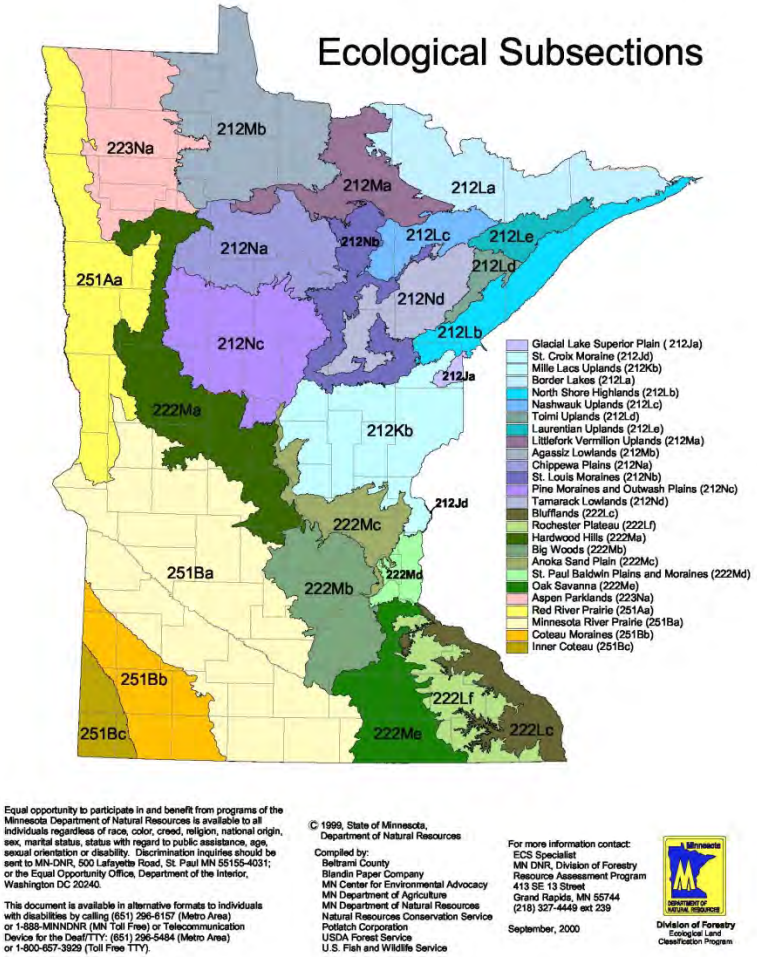

Table 9.1. Native Plant Communities in the Northern Superior Uplands

Native Plant Community Name	*Community Code*	*State Conservation Rank*
Northern Spruce Bog	**APn80**	
Black Spruce Bog	APn80a	S4
Treed Subtype	*APn80a1*	*S4*
Semi-Treed Subtype	*APn80a2*	*S4*
Northern Poor Conifer Swamp	**APn81**	
Poor Black Spruce Swamp	APn81a	S5
Poor Tamarack - Black Spruce Swamp	APn81b	S4
Black Spruce Subtype	*APn81b1*	*S4*
Tamarack Subtype	*APn81b2*	*S4*
Northern Open Bog	**APn90**	
Low Shrub Bog	APn90a	S4S5
Graminoid Bog	APn90b	S2 or S4
Typic Subtype	*APn90b1*	*S4*
Northern Poor Fen	**APn91**	
Low Shrub Poor Fen	APn91a	S5
Graminoid Poor Fen (Basin)	APn91b	S3
Graminoid Poor Fen (Water Track)	APn91c	S3 or S4
Featureless Water Track Subtype	*APn91c1*	*S4*
Flark Subtype	*APn91c2*	*S3*
Northern Dry Cliff	**CTn11**	

Native Plant Community Name	*Community Code*	*State Conservation Rank*
Dry Mafic Cliff (Northern)	CTn11a	S4
Dry Rove Cliff (Northern)	CTn11b	S2
Dry Felsic Cliff (Northern)	CTn11d	S3
Northern Open Talus	**CTn12**	
Dry Open Talus (Northern)	CTn12a	S3
Mesic Open Talus (Northern)	CTn12b	S2
Northern Scrub Talus	**CTn24**	
Dry Scrub Talus (Northern)	CTn24a	S3
Mesic Scrub Talus (Northern)	CTn24b	S3
Northern Mesic Cliff	**CTn32**	
Mesic Mafic Cliff (Northern)	CTn32a	S3
Mesic Rove Cliff (Northern)	CTn32b	S3
Mesic Thomson Cliff (Northern)	CTn32c	S2
Mesic Felsic Cliff (Northern)	CTn32d	S1
Northern Wet Cliff	**CTn42**	
Wet Mafic Cliff (Northern)	CTn42a	S2
Wet Rove Cliff (Northern)	CTn42b	S1
Wet Felsic Cliff (Northern)	CTn42c	S1
Wet Sandstone Cliff (Northern)	CTn42d	S1
Lake Superior Cliff	**CTu22**	
Exposed Mafic Cliff (Lake Superior)	CTu22a	S3

Native Plant Community Name	*Community Code*	*State Conservation Rank*
Exposed Felsic Cliff (Lake Superior)	CTu22b	S2
Sheltered Mafic Cliff (Lake Superior)	CTu22c	S1
Central Dry-Mesic Pine-Hardwood Forest	**FDc34**	
Red Pine - White Pine Forest	FDc34a	S2
Northern Dry-Sand Pine Woodland	**FDn12**	
Red Pine Woodland (Sand)	FDn12b	S2
Northern Dry-Bedrock Pine (Oak) Woodland	**FDn22**	
Jack Pine Woodland (Bedrock)	FDn22a	S3
Red Pine – White Pine Woodland (Northeastern Bedrock)	FDn22b	S3
Pin Oak Woodland (Bedrock)	FDn22c	S3
Northern Poor Dry-Mesic Mixed Woodland	**FDn32**	
Red Pine - White Pine Woodland (Canadian Shield)	FDn32a	S3
Red Pine – White Pine Woodland (Minnesota Point)	FDn32b	S1
Black Spruce - Jack Pine Woodland	FDn32c	S2 or S3
Jack Pine - Balsam Fir Subtype	*FDn32c1*	*S2*
Black Spruce - Feathermoss Subtype	*FDn32c2*	*S3*
Jack Pine – Black Spruce – Aspen Subtype	*FDn32c3*	*S3*
Jack Pine - Black Spruce Woodland (Sand)	FDn32d	S2
Spruce - Fir Woodland (North Shore)	FDn32e	S1
Northern Dry-Mesic Mixed Woodland	**FDn33**	
Red Pine - White Pine Woodland	FDn33a	S3

Native Plant Community Name	*Community Code*	*State Conservation Rank*
Balsam Fir Subtype	*FDn33a1*	*S3*
Mountain Maple Subtype	*FDn33a2*	*S3*
Aspen - Birch Woodland	FDn33b	S5
Black Spruce Woodland	FDn33c	S2
Northern Mesic Mixed Forest	**FDn43**	
White Pine - Red Pine Forest	FDn43a	S2
Aspen - Birch Forest	FDn43b	S5
Balsam Fir Subtype	*FDn43b1*	S5
Hardwood Subtype	*FDn43b2*	S5
Upland White Cedar Forest	FDn43c	S3
Northern Terrace Forest	**FFn57**	
Black Ash - Silver Maple Terrace Forest	FFn57a	S3
Northern Floodplain Forest	**FFn67**	
Silver Maple - (Sensitive Fern) Floodplain Forest	FFn67a	S3
Northern Rich Spruce Swamp (Basin)	**FPn62**	
Rich Black Spruce Swamp (Basin)	FPn62a	S3
Northern Cedar Swamp	**FPn63**	
White Cedar Swamp (Northeastern)	FPn63a	S4
White Cedar Swamp (Northcentral)	FPn63b	S3
Northern Rich Spruce Swamp (Water Track)	**FPn71**	
Rich Black Spruce Swamp (Water Track)	FPn71a	S3

Native Plant Community Name	*Community Code*	*State Conservation Rank*
Northern Rich Tamarack Swamp (Eastern Basin)	**FPn72**	
Rich Tamarack Swamp (Eastcentral)	FPn72a	S3
Northern Rich Alder Swamp	**FPn73**	
Alder - (Maple - Loosestrife) Swamp	FPn73a	S5
Northern Rich Tamarack Swamp (Water Track)	**FPn81**	
Northern Rich Tamarack Swamp (Western Basin)	**FPn82**	
Rich Tamarack - (Alder) Swamp	FPn82a	S5
Extremely Rich Tamarack Swamp	FPn82b	S4
Southern Rich Conifer Swamp	**FPs63**	
Tamarack Swamp (Southern)	FPs63a	S2S3
Inland Lake Sand/Gravel/Cobble Shore	**LKi32**	
Sand Beach (Inland Lake)	LKi32a	S1
Gravel/Cobble Beach (Inland Lake)	LKi32b	S2
Inland Lake Rocky Shore	**LKi43**	
Boulder Shore (Inland Lake)	LKi43a	S4
Bedrock Shore (Inland Lake)	LKi43b	S4
Inland Lake Clay/Mud Shore	**LKi54**	
Mud Flat (Inland Lake)	LKi54b	S3
Non-Saline Subtype	*LKi54b2*	*S3*
Lake Superior Sand/Gravel/Cobble Shore	**LKu32**	
Beachgrass Dune (Lake Superior)	LKu32a	S1

Native Plant Community Name	*Community Code*	*State Conservation Rank*
Juniper Dune Shrubland (Lake Superior)	LKu32b	S1
Sand Beach (Lake Superior)	LKu32c	S1
Beach Ridge Shrubland (Lake Superior)	LKu32d	S2
Gravel/Cobble Beach (Lake Superior)	LKu32e	S4
Lake Superior Rocky Shore	**LKu43**	
Dry Bedrock Shore (Lake Superior)	LKu43a	S4
Wet Rocky Shore (Lake Superior)	LKu43b	S2
Cobble Subtype	*LKu43b1*	*S2*
Bedrock Subtype	*LKu43b2*	*S2*
Northern Mesic Hardwood Forest	**MHn35**	
Aspen - Birch - Basswood Forest	MHn35a	S4
Red Oak – Sugar Maple – Basswood (Bluebead Lily) Forest	MHn35b	S4
Northern Wet-Mesic Boreal Hardwood-Conifer Forest	**MHn44**	
Aspen - Birch - Red Maple Forest	MHn44a	S4
White Pine - White Spruce - Paper Birch Forest	MHn44b	S2
Aspen - Fir Forest	MHn44c	S3S4
Aspen - Birch - Fir Forest	MHn44d	S3
Northern Mesic Hardwood (Cedar) Forest	**MHn45**	
Paper Birch – Sugar Maple Forest (North Shore)	MHn45a	S4
White Cedar – Yellow Birch Forest	MHn45b	S2

Native Plant Community Name	*Community Code*	*State Conservation Rank*
Sugar Maple Forest (North Shore)	MHn45c	S3
Northern Wet-Mesic Hardwood Forest	**MHn46**	
Aspen - Ash Forest	MHn46a	S4
Black Ash - Basswood Forest	MHn46b	S4
Northern Rich Mesic Hardwood Forest	**MHn47**	
Sugar Maple - Basswood - (Bluebead Lily) Forest	MHn47a	S3
Northern Mixed Cattail Marsh	**MRn83**	
Cattail - Sedge Marsh (Northern)	MRn83a	S2
Cattail Marsh (Northern)	MRn83b	S2
Northern Bulrush-Spikerush Marsh	**MRn93**	
Bulrush Marsh (Northern)	MRn93a	S3
Spikerush - Bur Reed Marsh (Northern)	MRn93b	S2
Lake Superior Coastal Marsh	**MRu94**	
Estuary Marsh (Lake Superior)	MRu94a	S1
Northern Shrub Shore Fen	**OPn81**	
Bog birch - Alder Shore Fen	OPn81a	S5
Leatherleaf – Sweet Gale Shore Fen	OPn81b	S5
Northern Rich Fen (Water Track)	**OPn91**	
Shrub Rich Fen (Water Track)	OPn91a	S4
Graminoid Rich Fen (Water Track)	OPn91b	S2 or S3
Featureless Water Track Subtype	*OPn91b1*	*S3*

Native Plant Community Name	*Community Code*	*State Conservation Rank*
Flark Subtype	*OPn91b2*	*S2*
Northern Rich Fen (Basin)	**OPn92**	
Graminoid Rich Fen (Basin)	OPn92a	S4
Graminoid - Sphagnum Rich Fen (Basin)	OPn92b	S4
Northern Bedrock Outcrop	**ROn12**	
Sandstone Outcrop (Northern)	ROn12a	S2
Crystalline Bedrock Outcrop (Northern)	ROn12b	S4
Northern Bedrock Shrubland	**ROn23**	
Bedrock Shrubland (Inland)	ROn23a	S3
Bedrock Shrubland (Lake Superior)	ROn23b	S1
Sand/Gravel/Cobble River Shore	**RVx32**	
Willow Sandbar Shrubland (River)	RVx32a	S4
Sand Beach/Sandbar (River)	RVx32b	S3
Permanent Stream Subtype	*RVx32b2*	*S2*
Gravel/Cobble Beach (River)	RVx32c	S3
Permanent Stream Subtype	*RVx32c2*	*S3*
Rocky River Shore	**RVx43**	
Bedrock/Boulder Shore (River)	RVx43a	S3
Intermittent Streambed Subtype	RVx43a1	*S3*
Permanent Stream Subtype	RVx43a2	*S3*
Clay/Mud River Shore	**RVx54**	

Native Plant Community Name	*Community Code*	*State Conservation Rank*
Slumping Clay/Mud Slope (River)	RVx54a	S2
Clay/Mud Shore (River)	RVx54b	S3
Permanent Stream Subtype	*RVx54b2*	*S3*
Northern Wet Cedar Forest	**WFn53**	
Lowland White Cedar Forest (North Shore)	WFn53a	S4
Lowland White Cedar Forest (Northern)	WFn53b	S3
Northern Wet Ash Swamp	**WFn55**	
Black Ash - Aspen - Balsam Poplar Swamp (Northeastern)	WFn55a	S4
Black Ash - Mountain Maple Swamp (Northern)	WFn55c	S4
Northern Very Wet Ash Swamp	**WFn64**	
Black Ash - Conifer Swamp (Northeastern)	WFn64a	S4
Black Ash - Alder Swamp (Northern)	WFn64c	S4
Northern Wet Alder Swamp	**WFn74**	
Alder - (Red Currant – Meadow Rue) Swamp	WFn74a	S3
Northern Wet Meadow/Carr	**WMn82**	
Willow - Dogwood Shrub Swamp	WMn82a	S5
Sedge Meadow	WMn82b	S4 or S5
Bluejoint Subtype	*WMn82b1*	*S5*
Beaked Sedge Subtype	*WMn82b3*	*S4*
Lake Sedge Subtype	*WMn82b4*	*S5*

Appendix C: Land Type Associations in the Northern Superior Uplands Section

Brief Descriptions and Boundary Documentation of Land Type Associations in the Northern Superior Uplands Section of the Laurentian Mixed Forest Province (212)

What are LTAs? National Hierarchy

A Land Type Association (LTA) is an area of land with common characteristics such as glacial landform, depth to bedrock, bedrock type, topographic roughness, pre-European settlement vegetation, and surface water features (lakes, streams, and wetlands) or combinations of the above occurring in repeating patterns. LTAs were delineated at a scale of 1:100,000. The size of map units ranges from 10,000 acres to 2,000,000 acres.

In theory, LTA concepts emphasize the interrelationships of biological and physical features. These interrelationships are discovered by overlaying single-theme maps of biotic and abiotic features and observing how patterns coincide. Landform maps are often a starting point for LTAs because they often integrate many of the individual features that show coincident pattern and reasonably explain spatial variations in physical characteristics of the landscape such as topography and soil material at this scale. These characteristics also strongly influence micro climate, surface and subsurface hydrologic characteristics, and historic disturbance regimes.

In practice, LTA definitions in province 212 and 251 were heavily biased by abiotic features; particularly glacial landforms and soil parent material. In province 223 and 222, pre-European settlement vegetation was used together with abiotic features.

Review process:

At the current time there is no formal review process in place within the DNR for revising LTA boundaries or names. Feedback from you, the user, will hopefully improve the probability that a future revision will take place. Proposed changes are being collected and archived in anticipation of a revision. Proposed changes should be sent to:

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Notes:

The percentage figures (based on acres) given for each topic, uplands/wetlands/lakes, soils, and presettlement vegetation will not always agree with one another. This is due to differences in resolution among the covers used. Of the three, the mnwet cover has the best resolution, however in some landforms the wetland-upland distinction is suspect. In landscapes where agriculture exists, the differences in wetland/upland percentages also reflect drainage practices. Direct comparison of the relative abundance of wetlands historically and now with these covers would be shaky because of resolution differences.

Province 212 – Laurentian Mixed Forest -- Subsection 212La - Border Lakes (Updated 2-18-00)

La07. Johnson Lake Bedrock Complex - 149,185 acres

Concept: This LTA is characterized by thin deposits of Rainy Lobe till over bedrock. The dominant bedrock type is the Vermilion Granite (migmatite) formation. Uplands occupy 75%, wetlands occupy 17%, and lakes occupy 8% of the LTA (MN DNR, 1998). There are 175 miles of streams. The terrain is steep and irregular. Bedrock outcrops are present on 75-100% of the area. Most soils have gravelly sandy loam or loam textures (NRCS, 1994). Hardpans in the subsoil are common. Clayey or silty sediment from the Koochiching Lobe &/or Lake Agassiz are present at lower elevations.

The presettlement vegetation was mixture of mixed white and red pine (42%), jack pine barrens (22%), and aspen-birch-conifer (22%) with minor amounts of conifer bog and swamp (6%) (Marschner, 1974).

La08 Lac LaCroix Bedrock Complex - 145,617 acres

Concept: This LTA is characterized by thin Rainy Lobe sediment over bedrock. The dominant bedrock type is Lac La Croix granite. Uplands occupy 66%, wetlands occupy 12%, and lakes occupy 22% of the LTA (MN DNR, 1998). There are 82 miles of streams. The terrain is steep and irregular. Bedrock outcrops are present on 75-100% of the area. Most soils have gravelly sandy loam or loam textures (NRCS, 1994). Hardpans in the subsoil are common.

The presettlement vegetation was mixture of mixed white and red pine (39%), jack pine barrens (25%), and aspen-birch-conifer (12%) with minor amounts of conifer bog and swamp (2%) (Marschner, 1974).

La09 Voyageurs Bedrock Complex - 198,827 acres

Concept: This LTA is characterized by a complex of large lakes and bedrock-controlled uplands with thin soils. The bedrock type is Vermilion Granite group, schist-rich migmatite. Uplands occupy 45%, wetlands occupy 11%, and lakes occupy 44% of the LTA (MN DNR, 1998). Bedrock outcrops are present over 75-100% of the area. Most soils have gravelly sandy loam or loam textures (NRCS, 1994). Hardpans in the subsoil are common. Clayey and silty soils, from the Koochiching Lobe and/or Lake Agassiz, are present at lower elevations, particularly in the west half.

The presettlement vegetation was mixture of jack pine barrens (20%), mixed white and red pine (20%), and aspen-birch-conifer (10%) with minor amounts of wet sedge meadow(2%) and conifer bog and swamp (1%) (Marschner, 1974).

La11 Swamp River Till Plain - 42,562 acres

Concept: This LTA is characterized by thick soils over bedrock. The bedrock is predominantly North Shore Volcanic Group basalt. Uplands occupy 69%, wetlands occupy 28%, and lakes occupy 3% of the LTA (MN DNR, 1998). The bedrock-controlled landscape has nearly level to gently rolling terrain; deposits of Rainy Lobe till and clayey lake sediments over bedrock. A variety of soil parent material is present. Textures include: sandy loam over bedrock (38%), silt loam or loam over sandy loam with a hardpan (25%), clay (22%), and acid peat (15%) (NRCS, 1994).

The presettlement vegetation was mixture of Conifer Bog and Swamp (50%), Mixed White and Red Pine (25%), and Aspen-Birch-Conifer (spruce-fir) (22%) (Marschner, 1974).

La13. Gabbro Lake Bedrock Complex - 453,589 acres

Concept: This LTA is characterized by thin soils over bedrock. The dominant bedrock type is Duluth Gabbro complex. Uplands occupy 71%, wetlands occupy 16%, and lakes occupy 13% of the LTA (MN DNR, 1998). The terrain is rolling to steep. Bedrock outcrops are present over 75-100% of the area. Faults are very common. Most soils have gravelly sandy loam or loam textures (NRCS, 1994). Hardpans are absent from the subsoil in the western two thirds of the LTA.

The presettlement vegetation was mixture of Aspen-Birch-Conifer (spruce-fir) (32%), Jack Pine Barrens (27%), Aspen-Birch-Hardwood (18%), Mixed White and Red Pine (9%) with minor amounts of Conifer Bog and Swamp (6%) (Marschner, 1974).

La14. Rove Slate Bedrock Complex - 81,995 acres

Concept: This LTA is characterized by thin soils over bedrock. The bedrock is a complex of the Virginia graywacke formation and Rove slate formation. Uplands occupy 71%, wetlands occupy 5%, and lakes occupy 24% of the LTA (MN DNR, 1998). Bedrock outcrops are present over 75-100% of the area. The terrain is steep with prominent east-west oriented ridges due to eroded bedrock faults. Most soils have gravelly sandy loam or loam textures (NRCS, 1994). Hardpans in the subsoil are common.

The dominant presettlement vegetation was Mixed White and Red Pine (66%) with minor amounts of Aspen-Birch-Conifer (pine) (11%) (Marschner, 1974).

La15. Trout Lake Bedrock Complex - 404,780 acres

Concept: This LTA is dominated by thin soils over bedrock. The bedrock is predominantly the Vermilion granitic complex formation. Uplands occupy 70%, wetlands occupy 17%, and lakes occupy 13% of the LTA (MN DNR, 1998). Bedrock outcrops are present over 75-100% of the area. The bedrock-controlled terrain has steep and irregular slopes. This LTA contains the highest point in elevation of the surrounding area. Most soils have gravelly sandy loam or loam textures (NRCS, 1994). Hardpans in the subsoil are common. Scattered inclusions of deep outwash sand occur. Gray clayey material (Koochiching Lobe or Lake Agassiz origin) is occasionally present in lower elevations.

The presettlement vegetation was mixture of Jack Pine Barrens (34%), Mixed White and Red Pine (24%), Aspen-Birch-Conifer (pine) (18%), and Conifer Bog and Swamp (12%) (Marschner, 1974).

La16. Myrtle Lake Till Plain - 297,135 acres

Concept: This LTA is characterized by thick soils over bedrock. Bedrock is predominantly the Vermilion granite formation. Uplands occupy 73%, wetlands occupy 19%, and lakes occupy 8% of the LTA (MN DNR, 1998). The terrain is rolling to steep. Bedrock outcrops

are present over 75-100% of the area. Seventy seven percent of the LTA has soil sandy loam textures (NRCS, 1994). Rocks and gravel are abundant. Hardpans in the subsoil are common. Gray clay from the Koochiching Lobe or Glacial Lake Agassiz is very common at lower elevations. An end moraine with deep sandy loam and sand is present at the southern end of the LTA.

The presettlement vegetation was mixture of Mixed White and Red Pine (48%), Aspen-Birch-Conifer (23%), and Conifer Bog and Swamp (15%) with minor amounts of Jack Pine Barrens (7%) (Marschner, 1974).

La17. Ash Lake Till Plain - 232,135 acres

Concept: This LTA is a transition between Lake Agassiz to the west and the bedrock controlled terrain to the east. It is characterized by thick soils on a rolling bedrock-controlled terrain. Uplands occupy 74%, wetlands occupy 26%, and lakes occupy <1% of the LTA (MN DNR, 1998). Bedrock outcrops are present over 25-50% of the area. The dominant bedrock type is the Vermilion granitic complex formation. A variety of soil parent material is present. Gray clayey soils from the Koochiching Lobe or Glacial Lake Agassiz occupy 46% of the LTA (NRCS, 1994). Most of the clay is found in the lower portions of the landscape, roughly below 1350 to 1400 feet in elevation. Sandy loam over bedrock soils (35% of the LTA) occur at higher elevations, usually on top of the bedrock-controlled hills (NRCS, 1994).

The presettlement vegetation was mixture of Aspen-Birch-Conifer (spruce-fir) (55%), Conifer Bog and Swamp (23%), Mixed White and Red Pine (18%) with minor amounts of Jack Pine Barrens (2%) (Marschner, 1974).

La21. Saganaga Lake Bedrock Complex - 52,062 acres

Concept: This LTA is characterized by thin soils over bedrock. Uplands occupy 58%, wetlands occupy 14%, and lakes occupy 28% of the LTA (MN DNR, 1998). The terrain is rolling to steep. The bedrock is dominated by the Saganaga granite formation. Bedrock outcrops are present over 75-100% of the area. Most soils (67%) have gravelly sandy loam or loam textures (NRCS, 1994). Hardpans in the subsoil are common. A small area (8% of the LTA) southwest of Saganaga Lake has deep soils with loam or silt loam over sandy loam textures (NRCS, 1994).

The presettlement vegetation was mixture of Mixed White and Red Pine (46%) and Aspen-Birch-Conifer (pine) (10%) with minor amounts of Conifer Bog and Swamp (6%), Jack Pine Barrens (5%), and Aspen-Birch-Hardwood (3%) (Marschner, 1974).

La22. Poplar Lake Bedrock Complex - 56,187 acres

Concept: This LTA is characterized by thin soils over bedrock. Bedrock is dominated by a complex of Duluth gabbro and red granophyric granite. Uplands occupy 72%, wetlands occupy 15%, and lakes occupy 13% of the LTA (MN DNR, 1998). The terrain is rolling to steep. Bedrock outcrops are present over 75-100% of the area. Dikes form east-west linear ridges. Most soils have gravelly sandy loam or loam textures (NRCS, 1994). Hardpans in the subsoil are common if the soil is thick enough.

The dominant presettlement vegetation was Aspen-Birch-Conifer (spruce-fir) (80%) with minor amounts of Mixed White and Red Pine (12%) and Conifer Bog and Swamp (1%) (Marschner, 1974).

La23. Ely-Knife Lake Bedrock Complex - 233,910 acres

Concept: This LTA is characterized by thin soil over bedrock. Bedrock outcrops are present over 75-100% of the area. Bedrock is predominantly Greenstone (mafic metavolcanic) & Knife Lake Group-Newton Lake formations(sandstone, siltstone, conglomerate, slate). Uplands occupy 67%, wetlands occupy 13%, and lakes occupy 20% of the LTA (MN DNR, 1998). The terrain is steep and irregular. The majority (88%) of the LTA has soils with gravelly sandy loam or loam textures with minor amounts (5%) of acid peat (NRCS, 1994). Hardpans are common in the subsoil. Gray clayey soils from the Koochiching Lobe or Glacial Lake Agassiz are occasionally present in lower elevations.

The dominant presettlement vegetation was Mixed White and Red Pine (52%) with minor amounts of Aspen-Birch-Conifer (pine) (13%), Conifer Bog and Swamp (11%) Aspen-Birch-Hardwood (3%), Jack Pine Barrens (3%), (Marschner, 1974).

La24. White Iron Lake Bedrock Complex - 92,835 acres

Concept: This LTA is characterized by thin soils over bedrock. deposits of Rainy lobe till on rolling bedrock-controlled terrain. The dominant bedrock type is the Giants Range granitic batholith (granite to granodiorite). Bedrock outcrops are present in over 50-75% of the area. Uplands occupy 61%, wetlands occupy 21%, and lakes occupy 18% of the LTA (MN DNR, 1998). Most (76% of the LTA) soils have gravelly sandy

loam or loam textures. Hardpans in the subsoil are common when the soil is thick enough. A small area (7% of the LTA) of deep soils with silt loam texture is present north of Birch Lake. A small area (5% of the LTA) of deep soils with sandy loam texture is present northeast of Bear Island Lake (NRCS, 1994).

The presettlement vegetation was mixture of Aspen-Birch-Conifer (25%), Conifer Bog and Swamp (23%), Mixed White and Red Pine (18%), and Jack Pine Barrens (17%) (Marschner, 1974).

La34. Vermilion Bedrock Complex - 94,246 acres

Concept: This LTA is characterized by a complex of thin soil over bedrock and Lake Vermilion. Metamorphic bedrock (biotite schist, paragneiss, schist-rich migmatite) dominates the west half while the east has volcanic and volcaniclastic rock with inclusions of the Soudan iron formation. Uplands occupy 47%, wetlands occupy 11%, and lakes occupy 42% of the LTA (MN DNR, 1998). The terrain is steep and irregular. Bedrock outcrops are present over 75-100% of the area. A mixture of soil parent material is present. Thirty five percent of the LTA has gravelly sandy loam texture over bedrock. An end moraine (13% of the LTA) with deep sandy loam and sand textures is present on the south side of Lake Vermilion. The remaining areas (5%) have acidic peat and clay textures (NRCS, 1994).

The presettlement vegetation was mixture of Aspen-Birch-Conifer (pine) (24%), Mixed White and Red Pine (16%), Conifer Bog and Swamp (11%) with minor amounts of Jack Pine Barrens (2%) (Marschner, 1974).

La35. Northern Lights Lake Till Plain - 69,529 acres

Concept: This LTA is characterized by a complex of thick and thin soils over bedrock-controlled terrain. The dominant bedrock type is the North Shore Volcanic Group (basaltic lava flows) with ridges of mafic intrusive rock (Brule-Hovland gabbro). Uplands occupy 80%, wetlands occupy 18%, and lakes occupy 2% of the LTA (MN DNR, 1998). Bedrock outcrops are present over 50-75% of the area. Sixty percent of the LTA has thin sandy loam soils over bedrock. The remaining areas have silt loam or loam over sandy loam (24%), gravelly sandy loam over sand (15%), and clay (1%) textures (NRCS, 1994).

The presettlement vegetation was mixture of Mixed White and Red Pine (41%), Conifer Bog and Swamp (32%), Aspen-Birch-Conifer (spruce-fir) (22%), with minor amounts of Jack Pine Barrens (5%) (Marschner, 1974).

La36. Two Island Lake Moraine - 57,451 acres

Concept: This LTA is characterized by a complex of thin (<20") and moderately thick (20-40") with minor amounts of thick (>40") soils over bedrock (Superior National Forest). The bedrock is dominated by North Shore Volcanics (basalt and rhyolite) with a few mafic (diabase and gabbro) intrusive dikes. Uplands occupy 68%, wetlands occupy 24%, and lakes occupy 8% of the LTA (MN DNR, 1998). The terrain is rolling. Bedrock outcrops are present over 50-75% of the area. A variety of soil parent material is present. They include: deep gravelly sandy loam over sand (34%), gravelly sandy loam over bedrock (33%), deep sandy loam or silt loam over gravelly sandy loam, with hardpans (25%) and acidic peat (7%) (NRCS, 1994).

The presettlement vegetation was mixture of Mixed White and Red Pine (35%), Aspen-Birch-Conifer (spruce-fir) (34%), and Conifer Bog and Swamp (26%)(Marschner, 1974).

La37. Vegetable Lakes Till Plain - 109,415 acres

Concept: This LTA is characterized by moderately thick soils over bedrock. The dominant bedrock type is the Duluth complex-Felsic series (red granophyric granite), Hovland basaltic lava flows, and Brule-Hovland gabbro intrusion. Uplands occupy 82%, wetlands occupy 10%, and lakes occupy 8% of the LTA (MN DNR, 1998). The terrain is rolling to steep. Bedrock outcrops are present over 75-100% of the area. Most (85%) of the soils have 20-40" gravelly sandy loam or loam over bedrock. (NRCS, 1994). Hardpans in the subsoil are common. The remaining area has bedrock outcrops (5%), silt loam over gravelly sandy loam (4%), sandy loam over sand (4%) (NRCS, 1994).

Province 212 – Laurentian Mixed Forest --Subsection 212Lb – North Shore Highlands Updated March, 2002

Lb01. Split Rock Till Plain - 123,309 acres

Concept: This LTA is a complex containing a Superior lobe till plain and lake plain (Glacial Lake Duluth). The terrain is rolling and slopes towards lake Superior. Inclusions of steep bedrock-controlled hills are present. This LTA includes a very narrow strip of land directly adjacent to Lake Superior where the growing season starts later and lasts longer yet is cooler and moister than areas farther inland. This area is

too narrow to delineate at the scale used. Uplands occupy 88%, wetlands occupy 8%, and lakes occupy 4% of the LTA (MN DNR, 1998). There are 1.48 miles of streams per square mile (USDA Forest Service. 1999). Streams are deeply incised due to the clayey material.
Most (80%) of the LTA is dominated by red clayey soils. The remaining areas have thin soil over bedrock & bedrock outcrops (10%), silt loam over clay loam (5%), silt loam over sandy loam (2%), and sand (3%) (NRCS, 1994).

Lb02: North Shore Till Plain - 150,667 acres

Concept: A level to rolling landscape with clayey soil parent material. The local microclimate is modified by Lake Superior. The growing season starts later and lasts longer yet is cooler and moister than areas further inland. Winters are warmer with lower accumulations of snow. Uplands occupy 92%, wetlands occupy 8%, and lakes occupy <1% of the LTA (MN DNR, 1998). There are 1.17 miles of streams per square mile (USDA Forest Service, 1998).

Soil parent materials are predominantly clayey sediments from Glacial Lake Duluth and lake-modified clayey till. Coarse (sandy loam) Superior lobe till is present at higher elevations. Soil textures include: clay (36%), outcrops of Northshore Volcanic bedrock (33%), silt loam over clay loam (15%), thin sandy loam over bedrock (8%), silt loam over sandy loam (3%), sandy loam over sand (2%), and unidentified (3%) (NRCS, 1994).

Lb03. Highland Moraine - 355,424 acres

Concept: A rolling to hummocky end moraine formed by the Superior lobe. Uplands occupy 68%, wetlands occupy 29%, and lakes occupy 3% of the LTA (MN DNR, 1998). There are .74 miles of streams per square mile (USDA Forest Service, 1998).

Most of the LTA (61%) is dominated by fine sandy loam soils with hardpans. Soils in the remaining areas have the following textures: sandy loam over sand (16%), silt loam over clay loam with hardpans (11%), acid peat (7%), and miscellaneous (5%) (NRCS, 1994).

Lb04. Cloquet Sand Plain - 140,475 acres

Concept: A level to rolling outwash plain formed by the Superior lobe. Uplands occupy 62%, wetlands occupy 28%, and lakes occupy 10% of the LTA (MN DNR, 1998). There are .80 miles of streams per square mile (USDA Forest Service, 1998).

Most of the LTA (53%) is dominated by sandy loam over sand & gravel soil textures. The remaining areas have sandy loam with hardpans (20%), acid peat (10%), stony sandy loam with a hardpan (7%) (NRCS, 1994).

Lb05.Cabin Lake Till Plain - 71,886 acres

Concept: A rolling till plain formed by the Superior lobe. Long linear ridges of till and bedrock (flutes) oriented NW-SE are present. Rivers commonly occur in the low areas in between the flutes. Uplands occupy 62%, wetlands occupy 36%, and lakes occupy 2% of the LTA (MN DNR, 1998). There are 1.08 miles of streams per square mile (USDA Forest Service, 1998).

Most of the LTA (75%) is dominated by sandy loam soils with a hardpan. The remaining areas have sandy loam over sand & gravel (18%), and thin sandy loam over bedrock (7%) (NRCS, 1994).

Lb08. Honeymoon Mountain Till Plain - 106,736 acres

Concept: A rolling till plain formed by the Superior Lobe. The soil parent material is generally >40" thick over bedrock. Bedrock outcrops occupy 25-50% of the LTA. Uplands occupy 67%, wetlands occupy 29%, and lakes occupy 4% of the LTA (MN DNR, 1998). There are .93 miles of streams per square mile (USDA Forest Service, 1998). Streams are generally oriented northwest-southeast.

Most of the LTA (82%) is dominated by fine sandy loam soils with a hardpan. Stones are very common. The remaining areas have sandy loam over sand & gravel (8%) and acid peat (6%) (NRCS, 1994).

Lb10. Tettegouch Till Plain - 239,195 acres

Concept: A complex of Superior lobe till on a steep bedrock controlled terrain and rolling Superior lobe till plains. Bedrock outcrops with steep escarpments are common. The type of bedrock is predominantly the Beaver Bay Complex-gabbro, diabase formation. Uplands occupy 85%, wetlands occupy 13%, and lakes occupy 2% of the LTA (MN DNR, 1998). Stream density is .95 miles per square mile (USDA Forest Service. 1999).

Most of the LTA (65%) is dominated by fine sandy loam soils with a hardpan. The remaining areas have silt loam or loam over clay loam soils with a hardpan (14%), clay soils (11%), thin sandy loam over bedrock (5%), and bedrock outcrops (2%) (NRCS, 1994).

Lb11. Tettegouche Till Plain - 114,398 acres

Concept: A complex of thick and thin Superior lobe till on a steep bedrock controlled terrain. Beaver Bay Complex-gabbro - diabase formation bedrock outcrops occupy about 50% of the LTA. Uplands occupy 85%, wetlands occupy 13%, and lakes occupy 2% of the LTA (MN DNR, 1998). Stream density is .86 miles per square mile (USDA Forest Service, 1998).

A mixture of soil parent material is present. Forty five percent of the LTA has gravelly sandy loam texture over bedrock. Thirty seven percent has fine sandy loam soils with a hardpan. The remaining areas have silt loam or loam over clay loam soils with a hardpan (12%), and fine sandy loam over gravelly sand (4%) (NRCS, 1994).

Lb20. Brookston Moraine - 110,804 acres

Concept: A complex of hummocky end moraines and rolling till plains formed by the Superior Lobe glacier. Uplands occupy 47%, wetlands occupy 50%, and lakes occupy 3% of the LTA (MN DNR, 1998). Large peatlands are common. There are .69 miles of streams per square mile (USDA Forest Service. 1999).

The soil parent material is coarse loamy with many stones. Fifty nine percent of the LTA has fine sandy loam sandy loam textures. A hardpan is commonly present in the subsoil. Acid peatlands occupy 36% of the LTA. The remaining areas (5%) have sandy or and clayey textures (NRCS, 1994).

Lb21. Brimson Sand Plain - 68,996 acres

Concept: A level to rolling outwash plain formed by the Superior Lobe glacier. Moraine features are present for several miles on either side of the St. Louis River. Uplands occupy 57%, wetlands occupy 41%, and lakes occupy 2% of the LTA (MN DNR, 1998). There are .68 miles of streams per square mile (USDA Forest Service. 1999).

Soil parent material is predominantly sandy. Soil textures on the outwash plain (57% of the LTA) are loamy sand over sand. The moraines have fine sandy loam over sandy loam hardpans (28%). Remaining areas have clayey textures (8%) or acid peat (7%) (NRCS, 1994).

Province 212 – Laurentian Mixed Forest -- Subsection 212Lc - Nashwauk Uplands

Lc05. Pike-Sandy River Outwash Plain - 184,020 acres

Concept: A complex of Rainy lobe outwash plains and end moraines (Vermilion moraine). Uplands occupy 65%, wetlands occupy 32%, and lakes occupy 3% of the LTA (MN DNR, 1998). There are .62 miles of streams per square mile (USDA Forest Service, 1998). Soil materials are generally sandy in the outwash plain and a mix of loamy to sandy in the end moraine. Depth to bedrock is generally greater than 5 feet however, the predominance of bedrock-controlled terrain increases to the northeast of the Vermilion moraine. A narrow transition area next to the Giants range granite banded iron formation has areas of bedrock near the surface. The majority of the upland presettlement vegetation was wet-mesic hardwood-conifer (white pine), mixed white pine-red pine and dry-mesic pine-hardwoods (Shadis, 1999 and Marschner, 1974). Lowland presettlement vegetation was commonly conifer bog and swamp (Marschner, 1974).

Lc06. Whalsten Till Plain - 71,043 acres

Concept: A nearly level to rolling complex of a till plains and outwash plains formed by the Rainy lobe with scattered bedrock outcrops. Soil materials are sandy in the outwash plains and loamy in the till plains. The northern portion of the area is a transition unit to a landscape shaped by Glacial Lake Agassiz. Some of the adjacent till plains were reworked by wave action. Clayey lake sediments are occasionally present in the lower portions of the landscape. Uplands occupy 66%, wetlands occupy 33%, and lakes occupy 1% of the LTA (MN DNR, 1998). There are .45 miles of streams per square mile (USDA Forest Service,1998).

Lc07. Big Rice Moraine - 59,914 acres

Concept: A nearly level to rolling till plain formed by the Rainy Lobe glacier. Scattered outwash plains, end moraines and bedrock outcrops occur. Bedrock is generally granitic with some greenstone, graywacke, and slate. Soil material is generally loamy in the till plain and sandy in the outwash. Uplands occupy 67%, wetlands occupy 29%, and lakes occupy 4% of the LTA (MN DNR, 1998). There are .61 miles of streams per square mile (USDA Forest Service, 1998).

Lc10. Mesabi Range - 116,909 acres

Concept: A rolling to steep till plain formed the Rainy lobe sediments on a bedrock-controlled terrain. Bedrock is predominantly the Giants Range batholith and the Biwabik iron formation. Uplands occupy 92%, wetlands occupy 4%, and lakes occupy 3% of the LTA (MN DNR, 1998). Depth to bedrock is variable from less than 2 feet to greater than 5 feet. Soil materials range from loamy to sandy. Mining areas are common. The presettlement vegetation was mixed hardwood (northern) and pine (white), mixed white and red pine (with birch), and wet-mesic hardwood-conifer (spruce-fir) (Shadis, 1999 and Marschner, 1974). Lowland presettlement vegetation was conifer bog and swamp (Marschner, 1974).

Lc20. Nashwauk Moraine - 268,886 acres

Concept: A nearly level to rolling Rainy lobe till plain with small scattered outwash plains and end moraines. Portions of the till plain have been lake-washed or mantled with a veneer of younger material. Topography is rolling on the till plain and hummocky on the end moraine. Uplands occupy 66%, wetlands occupy 29%, and lakes occupy 5% of the LTA (MN DNR, 1998). There are .64 miles of streams per square mile (USDA Forest Service). 1999. Soil materials are generally loamy on the till plains, loamy in the end moraines, and sandy in the outwash plains. A hard pan within the upper 4 feet is common in the till plain and end moraine.

The presettlement vegetation was wet-mesic hardwood-conifer (spruce-fir), wet-mesic hardwood-conifer (pine), dry mesic pine hardwood, and jack pine barrens, (Shadis, 1999 and Marschner, 1974). Lowland presettlement vegetation was conifer bog and swamp (Marschner, 1974).

Lc21. Pengilly Till Plain - 109,257 acres

Concept: A rolling till plain formed by the Rainy lobe. Uplands occupy 77%, wetlands occupy 14%, and lakes occupy 9% of the LTA (MN DNR, 1998). There are .85 miles of streams per square mile (USDA Forest Service). 1999. Underlying bedrock may be influencing the terrain in the western portion of the area. Soil materials are predominantly loamy. A hard pan within the upper 4 feet is common.

The presettlement vegetation was wet-mesic hardwood-conifer (pine), wet-mesic hardwood-conifer (spruce-fir), dry mesic pine-hardwood, and mixed hardwood (northern) and pine (white) (Shadis, 1999 and Marschner, 1974). Lowland presettlement vegetation was conifer bog and swamp (Marschner, 1974).

Province 212 – Laurentian Mixed Forest -- Subsection 212Ld - Toimi Uplands (K)

Ld01. Toimi Drumlin Plain - 339,285 acres

Concept: A rolling drumlin plain formed by the Rainy Lobe glacier with small scattered Superior lobe outwash plains. The cigar-shaped hills (drumlins) are abundant. They range from .25 to .33 miles wide and .5 to 3 miles long. They are oriented parallel to each other generally in a northeast-southwest direction. Wetlands commonly occur in between the drumlins, sandy in the outwash plains and peat in the wetlands. Uplands occupy 66%, wetlands occupy 31%, and lakes occupy 3% of the LTA (MN DNR, 1998). There are .80 miles of streams per square mile (USDA Forest Service, 1998).
Soil parent material is loamy till on the drumlins. Soil textures on the drumlin plain are sandy loam over a gravelly sandy loam hardpan (68%). Stones are common. Other areas on the drumlins have fine sandy loam over a sandy loam hardpan (4%). The soil parent material is sandy on the outwash plains. Soil textures are fine sandy loam over sand & gravel (8%). Remaining areas have clayey textures (2%) or acid peat (16%) (NRCS, 1994).

This LTA is part of a landscape that was not covered by ice during the later episodes of glacial activity (specifically the Automba phase of the Rainy Lobe; The Automba, Split Rock, and Nickerson phases of the Superior Lobes; and the Bemis and Alborn phase of the St. Louis Lobe). Radio

carbon dates of lake sediments suggest that this landscape has been vegetated since 15,850 years before present (Birks, 1981*); thousands of years before surrounding areas were vegetated. The exact extent of this older landscape is unknown.

Province 212 – Laurentian Mixed Forest – Subsection 212Le – Laurentian Uplands

Le01. Isabella Moraine Complex - 103,929 acres

Concept: A complex of several parallel east-west oriented end moraines with till plains and outwash plains in between. Topography is rolling to hummocky on the end moraines, and gently rolling in the till plains and outwash plains. Uplands occupy 72%, wetlands occupy 24%, and lakes occupy 4% of the LTA (MN DNR, 1998). There are .68 miles of streams per square mile (USDA Forest Service, 1998).

Soil parent material is Rainy lobe origin in the end moraines and till plains and both Rainy and Superior lobe material in the outwash plains. Most of the soil material on the moraines and till plains has sandy loam over gravelly sandy loam (72% of the LTA). A hardpan is commonly present. Other areas (5%) have sandy loam over bedrock. The outwash plains have fine sandy loam over sand & gravel (15% of the LTA). Remaining areas have acid peat (8%) (NRCS, 1994).

Le02. Kelly-Sawbill Landing Till Plain - 89,703 acres

Concept: A rolling till plain formed by the Rainy lobe with minor areas of gently rolling Superior lobe outwash plains. The soil materials are generally thick however bedrock (Duluth Complex) outcrops are common especially on the ridges. This LTA is a transition from bedrock controlled terrain to the north and terrain with deeper glacial sediments to the south. Uplands occupy 64%, wetlands occupy 32%, and lakes occupy 4% of the LTA (MN DNR, 1998). There are .89 miles of streams per square mile (USDA Forest Service, 1998).

Most (77% of the LTA) of the soil material has sandy loam over gravelly sand texture. Remaining areas have sandy loam material over bedrock (19%) or fine sandy loam over sandy loam hardpan (3%) (NRCS, 1994).

Le03. Timber Freer Till Plain - 50,579 acres

Concept: A complex of rolling Rainy lobe till plains with minor areas of Superior lobe outwash plains on a bedrock controlled terrain. The bedrock type is Duluth complex and red granoferric granite ("red rock"). Soil material is generally thick (>40") and is loamy on the till plains and sand and gravel on the outwash plains. Boulders are very common. Uplands occupy 79%, wetlands occupy 13%, and lakes occupy 8% of the LTA (MN DNR, 1998). There are .48 miles of streams per square mile (USDA Forest Service, 1998).

Most of the LTA (60%) has sandy loam soils over bedrock. Hardpans are common. Remaining areas have fine sandy loam over sandy loam hardpan (22%). Soil textures on the outwash plains are sandy loam over gravelly sand textures (18% of the LTA) (NRCS, 1994).

Le04. Temperance River Till Plain - 50,222 acres

Concept: A rolling till plain formed by the Rainy and Superior lobes. The area is dissected by north-south oriented drainages. The soil materials are predominantly thick (>40") loamy till. Uplands occupy 68%, wetlands occupy 27%, and lakes occupy 5% of the LTA (MN DNR, 1998). There are .87 miles of streams per square mile (USDA Forest Service, 1998).

Most of the LTA (57%) has sandy loam over a gravelly sandy loam soil textures. The remaining areas have sandy loam with a hardpan over bedrock (18%), acid peat (16%), or fine sandy loam over sandy loam with a hardpan (9%) (NRCS, 1994).

Le08. Seven Beavers Peatland - 29,635 acres

Concept: A nearly level landscape dominated by large contiguous peatlands with scattered upland islands. Soil materials are predominantly deep peat, loamy till and sand-gravel (eskers). Uplands occupy 15%, wetlands occupy 83%, and lakes occupy 2% of the LTA (MN DNR, 1998). There are .27 miles of streams per square mile (USDA Forest Service, 1998).

Most of the LTA (89%) has is acid peat soil parent material. The upland islands have fine sandy loam over gravelly sand (7%) or sandy loam over a gravelly sandy loam hardpan (4%) soils (NRCS, 1994).

Le09. Phantom Lake Peatland - 13,005 acres

Concept: A nearly level landscape dominated by large contiguous peatlands with scattered upland islands. Soil materials are predominantly deep peat, loamy till (till plain islands) and sand-gravel (eskers). Uplands occupy 16%, wetlands occupy 82%, and lakes occupy 2% of the LTA (MN DNR, 1998). There are .44 miles of streams per square mile (USDA Forest Service, 1998).

A mixture of soil parent material is present. Forty nine percent of the LTA is acid peat. Thirty two percent has sandy loam over a gravelly sandy loam hardpan. The remaining areas have fine sandy loam over gravelly sand (17%) and fine sandy loam over a sandy loam a hardpan (2%) (NRCS, 1994).

Le10. Greenwood Lake Till Plain - 124,416 acres

Concept: A nearly level to gently rolling till plain formed by the Rainy Lobe with scattered outwash plains formed by the Superior Lobe glacier. The underlying bedrock (Duluth Gabbro), while generally greater than 40" deep, influences the landscape features. A few widely scattered low cigar-shaped hills called drumlins are present. Uplands occupy 51%, wetlands occupy 45%, and lakes occupy 4% of the LTA (MN DNR, 1998). There are .58 miles of streams per square mile (USDA Forest Service, 1998). Streams are often oriented ne-sw.

A mixture of soil parent material is present. The till plain is sandy loam over a gravelly sandy loam hardpan (49% of the LTA). A 1-2 foot thick cap of silt loam on the surface is present in some areas. The outwash plains have fine sandy loam over gravelly sand soils (30%). Eighteen percent is acid peat. (NRCS, 1994).

This LTA may be part of a landscape that was not covered by ice during the later episodes of glacial activity (specifically the Automba phase of the Rainy Lobe; The Automba, Split Rock, and Nickerson phases of the Superior Lobes; and the Bemis and Alborn phase of the St. Louis Lobe). Radio carbon dates of lake sediments suggest that this landscape has been vegetated since 15,850 years before present (Birks, 1981*); thousands of years before surrounding areas were vegetated. The exact extent of this older landscape is unknown.

Le11. Big-Bird Lake Moraine - 105,792 acres

Concept: A nearly level to rolling till plain formed the Rainy Lobe glacier with scattered Rainy lobe end moraines and Superior lobe outwash plains. Low cigar-shaped hills called drumlins are present. The underlying Duluth Gabbro bedrock is generally greater than 40" deep, yet it influences the landscape features. Uplands occupy 65%, wetlands occupy 33%, and lakes occupy 2% of the LTA (MN DNR, 1998). There are .63 miles of streams per square mile (USDA Forest Service, 1998).

The soil textures in the till plain the end moraines are gravelly sandy loam soils with a hardpan (73% of the LTA). Remaining areas (2%) have sandy loam with hardpans over bedrock and acid peat (19%) soils. The outwash plains have fine sandy loam over gravelly sand soils (5%) (NRCS, 1994).

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Glossary of Landform Types

The Hobbs & Goebel Geologic map of Minnesota, Quaternary geology serves as the reference for these terms; the map can be downloaded from http://conservancy.umn.edu/handle/60085

Stagnation or pitted moraine – A hummocky landform deposited by a glacier that has stopped moving. It has tall hills, steep slopes, and numerous closed depressions that may or may not be occupied by wetlands or lakes. It is characterized by complex surface deposits that are sorted, partially sorted, or not sorted at all by meltwater as the ice melts and the landscape collapses.

These landforms are most frequently formed at the ice margin when a glacier reaches the end of an advance. Typically, the outer edge of the glacier was frozen at the base forming a dam to the faster moving ice up-glacier. The moving ice containing debris or sediment is thrust upward by the dam where it breaks into huge blocks. Sediment accumulates at the surface of the ice as it melts and buries the ice blocks. As the ice blocks melt deep valleys and depressions are formed. Modern soils are often highly variable and can change over short distances.

Moraine - A distinct hilly landscape with steep slopes that usually has the highest elevation of the local area. Moraines are formed at the outer edges of glaciers when the front edge of the ice was relatively stationary for a period of time. It was stationary because it was melting about as fast as the ice was flowing. In this situation, the glacier acts like a giant conveyor belt creating piles of sediment. The sediment is a mixture of sand, silt, clay, gravel, and boulders. It accumulates on the surface of the ice and often buries huge blocks of ice.

Outwash Plain - A broad relatively level or gently rolling plain. Sand and/or gravel sediment was deposited by flowing water. The primary source of the water and sediment is from melting glacial ice.

Outwash Channel, Outwash train, Valley train - Long narrow deposits of sand and/or gravel that are often sorted and stratified. Topographic relief is relatively flat. These landforms were created when water and sediment flowing away from melting glacial ice was restricted to old glacial stream channels either on the ground or on the ice.

Pitted Outwash Plain - A broad plain with rolling to steep hills. Soil material is commonly sand and/or gravel. These landforms are created by water flowing from melting glacial ice. Huge blocks of ice left behind by the retreating glacier were buried by the sand. As the ice melted, the soil collapsed to form depressions or pits.

Till Plain - A broad rolling landscape that was formed underneath a glacier as it retreated. Little or no sorting of materials occurred. Soil materials are a mixture of clay, sand, gravel, and boulders and are relatively uniform in texture. In Minnesota, till plains are often loam, sandy loam, or clay loam in texture.

Drumlin Plain - A broad landscape that has distinct long cigar-shaped hills or ridges. These ridges (called drumlins) are usually oriented in the same general direction. Soil materials are a mixture of clay, sand, gravel, and boulders and are relatively uniform in texture. In Minnesota, drumlin plains are commonly sandy loam in texture.

Lake Plain - A broad level to gently rolling landscape that was formed on the bottom of a post-glacial lake.

Appendix D: Age Class Distributions

The following charts display:

1) Acres of timberland in 10-year age classes by ECS subsection for covertypes typically managed as even-aged stands, from two sources:

    a. An *estimate* of total cover type acres (broken out into site index classes used in DNR forest planning) from 2012 FIA data;

    b. Actual acres by forest type from a compilation of available forest inventory data (labeled "NSU Combined") from MN DNR, Superior National Forest, Carlton County, Itasca County, Koochiching County, Lake County, and St. Louis County (see following "Combined Public Land Forest Inventory Metadata" description);

2) 95% confidence intervals (displayed as black vertical lines) for FIA derived age class estimates, and;

3) A superimposed Desired Future (age class) Composition (displayed as a red "DFC") line based on DFCs from first generation SFRMPs covering each subsection, linearly scaled to the total amount of forest in the subsection.

Table 9.2.Stand Age (10-Yr Classes) Estimate of Acres for Border Lakes Subsection

	Source	FIA	NSU-combined	Better	DFFC		FIA	NSU-combined	Better	DFFC		FIA	NSU-combined	Better	DFFC	
	Subsection	Border	Border Lakes	Border	Border		Border	Border Lakes	Border	Border		Border	Border Lakes	Border	Border	
	Forest Type	Aspen-Balm	Aspen-Balm of	Aspen-Balm	Aspen-Balm		Birch	Birch	Birch	Birch		Black	Black spruce	Black	Black	
	Site class	All	All	All	All	DFFC	All	All	All	All	DFFC %	<30	<30	<30	<30	DFFC
Stand age (10 yr classes) Estimate of acres	Total	446,462	394,860				124,363	39,970				13,478	18,561			
	0 - 10	79,721	49,122			0.19	8,019	2,176			0.16		1,093			0.08
	11 - 20	97,643	64,446			0.19	8,644	1,009			0.16		295			0.08
	21 - 30	60,252	58,336			0.19	3,085	394			0.16		378			0.08
	31 - 40	46,731	37,265			0.19	0	286			0.16		442			0.08
	41 - 50	40,431	23,052			0.15	3,705	1,129			0.16		628			0.08
	51 - 60	22,110	12,114			0.02	13,933	1,413			0.16		720			0.08
	61 - 70	39,595	15,746			0.02	32,908	3,920			0.02		851			0.08
	71 - 80	27,100	31,643			0.01	23,943	5,512			0.01		890			0.08
	81 - 90	24,040	39,769			0.01	18,106	10,034			0.01		1,522			0.08
	91 - 100	6,234	31,356			0.00	8,259	7,962			0.00		1,833			0.08
	101 - 110		19,273			0.00	0	3,365			0.00		1,904			0.08
	111 - 120		9,639			0.00	0	1,798			0.00		2,213			0.08
	121 - 130	2,604	2,405				3,761	533					2,183			0.01
	131 - 140		456					265					1,133			0.01
	141 - 150		129										1,054			0.01
	151 - 175		79					133					985			0.04
	176 - 200							41					324			
	201+		31										113			
95% CI	Total	4713					5530									
	0 to 10	4920		4920			7329		7329					0		
	11 to 20	4802		4802			5771		5771					0		
	21 to 30	4702		4702			4671		4671					0		
	31 to 40	5225		5225			0		0					0		
	41 to 50	6030		6030			27909		27909					0		
	51 to 60	4361		4361			8036		8036					0		
	61 to 70	5861		5861			6458		6458					40314		
	71 to 80	5486		0			9249		9249					0		
	81 to 90	4851		0			6817		6817					0		
	91 to 100	39403		0			12115		12115					0		
	101 to 110	0		0			0		0					0		
	111 to 120	0		0			0		0					0		
	121 to 130	0		0			27945		27945					31589		
	131 to 140	0		0			0		0					0		
	141 to 150	0		0			0		0					0		
	151 to 175	0		0			0		0					0		
	176 to 200	0		0			0		0					0		
	201+	0		0			0		0					0		

	Source	FIA	NSU-combined	Better	DFFC		FIA	NSU-combined	Better	DFFC		FIA estimate	NSU-combined	Better	DFFC	
	Subsection	Border	Border Lakes	Border	Border		Border	Border Lakes	Border	Border		Border Lakes	Border Lakes	Border Lakes	Border Lakes	
	Forest	Black	Black spruce	Black	Black		Black	Black spruce	Black	Black		Black spruce	Black spruce	Black spruce	Black spruce	
	Site class	30-39	30-39	30-39	30-39	DFFC %	>39	>39	>39	>39	DFFC %	All	All	All	All	DFFC %
Stand age (10 yr classes) Estimate of acres	Total	52697	38,369				24488	16,231				24488				
	0 - 10	2975	2,483			0.09		1,446			0.12					0.14
	11 - 20	525	2,140			0.09		686			0.12					0.14
	21 - 30	4698	1,323			0.09		561			0.12					0.14
	31 - 40	3539	1,170			0.09	2936	410			0.12	2936				0.14
	41 - 50	3297	1,364			0.09	11813	807			0.12	11813				0.14
	51 - 60	10723	1,614			0.09	5409	1,092			0.12	5409				0.14
	61 - 70	6602	2,187			0.09	1393	927			0.12	1393				0.14
	71 - 80	4228	2,892			0.09		1,327			0.12					0.01
	81 - 90	3506	3,599			0.09		1,847			0.02					0.00
	91 - 100	9323	5,605			0.09		1,920			0.01					0.00
	101 - 110		3,455			0.01		1,426			0.01					0.00
	111 - 120		3,880				2936	1,926			0.00	2936				0.00
	121 - 130		2,425					873					668			
	131 - 140		1,572					291					518			
	141 - 150		1,004					144								
	151 - 175	3281	844					277					108			
	176 - 200		564					90								
	201+		248					180								
95% CI	Total															
	0 to 10			0					0					0		
	11 to 20			0					0					0		
	21 to 30			29906					0					0		
	31 to 40			25978												
	41 to 50													7178		
	51 to 60			6870					42943					34529		
	61 to 70			40964					10249					0		
	71 to 80			6833					0					0		
	81 to 90			0					0					0		
	91 to 100			8076					0					0		
	101 to 110			0					0					0		
	111 to 120			0												
	121 to 130			0					0					0		
	131 to 140			0					0					0		
	141 to 150			0					0					0		
	151 to 175								0					0		
	176 to 200			0					0					0		
	201+			0					0					0		

	Source	FIA	NSU-combined	Better	DFFC	
	Subsection	Border	Border Lakes	Border	Border	
	Forest Type	Jack pine	Jack pine	Jack pine	Jack pine	
	Site class	All	All	All	All	DFFC %
Stand age (10 yr classes) Estimate of acres	Total	55,404	94,342			
	0 - 10		8,085			0.16
	11 - 20		7,861			0.16
	21 - 30		11,338			0.16
	31 - 40		14,008			0.16
	41 - 50		10,161			0.16
	51 - 60		4,265			0.16
	61 - 70		2,220			0.02
	71 - 80		2,249			0.02
	81 - 90		4,332			0.01
	91 - 100		8,930			0.01
	101 - 110		8,532			0.00
	111 - 120		9,250			0.00
	121 - 130		1,850			
	131 - 140		686			
	141 - 150		474			
	151 - 175		47			
	176 - 200		56			
	201+					
95% CI	Total					
	0 to 10			0		
	11 to 20			0		
	21 to 30			5989		
	31 to 40			0		
	41 to 50			5691		
	51 to 60			0		
	61 to 70			0		
	71 to 80			34369		
	81 to 90			38129		
	91 to 100			0		
	101 to 110			0		
	111 to 120			0		
	121 to 130			0		
	131 to 140					
	141 to 150			0		
	151 to 175			0		
	176 to 200			0		
	201+					

Table 9.3.Stand Age (10-Yr Classes) Estimate of Acres for Nashwauk Uplands Subsection

	Source	FIA	NSU-combined	Better	DFFC		FIA	NSU-combined	Better	DFFC		FIA	NSU-combined	Better	DFFC	
	Subsection	Nashwauk	Nashwauk	Nashwauk	Nashwauk		Nashwauk	Nashwauk	Nashwauk	Nashwauk		Nashwauk	Nashwauk	Nashwauk	Nashwauk	
	Forest Type	Aspen-Balm	Aspen-Balm of	Aspen-Balm	Aspen-Balm		Birch	Birch	Birch	Birch		Black	Black spruce	Black	Black	
	Site class	All	All	All	All	DFFC %	All	All	All	All	DFFC %	<30	<30	<30	<30	DFFC %
Stand age (10 yr classes) Estimate of acres	Total	294,226	109,627	305,238			44,801	11,452				27,028	9,809			
	0 - 10	42,124	17,043	42,124	53,722	0.18	0	1,270			0.18	0	267			0.07
	11 - 20	64,281	18,418	64,281	53,722	0.18	4,435	190			0.18	0	111			0.07
	21 - 30	45,892	28,617	45,892	53,722	0.18	6,326	324			0.18	0	123			0.07
	31 - 40	50,274	11,043	50,274	53,722	0.18	0	118			0.18	0	32			0.07
	41 - 50	20,858	8,443	20,858	53,722	0.18	3,073	68			0.18	4,231	323			0.07
	51 - 60	26,309	2,281	26,309	18,314	0.06	8,155	76			0.08	3,060	287			0.07
	61 - 70	17,260	2,730	17,260	12,210	0.04	6,241	329			0.04	3,297	178			0.07
	71 - 80	20,647	5,624	20,647	6,105	0.02	7,526	1,709			0.00	4,072	448			0.07
	81 - 90	2,935	9,438	9,438	-	0.00	3,680	3,401			0.00	0	524			0.07
	91 - 100	1,414	5,053	5,053	-	0.00	3,163	3,377			0.00	0	903			0.07
	101 - 110	0.0	813		-	0.00	0	367			0.00	3,073	1,449			0.07
	111 - 120	2,231	67	2,231	-	0.00	0	179			0.00	3,060	1,641			0.07
	121 - 130			-	-	0.00	2,201	7			0.00	2,936	989			0.03
	131 - 140		58	58	-	0.00		1			0.00	3,297	788			0.03
	141 - 150			-	-	0.00		24			0.00		689			0.03
	151 - 175			-	-			12					1,048			0.03
	176 - 200			-	-								8			0.03
	201+			-	-								-			0.02
95% CI	Total	5026		5026			5510		5510			6344		6344		
	0 to 10	4942		4942			0		0			0		0		
	11 to 20	5583		5583			7918		7918			0		0		
	21 to 30	5514		5514			39803		39803			0		0		
	31 to 40	6033		6033			0		0			0		0		
	41 to 50	5240		5240			0		0			29149		29149		
	51 to 60	5259		5259			7031		7031			0		0		
	61 to 70	4441		4441			39801		39801			0		0		
	71 to 80	6399		6399			11266		11266			29605		29605		
	81 to 90	0		0			0		0			0		0		
	91 to 100	0		0			0		0			0		0		
	101 to 110	0		0			0		0			0		0		
	111 to 120	0		0			0		0			0		0		
	121 to 130	0		0			0		0			0		0		
	131 to 140	0		0			0		0			0		0		
	141 to 150	0		0			0		0			0		0		
	151 to 175	0		0			0		0			0		0		
	176 to 200	0		0			0		0			0		0		
	201+	0		0			0		0			0		0		

	Source	FIA	NSU-combined	Better	DFFC		FIA	NSU-combined	Better	DFFC		FIA	NSU-combined	Better	DFFC	
	Subsection	Nashwauk	Nashwauk	Nashwauk	Nashwauk		Nashwauk	Nashwauk	Nashwauk	Nashwauk		Nashwauk	Nashwauk	Nashwauk	Nashwauk	
	Forest Type	Black	Black spruce	Black	Black		Black	Black spruce	Black	Black		Jack pine	Jack pine	Jack pine	Jack pine	
	Site class	30-39	30-39	30-39	30-39	DFFC %	>39	>39	>39	>39	DFFC %	All	All	All	All	DFFC %
Stand age (10 yr classes) Estimate of acres	Total	24,299	16,054	32,837			9,049	8,460	16,150			18,208	8,642	23,787		
	0 - 10	0	1,411	1,411	2,857	0.09	0	820	820	2,053	0.13	0	1,370	1,370	4,187	0.18
	11 - 20	0	572	572	2,857	0.09	0	404	404	2,053	0.13	2,231	1,099	2,231	4,187	0.18
	21 - 30	0	245	245	2,857	0.09	0	337	337	2,053	0.13	0	1,511	1,511	4,187	0.18
	31 - 40	0	145	145	2,857	0.09	336	109	336	2,053	0.13	7,826	725	7,826	4,187	0.18
	41 - 50	0	649	649	2,857	0.09	2,372	312	2,372	2,053	0.13	0	1,092	1,092	4,187	0.18
	51 - 60	3,987	209	3,987	2,857	0.09	3,281	267	3,281	2,053	0.13	0	244	244	1,570	0.07
	61 - 70	7,930	319	7,930	2,857	0.09	0	116	116	2,053	0.13	3,281	177	3,281	1,285	0.05
	71 - 80	5,490	1,108	5,490	2,857	0.09	3,060	670	3,060	799	0.05	0	832	832	-	0.00
	81 - 90	3,060	2,048	3,060	2,857	0.09		2,152	2,152	651	0.04	4,567	759	4,567	-	0.00
	91 - 100	3,831	4,018	4,018	2,857	0.09		1,742	1,742	326	0.02	302	424	424	-	0.00
	101 - 110		1,835	1,835	1,195	0.04		669	669	-	0.00		378	378	-	0.00
	111 - 120		1,899	1,899	1,195	0.04		668	668	-	0.00		32	32	-	0.00
	121 - 130		502	502	1,195	0.04		48	48	-	0.00			-	-	0.00
	131 - 140		430	430	683	0.02		131	131	-	0.00			-	-	0.00
	141 - 150		320	320	-	0.00		15	15	-	0.00			-	-	0.00
	151 - 175		307	307	-			-	-	-				-	-	
	176 - 200		32	32	-			-	-	-				-	-	
	201+		3	3	-			-	-	-				-	-	
95% CI	Total	5547		5547			5726		5726			4934		4934		
	0 to 10	0		0			0		0			0		0		
	11 to 20	0		0			0		0			0		0		
	21 to 30	0		0			0		0			0		0		
	31 to 40	0		0			0		0			11297		11297		
	41 to 50	0		0			0		0			0		0		
	51 to 60	29073		29073			22704		22704			0		0		
	61 to 70	7459		7459			0		0			20293		20293		
	71 to 80	34898		34898			0		0			0		0		
	81 to 90	0		0			0		0			28485		28485		
	91 to 100	29629		0			0		0			0		0		
	101 to 110	0		0			0		0			0		0		
	111 to 120	0		0			0		0			0		0		
	121 to 130	0		0			0		0			0		0		
	131 to 140	0		0			0		0			0		0		
	141 to 150	0		0			0		0			0		0		
	151 to 175	0		0			0		0			0		0		
	176 to 200	0		0			0		0			0		0		
	201+	0		0			0		0			0		0		

	Source	FIA	NSU-combined	Better	DFFC		FIA	NSU-combined	Better	DFFC		FIA	NSU-combined	Better	DFFC	
	Subsection	Nashwauk	Nashwauk	Nashwauk	Nashwauk		Nashwauk	Nashwauk	Nashwauk	Nashwauk		Nashwauk	Nashwauk	Nashwauk	Nashwauk	
	Forest	Tamarack	Tamarack	Tamarack	Tamarack		Tamarack	Tamarack	Tamarack	Tamarack		White	White spruce	White	White	
	Site class	<40	<40	<40	<40	DFFC %	>39	>39	>39	>39	DFFC %	All	All			DFFC %
Stand age (10 yr classes) Estimate of acres	Total	20,185	3,355	21,755			13,400	2,181	14,117			3,692	6,209	7,604		
	0 - 10	2,461	60	2,461	2,055	0.09	0.0	108	108	2,000	0.14	0.0	1,116	1,116	1,141	0.15
	11 - 20	0.0	124	124	2,055	0.09	2,387	29	2,387	2,000	0.14	2,215	820	2,215	1,141	0.15
	21 - 30	0.0		-	2,055	0.09	482	15	482	2,000	0.14	734	1,669	1,669	1,141	0.15
	31 - 40	0.0	39	39	2,055	0.09	0.0	35	35	2,000	0.14	744	1,499	1,499	1,141	0.15
	41 - 50	0.0	99	99	2,055	0.09	615	17	615	2,000	0.14		206	206	1,141	0.15
	51 - 60	0.0	218	218	2,055	0.09	2,975	196	2,975	2,000	0.14		191	191	1,141	0.15
	61 - 70	4,774	184	4,774	2,055	0.09	0.0	20	20	847	0.06		115	115	570	0.08
	71 - 80	1,864	292	1,864	2,055	0.09	824	315	824	847	0.06		294	294	127	0.02
	81 - 90	2,975	615	2,975	2,055	0.09	2,935	578	2,935	282	0.02		206	206	63	0.01
	91 - 100	5,177	634	5,177	685	0.03	3,182	314	3,182	94	0.01		73	73	-	0.00
	101 - 110		291	291	685	0.03		56	56	31	0.00		16	16	-	0.00
	111 - 120		297	297	685	0.03		436	436	16	0.00			-	-	0.00
	121 - 130		387	387	685	0.03		54	54	-	0.00		5	5	-	0.00
	131 - 140		21	21	348	0.02		1	1	-	0.00			-	-	0.00
	141 - 150		26	26	174	0.01		0	-	-	0.00			-	-	0.00
	151 - 175		62	62	-			0	-	-				-	-	
	176 - 200	2,935	1	2,935	-			0	-	-				-	-	
	201+		6	6	-			6	6	-				-	-	
95% CI	Total	5803		5803			5458		5458			6220		0		
	0 to 10	0		0			0		0			0		0		
	11 to 20	0		0			0		0			0		0		
	21 to 30	0		0			0		0			0		0		
	31 to 40	0		0			0		0			0		0		
	41 to 50	0		0			0		0			0		0		
	51 to 60	0		0			0		0			0		0		
	61 to 70	4435		4435			0		0			0		0		
	71 to 80	0		0			0		0			0		0		
	81 to 90	0		0			0		0			0		0		
	91 to 100	34369		34369			0		0			0		0		
	101 to 110	0		0			0		0			0		0		
	111 to 120	0		0			0		0			0		0		
	121 to 130	0		0			0		0			0		0		
	131 to 140	0		0			0		0			0		0		
	141 to 150	0		0			0		0			0		0		
	151 to 175	0		0			0		0			0		0		
	176 to 200	0		0			0		0			0		0		
	201+	0		0			0		0			0		0		

Table 9.4.Stand Age (10-Yr Classes) Estimate of Acres for Laurentian Uplands Subsection

	Source	FIA	NSU-combined	Better	DFFC		FIA	NSU-combined	Better	DFFC		FIA	NSU-combined	Better	DFFC	
	Subsection	Laurentian	Laurentian	Laurentian	Laurentian		Laurentian	Laurentian	Laurentian	Laurentian		Laurentian	Laurentian	Laurentian	Laurentian	
	Forest Type	Aspen-Balm	Aspen-Balm of	Aspen-Balm	Aspen-Balm		Balsam fir	Balsam fir	Balsam fir	Balsam fir		Birch	Birch	Birch	Birch	
	Site class	All	All	All	All	DFFC %	All	All	All	All	DFFC %	All	All	All	All	DFFC %
Stand age (10 yr classes) Estimate of acres	Total	83,507	104,867	120,955			53,007	20,063				68,722	36,364			
	0 - 10	11,237	6,957	11,237	19,850	0.16	2,570	919			0.18	7,341	2,113			0.15
	11 - 20	10,963	13,341	13,341	19,850	0.16	7,007	906			0.18	8,816	366			0.15
	21 - 30	9,755	18,477	18,477	19,850	0.16	13,231	1,166			0.18	2,936	484			0.15
	31 - 40	11,168	12,616	12,616	19,850	0.16	3,163	1,591			0.18	700	647			0.15
	41 - 50	9,075	9,506	9,506	19,850	0.16	5,415	1,599			0.18	6,256	350			0.15
	51 - 60	18,112	6,304	18,112	13,143	0.11	7,845	1,415			0.04	6,602	954			0.10
	61 - 70	377	8,470	8,470	4,999	0.04	6,272	1,219			0.03	6,021	2,496			0.05
	71 - 80	6,555	6,658	6,658	2,672	0.02	5,873	3,125			0.02	12,029	5,075			0.05
	81 - 90	6,265	9,527	9,527		0.01		3,409			0.00	11,189	8,462			0.02
	91 - 100		5,308	5,308	-	0.00		2,884			0.00		8,155			0.00
	101 - 110		3,758	3,758	-	0.00		685			0.00	1,603	2,759			0.00
	111 - 120		2,428	2,428	-	0.00		605			0.00		2,382			0.00
	121 - 130		920		-	0.00		292			0.00	3,761	1,198			0.00
	131 - 140		413		-	0.00		186			0.00		592			0.00
	141 - 150		83	83	-	0.00		62			0.00		209			0.00
	151 - 175		48	48	-							1,468	117			
	176 - 200			-	-		1,631									
	201+		54	54	-								4			
95% CI	Total	4867		0			5542		5542			5122		5122		
	0 to 10	6941		6941			0		0			11166		11166		
	11 to 20	5514		0			10940		10940			12562		12562		
	21 to 30	4836		0			7850		7850			0		0		
	31 to 40	6699		0			0		0			0		0		
	41 to 50	12764		0			34791		34791			39969		39969		
	51 to 60	6677		6677			6853		6853			40964		40964		
	61 to 70	0		0			39925		39925			9688		9688		
	71 to 80	10231		0			38129		38129			5623		5623		
	81 to 90	10799		0			0		0			6894		6894		
	91 to 100	0		0			0		0			0		0		
	101 to 110	0		0			0		0			0		0		
	111 to 120	0		0			0		0			0		0		
	121 to 130	0		0			0		0			27945		27945		
	131 to 140	0		0			0		0			0		0		
	141 to 150	0		0			0		0			0		0		
	151 to 175	0		0			0		0			0		0		
	176 to 200	0		0			0		0			0		0		
	201+	0		0			0		0			0		0		

	Source	FIA	NSU-combined	Better	DFFC		FIA	NSU-combined	Better	DFFC		FIA	NSU-combined	Better	DFFC	
	Subsection	Laurentian	Laurentian	Laurentian	Laurentian		Laurentian	Laurentian	Laurentian	Laurentian		Laurentian	Laurentian	Laurentian	Laurentian	
	Forest	Black	Black spruce	Black	Black		Black	Black spruce	Black	Black		Black	Black spruce	Black	Black	
	Site class	<30	<30	<30	<30	DFFC %	30-39	30-39	30-39	30-39	DFFC %	>39	>39	>39	>39	DFFC %
Stand age (10 yr classes) Estimate of acres	Total	29,975	29,127				53,354	50,816				62,810	31,341			
	0 - 10	0	399			0.08	3,795	1,506			0.09	3,348	1,059			0.11
	11 - 20	0	175			0.08	0	741			0.09	0	981			0.11
	21 - 30	0	615			0.08	5,326	1,785			0.09	826	1,170			0.11
	31 - 40	1,488	538			0.08	0	1,256			0.09	5,383	908			0.11
	41 - 50	0	674			0.08	6,138	1,605			0.09	7,058	1,298			0.11
	51 - 60	0	1,012			0.08	0	2,005			0.09	6,218	2,518			0.11
	61 - 70	0	2,520			0.08	8,052	3,327			0.09	8,714	3,202			0.11
	71 - 80	0	2,729			0.08	12,874	6,512			0.09	20,439	2,984			0.11
	81 - 90	0	3,069			0.08	5,770	6,408			0.09	1,841	4,628			0.07
	91 - 100	5,409	2,520			0.08	2,461	7,880			0.09	0	4,994			0.04
	101 - 110	1,641	1,948			0.08	2,975	4,933			0.03	6,009	3,232			0.03
	111 - 120	8,096	3,166			0.08	2,202	4,254			0.03	2,975	1,394			0.01
	121 - 130	7,295	2,841			0.02	824	2,680			0.02		1,366			0.00
	131 - 140	1,913	1,896			0.02	2,936	2,295			0.01		924			0.00
	141 - 150	0	1,826			0.02		1,725			0.00		422			0.00
	151 - 175	4,132	2,471			0.02		1,438					197			
	176 - 200		453			0.01		233					64			
	201+		276			0.01		233					-			
95% CI	Total	6220		6220			5453		5453			5343		5343		
	0 to 10	0		0			28679		28679			29241		29241		
	11 to 20	0		0			0		0			0		0		
	21 to 30	0		0			8661		8661			0		0		
	31 to 40	0		0			0		0			4684		4684		
	41 to 50	0		0			39557		39557			11062		11062		
	51 to 60	0		0			0		0			38179		38179		
	61 to 70	0		0			6953		6953			12510		12510		
	71 to 80	0		0			10110		10110			7272		7272		
	81 to 90	0		0			35729		0			0		0		
	91 to 100	34529		34529			0		0			0		0		
	101 to 110	0		0			0		0			38958		38958		
	111 to 120	12049		12049			0		0			0		0		
	121 to 130	43344		43344			0		0			0		0		
	131 to 140	0		0			0		0			0		0		
	141 to 150	0		0			0		0			0		0		
	151 to 175	0		0			0		0			0		0		
	176 to 200	0		0			0		0			0		0		
	201+	0		0			0		0			0		0		

	Source	FIA	NSU-combined	Better	DFFC		FIA	NSU-combined	Better	DFFC		FIA	NSU-combined	Better	DFFC	
	Subsection	Laurentian	Laurentian	Laurentian	Laurentian		Laurentian	Laurentian	Laurentian	Laurentian		Laurentian	Laurentian	Laurentian	Laurentian	
	Forest	Jack pine	Jack pine	Jack pine	Jack pine		Tamarack	Tamarack	Tamarack	Tamarack		Tamarack	Tamarack	Tamarack	Tamarack	
	Site class	All	All	All	All	DFFC %	<40	<40	<40	<40	DFFC %	>39	>39	>39	>39	DFFC %
Stand age (10 yr classes) Estimate of acres	Total	32,213	25,143				10,357	3,102				8,153	2,154			
	0 - 10	820	1,656			0.15	0	65			0.09	0	90			0.11
	11 - 20	3,766	957			0.15	0	25			0.09	0	55			0.11
	21 - 30	4,238	1,629			0.15	0	190			0.09	2,473	165			0.11
	31 - 40	11,519	6,843			0.15	3,297	209			0.09	0	113			0.11
	41 - 50	6,996	3,813			0.15	0	107			0.09	2,473	123			0.11
	51 - 60	0	3,323			0.15	0	91			0.09	0	357			0.11
	61 - 70	0	4,029			0.06	2,291	58			0.09	0	394			0.11
	71 - 80	0	720			0.03	4,768	554			0.09	734	178			0.11
	81 - 90	4,873	401			0.00		500			0.09	2,473	271			0.07
	91 - 100		689			0.00		603			0.09		156			0.04
	101 - 110		291			0.00		271			0.03		115			0.03
	111 - 120		328			0.00		230			0.03		110			0.01
	121 - 130		188			0.00		152			0.03		28			0.00
	131 - 140		182			0.00		20			0.02		0			0.00
	141 - 150		93			0.00		28			0.01		0			0.00
	151 - 175										0.00					
	176 - 200										0.00					
	201+										0.00					
95% CI	Total	4981		4981			8461		8461			6657		6657		
	0 to 10	0		0			0		0			0		0		
	11 to 20	27191		27191			0		0			0		0		
	21 to 30	8185		8185			0		0			0		0		
	31 to 40	6755		6755			0		0			0		0		
	41 to 50	10956		10956			0		0			0		0		
	51 to 60	0		0			0		0			0		0		
	61 to 70	0		0			0		0			0		0		
	71 to 80	0		0			0		0			0		0		
	81 to 90	32495		32495			0		0			0		0		
	91 to 100	0		0			0		0			0		0		
	101 to 110	0		0			0		0			0		0		
	111 to 120	0		0			0		0			0		0		
	121 to 130	0		0			0		0			0		0		
	131 to 140	0		0			0		0			0		0		
	141 to 150	0		0			0		0			0		0		
	151 to 175	0		0			0		0			0		0		
	176 to 200	0		0			0		0			0		0		
	201+	0		0			0		0			0		0		

Table 9.5.Stand Age (10-Yr Classes) Estimate of Acres for North Shore Highlands Subsection

	Source	FIA	NSU-combined	Better	DFFC		FIA	NSU-combined	Better	DFFC		FIA	NSU-combined	Better	DFFC	
	Subsection	North	North Shore	North	North		North	North Shore	North	North		North	North Shore	North	North	
	Forest Type	Aspen-Balm	Aspen-Balm of	Aspen-Balm	Aspen-Balm		Balsam fir	Balsam fir	Balsam fir	Balsam fir		Birch	Birch	Birch	Birch	
	Site class	All	All	All	All	DFFC %	All	All	All	All	DFFC %	All	All	All	All	DFFC %
Stand age (10 yr classes) Estimate of acres	Total	399,690	211,731	422,013			65,727	32,990				187,331	82,385			
	0 - 10	24,332	29,306	29,306	69,257	0.16	2,975	691			0.18	9,480	2,850			0.15
	11 - 20	48,935	29,045	48,935	69,257	0.16	8,292	855			0.18	13,466	714			0.15
	21 - 30	56,599	47,450	56,599	69,257	0.16	16,953	1,499			0.18	734	1,022			0.15
	31 - 40	39,869	21,871	39,869	69,257	0.16	6,503	2,187			0.18	3,954	596			0.15
	41 - 50	61,820	10,083	61,820	69,257	0.16	6,044	1,482			0.18	12,418	487			0.15
	51 - 60	51,594	8,890	51,594	45,855	0.11	4,839	2,608			0.04	30,546	2,091			0.10
	61 - 70	55,958	9,410	55,958	17,443	0.04	9,261	2,485			0.03	47,974	4,748			0.05
	71 - 80	37,950	15,694	37,950	9,324	0.02	3,911	4,746			0.02	30,376	12,581			0.05
	81 - 90	13,965	18,538	18,538	3,108	0.01	2,516	7,298			0.00	23,480	24,559			0.02
	91 - 100	5,732	11,317	11,317	-	0.00	2,202	4,656			0.00	9,765	18,281			0.00
	101 - 110	2,936	6,746	6,746	-	0.00	0	2,289			0.00	0	11,618			0.00
	111 - 120		2,611	2,611	-	0.00	0	1,264			0.00	2,202	1,516			0.00
	121 - 130		208		-	0.00	0	383			0.00	0	687			0.00
	131 - 140		470		-	0.00	2,231	307			0.00	2,936	300			0.00
	141 - 150		63	63	-	0.00		98			0.00		69			0.00
	151 - 175		17	17	-			26					257			
	176 - 200		12	12	-			115					9			
	201+			-	-											
95% CI	Total	4955		4955			4589		4589			5533		5533		
	0 to 10	4220		0			21934		21934			13435		13435		
	11 to 20	4947		4947			5264		5264			7058		7058		
	21 to 30	5987		5987			6345		6345			0		0		
	31 to 40	5543		5543			10174		10174			29031		29031		
	41 to 50	5333		5333			37714		37714			8815		8815		
	51 to 60	5418		5418			8534		8534			6349		6349		
	61 to 70	5510		5510			5741		5741			6261		6261		
	71 to 80	5389		5389			5836		0			6012		6012		
	81 to 90	6262		0			0		0			6933		0		
	91 to 100	36735		0			0		0			13747		0		
	101 to 110	0		0			0		0			0		0		
	111 to 120	0		0			0		0			0		0		
	121 to 130	0		0			0		0			0		0		
	131 to 140	0		0			0		0			0		0		
	141 to 150	0		0			0		0			0		0		
	151 to 175	0		0			0		0			0		0		
	176 to 200	0		0			0		0			0		0		
	201+	0		0			0		0			0		0		

	Source	FIA	NSU-combined	Better	DFFC		FIA	NSU-combined	Better	DFFC		FIA	NSU-combined	Better	DFFC	
	Subsection	North	North Shore	North	North		North	North Shore	North	North		North	North Shore	North	North	
	Forest	Black	Black spruce	Black	Black		Black	Black spruce	Black	Black		Black	Black spruce	Black	Black	
	Site class	<30	<30	<30	<30	DFFC %	30-39	30-39	30-39	30-39	DFFC %	>39	>39	>39	>39	DFFC %
Stand age (10 yr classes) Estimate of acres	Total	16,062	10,847				17,316	27,457				23,334	15,260			
	0 - 10	0	155			0.08	458	890			0.09	0	601			0.11
	11 - 20	417	106			0.08	0	382			0.09	0	249			0.11
	21 - 30	929	267			0.08	0	782			0.09	0	945			0.11
	31 - 40	0	912			0.08	2,256	321			0.09	2,936	495			0.11
	41 - 50	0	728			0.08	0	852			0.09	1,702	539			0.11
	51 - 60	2,120	235			0.08	0	1,081			0.09	0	764			0.11
	61 - 70	0	440			0.08	826	2,378			0.09	11,744	1,353			0.11
	71 - 80	3,057	1,134			0.08	390	2,623			0.09	4,015	1,699			0.11
	81 - 90	3,242	1,522			0.08	824	4,834			0.09	2,936	2,895			0.07
	91 - 100	2,998	1,157			0.08	9,585	5,271			0.09		2,215			0.04
	101 - 110	0	807			0.08	0	2,465			0.03		1,186			0.03
	111 - 120	3,297	1,129			0.08	0	2,022			0.03		1,036			0.01
	121 - 130		491			0.02	2,975	870			0.02		286			0.00
	131 - 140		335			0.02		1,257			0.01		391			0.00
	141 - 150		540			0.02		467			0.00		161			0.00
	151 - 175		383			0.02		648					290			
	176 - 200		434			0.01		204					154			
	201+		72			0.01		108					-			
95% CI	Total	4498		4498			5376		0			5749		5749		
	0 to 10	0		0			0		0			0		0		
	11 to 20	0		0			0		0			0		0		
	21 to 30	0		0			0		0			0		0		
	31 to 40	0		0			0		0			0		0		
	41 to 50	0		0			0		0			0		0		
	51 to 60	0		0			0		0			0		0		
	61 to 70	0		0			0		0			7160		7160		
	71 to 80	22066		22066			0		0			29533		29533		
	81 to 90	23014		23014			0		0			0		0		
	91 to 100	19908		19908			13362		13362			0		0		
	101 to 110	0		0			0		0			0		0		
	111 to 120	0		0			0		0			0		0		
	121 to 130	0		0			0		0			0		0		
	131 to 140	0		0			0		0			0		0		
	141 to 150	0		0			0		0			0		0		
	151 to 175	0		0			0		0			0		0		
	176 to 200	0		0			0		0			0		0		
	201+	0		0			0		0			0		0		

	Source	FIA	NSU-combined	Better	DFFC		FIA	NSU-combined	Better	DFFC		FIA	NSU-combined	Better	DFFC	
	Subsection	North	North Shore	North	North		North	North Shore	North	North		North	North Shore	North	North	
	Forest	Jack pine	Jack pine	Jack pine	Jack pine		Tamarack	Tamarack	Tamarack	Tamarack		Tamarack	Tamarack	Tamarack	Tamarack	
	Site class	All	All	All	All	DFFC %	<40	<40	<40	<40	DFFC %	>39	>39	>39	>39	DFFC %
Stand age (10 yr classes) Estimate of acres	Total	2,993	5,136				4,025	4,352				12,546	2,612			
	0 - 10	0	521			0.15	0	488			0.09	0	186			0.11
	11 - 20	0	833			0.15	0	26			0.09	0	192			0.11
	21 - 30	2,202	843			0.15	0	7			0.09	0	116			0.11
	31 - 40	791	1,490			0.15	0	312			0.09	0	266			0.11
	41 - 50		56			0.15	0	64			0.09	2,478	52			0.11
	51 - 60		112			0.15	3,281	218			0.09	777	11			0.11
	61 - 70		273			0.06	0	89			0.09	0	129			0.11
	71 - 80		454			0.03	744	216			0.09	3,304	301			0.11
	81 - 90		314			0.00		472			0.09	204	747			0.07
	91 - 100		119			0.00		1461			0.09	0	419			0.04
	101 - 110		29			0.00		297			0.03	0	111			0.03
	111 - 120		94			0.00		183			0.03	0	52			0.01
	121 - 130					0.00		501			0.03	3,304	26			0.00
	131 - 140					0.00		19			0.02	2,478	0			0.00
	141 - 150					0.00					0.01					0.00
	151 - 175							0			0.00		4			
	176 - 200										0.00					
	201+										0.00					
95% CI	Total	21446		0			29581		0			6083		6083		
	0 to 10	0		0			0		0			0		0		
	11 to 20	0		0			0		0			0		0		
	21 to 30	0		0			0		0			0		0		
	31 to 40	0		0			0		0			0		0		
	41 to 50	0		0			0		0			0		0		
	51 to 60	0		0			0		0			0		0		
	61 to 70	0		0			0		0			0		0		
	71 to 80	0		0			0		0			0		0		
	81 to 90	0		0			0		0			0		0		
	91 to 100	0		0			0		0			0		0		
	101 to 110	0		0			0		0			0		0		
	111 to 120	0		0			0		0			0		0		
	121 to 130	0		0			0		0			0		0		
	131 to 140	0		0			0		0			0		0		
	141 to 150	0		0			0		0			0		0		
	151 to 175	0		0			0		0			0		0		
	176 to 200	0		0			0		0			0		0		
	201+	0		0			0		0			0		0		

Table 9.6.Stand Age (10-Yr Classes) Estimate of Acres for Toimi Uplands Subsection

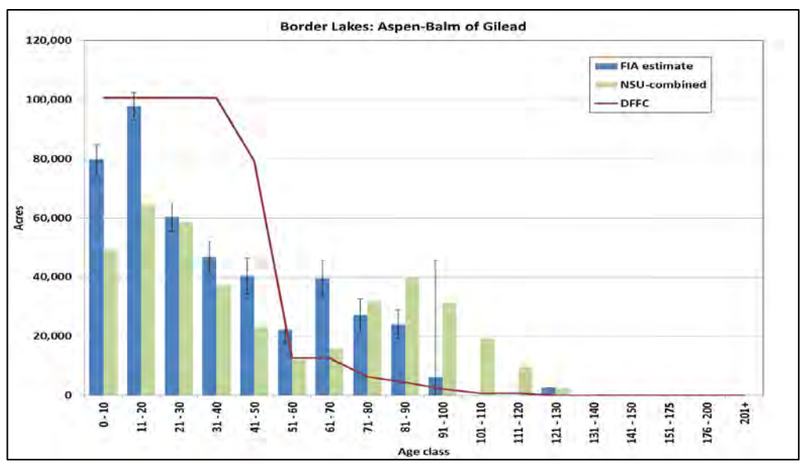
	Source	FIA	NSU-combined	Better	DFFC		FIA	NSU-combined	Better	DFFC		FIA	NSU-combined	Better	DFFC	
	Subsection	Toimi	Toimi Uplands	Toimi	Toimi		Toimi	Toimi Uplands	Toimi	Toimi		Toimi	Toimi Uplands	Toimi	Toimi	
	Forest Type	Aspen-Balm	Aspen-Balm of	Aspen-Balm	Aspen-Balm		Balsam fir	Balsam fir	Balsam fir	Balsam fir		Birch	Birch	Birch	Birch	
	Site class	All	All	All	All	DFFC %	All	All	All	All	DFFC %	All	All	All	All	DFFC %
Stand age (10 yr classes) Estimate of acres	Total	124,601	103,297	156,182			20,032	12,346				30,712	15,180			
	0 - 10	26,524	16,143	26,524	25,631	0.16	0	355			0.18	0	808			0.15
	11 - 20	28,783	22,994	28,783	25,631	0.16	2,294	135			0.18	734	158			0.15
	21 - 30	3,781	23,838	23,838	25,631	0.16	1,598	617			0.18	2,461	25			0.15
	31 - 40	15,922	7,728	15,922	25,631	0.16	0	558			0.18	0	13			0.15
	41 - 50	5,453	3,690	5,453	25,631	0.16	2,936	428			0.18	0	134			0.15
	51 - 60	8,227	4,049	8,227	16,970	0.11	2,936	439			0.04	0	247			0.10
	61 - 70	26,969	5,592	26,969	6,455	0.04	4,490	1,126			0.03	7,199	1,096			0.05
	71 - 80	5,638	9,449	9,449	3,451	0.02	5,777	2,890			0.02	18,666	4,534			0.05
	81 - 90	0	7,187	7,187	1,150	0.01		3,410			0.00	1,652	5,549			0.02
	91 - 100	3,304	2,102	3,304	-	0.00		1,868			0.00		1,898			0.00
	101 - 110		388		-	0.00		321			0.00		456			0.00
	111 - 120		59	59	-	0.00		62			0.00		123			0.00
	121 - 130			-	-	0.00		65			0.00		57			0.00
	131 - 140		27	27	-	0.00					0.00					0.00
	141 - 150		13	13	-	0.00		22			0.00		7			0.00
	151 - 175		20	20	-								76			
	176 - 200		20	20	-			53								
	201+			-	-											
95% CI	Total	5224		5224			5631		5631			5519		5519		
	0 to 10	5864		5864			0		0			0		0		
	11 to 20	5300		5300			15353		15353			0		0		
	21 to 30	29246		0			0		0			0		0		
	31 to 40	5491		5491			0		0			0		0		
	41 to 50	35378		35378			0		0			0		0		
	51 to 60	12162		12162			0		0			0		0		
	61 to 70	6318		6318			28691		28691			10760		10760		
	71 to 80	35763		0			36297		36297			6708		6708		
	81 to 90	0		0			0		0			0		0		
	91 to 100	0		0			0		0			0		0		
	101 to 110	0		0			0		0			0		0		
	111 to 120	0		0			0		0			0		0		
	121 to 130	0		0			0		0			0		0		
	131 to 140	0		0			0		0			0		0		
	141 to 150	0		0			0		0			0		0		
	151 to 175	0		0			0		0			0		0		
	176 to 200	0		0			0		0			0		0		
	201+	0		0			0		0			0		0		

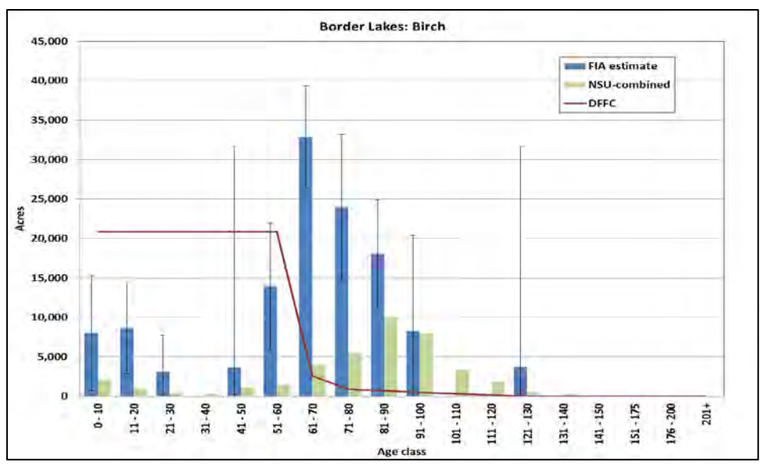
	Source	FIA	NSU-combined	Better	DFFC		FIA	NSU-combined	Better	DFFC		FIA	NSU-combined	Better	DFFC	
	Subsection	Toimi	Toimi Uplands	Toimi	Toimi		Toimi	Toimi Uplands	Toimi	Toimi		Toimi	Toimi Uplands	Toimi	Toimi	
	Forest	Black	Black spruce	Black	Black		Black	Black spruce	Black	Black		Black	Black spruce	Black	Black	
	Site class	<30	<30	<30	<30	DFFC %	30-39	30-39	30-39	30-39	DFFC %	>39	>39	>39	>39	DFFC %
Stand age (10 yr classes) Estimate of acres	Total	5,911	7,742				9,395	17,397				31,643	10,317			
	0 - 10	0	22			0.08	0	755			0.09	0	433			0.11
	11 - 20	0	32			0.08	0	810			0.09	0	195			0.11
	21 - 30	0	52			0.08	0	511			0.09	0	306			0.11
	31 - 40	0	65			0.08	0	121			0.09	0	121			0.11
	41 - 50	0	134			0.08	0	232			0.09	0	110			0.11
	51 - 60	0	177			0.08	0	85			0.09	3,119	69			0.11
	61 - 70	744	352			0.08	0	458			0.09	12,165	482			0.11
	71 - 80	2,936	541			0.08	824	1276			0.09	2,305	1,441			0.11
	81 - 90	2,231	1,351			0.08	2,291	3189			0.09	13,687	2,562			0.07
	91 - 100		755			0.08	3,304	5715			0.09	0	1,937			0.04
	101 - 110		308			0.08	0	1407			0.03	0	1,074			0.03
	111 - 120		546			0.08	0	1097			0.03	0	792			0.01
	121 - 130		491			0.02	2,975	557			0.02	367	335			0.00
	131 - 140		1,421			0.02		460			0.01		122			0.00
	141 - 150		306			0.02		448			0.00		269			0.00
	151 - 175		943			0.02		244					34			
	176 - 200		70			0.01		31					36			
	201+		177			0.01		0					-			
95% CI	Total	10709		0			8156		0			4917		4917		
	0 to 10	0		0			0		0			0		0		
	11 to 20	0		0			0		0			0		0		
	21 to 30	0		0			0		0			0		0		
	31 to 40	0		0			0		0			0		0		
	41 to 50	0		0			0		0			0		0		
	51 to 60	0		0			0		0			4686		4686		
	61 to 70	0		0			0		0			5972		5972		
	71 to 80	0		0			0		0			0		0		
	81 to 90	0		0			0		0			7882		7882		
	91 to 100	0		0			0		0			0		0		
	101 to 110	0		0			0		0			0		0		
	111 to 120	0		0			0		0			0		0		
	121 to 130	0		0			0		0			0		0		
	131 to 140	0		0			0		0			0		0		
	141 to 150	0		0			0		0			0		0		
	151 to 175	0		0			0		0			0		0		
	176 to 200	0		0			0		0			0		0		
	201+	0		0			0		0			0		0		

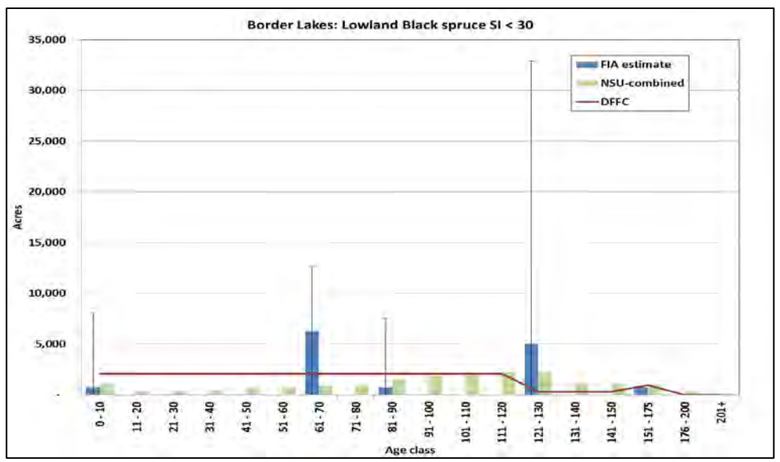
	Source	FIA	NSU-combined	Better	DFFC		FIA	NSU-combined	Better	DFFC		FIA	NSU-combined	Better	DFFC	
	Subsection	Toimi	Toimi Uplands	Toimi	Toimi		Toimi	Toimi Uplands	Toimi	Toimi		Toimi	Toimi Uplands	Toimi	Toimi	
	Forest	Jack pine	Jack pine	Jack pine	Jack pine		Tamarack	Tamarack	Tamarack	Tamarack		Tamarack	Tamarack	Tamarack	Tamarack	
	Site class	All	All	All	All	DFFC %	<40	<40	<40	<40	DFFC %	>39	>39	>39	>39	DFFC %
Stand age (10 yr classes) Estimate of acres	Total	7,430	3,698				2,790	5,001				10,804	2,592			
	0 - 10	0	788			0.15	0	75			0.09	0	156			0.11
	11 - 20	1,557	463			0.15	0	0			0.09	0				0.11
	21 - 30	0	375			0.15	0	0			0.09	0	89			0.11
	31 - 40	0	344			0.15	0	7			0.09	0	32			0.11
	41 - 50	0	130			0.15	645	66			0.09	2,975	48			0.11
	51 - 60	2,936	42			0.15	0	37			0.09	0	136			0.11
	61 - 70	0	176			0.06	1,652	43			0.09	0	108			0.11
	71 - 80	0	776			0.03	0	231			0.09	4,525	279			0.11
	81 - 90	2,936	191			0.00	493	799			0.09	3,304	860			0.07
	91 - 100		263			0.00		3218			0.09		455			0.04
	101 - 110		53			0.00		316			0.03		155			0.03
	111 - 120		97			0.00		80			0.03		187			0.01
	121 - 130					0.00		20			0.03		41			0.00
	131 - 140					0.00		46			0.02		27			0.00
	141 - 150					0.00		50			0.01		0			0.00
	151 - 175							14			0.00		18			
	176 - 200										0.00					
	201+										0.00					
95% CI	Total	11281		11281			4543		0			9036		9036		
	0 to 10	0		0			0		0			0		0		
	11 to 20	0		0			0		0			0		0		
	21 to 30	0		0			0		0			0		0		
	31 to 40	0		0			0		0			0		0		
	41 to 50	0		0			0		0			0		0		
	51 to 60	0		0			0		0			0		0		
	61 to 70	0		0			0		0			0		0		
	71 to 80	0		0			0		0			31317		31317		
	81 to 90	0		0			0		0			0		0		
	91 to 100	0		0			0		0			0		0		
	101 to 110	0		0			0		0			0		0		
	111 to 120	0		0			0		0			0		0		
	121 to 130	0		0			0		0			0		0		
	131 to 140	0		0			0		0			0		0		
	141 to 150	0		0			0		0			0		0		
	151 to 175	0		0			0		0			0		0		
	176 to 200	0		0			0		0			0		0		
	201+	0		0			0		0			0		0		

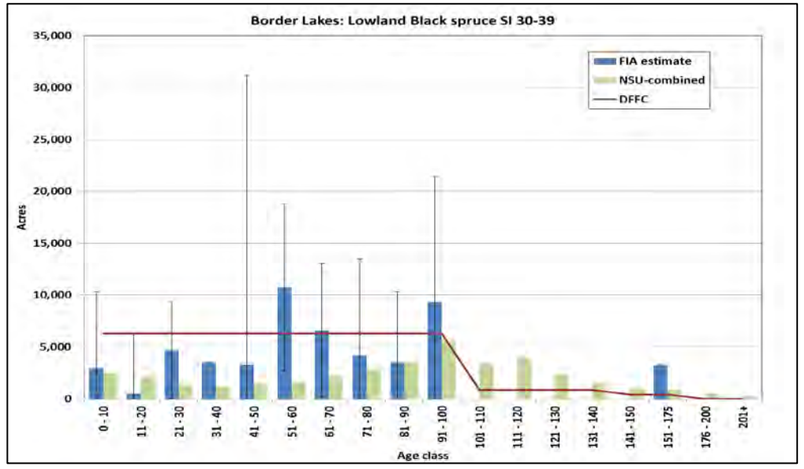
Figure 9.2. Age-class distribution charts for forest cover types in the Border Lakes Subsection

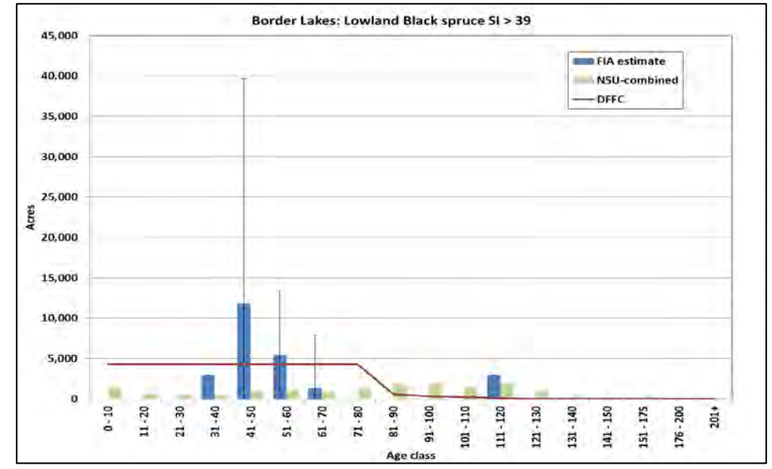
Each cover type, or cover type subset by site index is displayed in an individual chart.











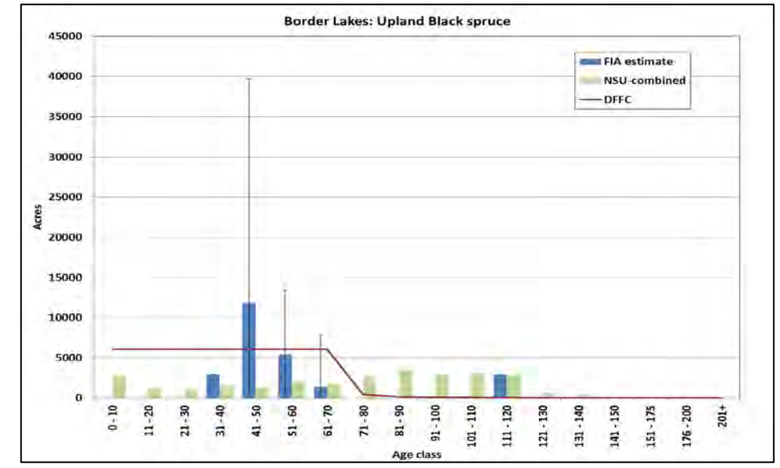
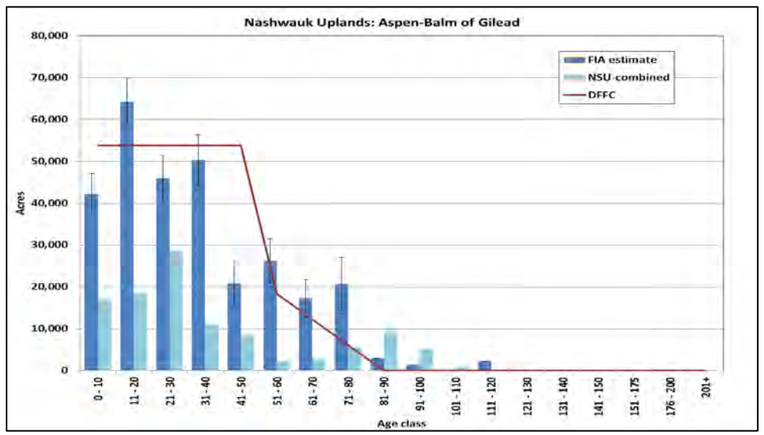
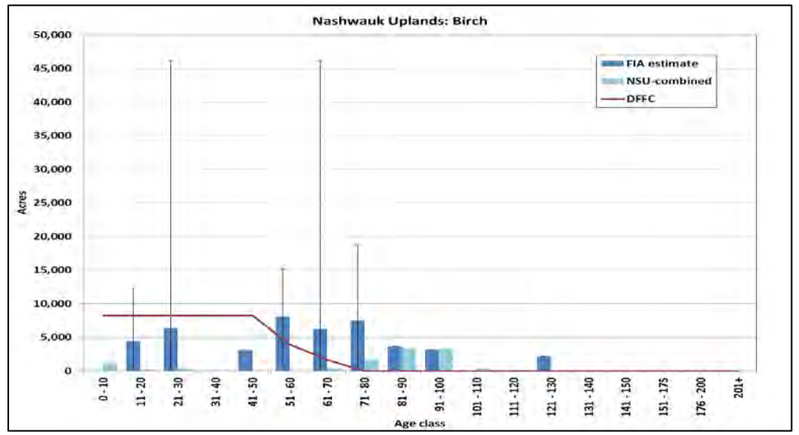
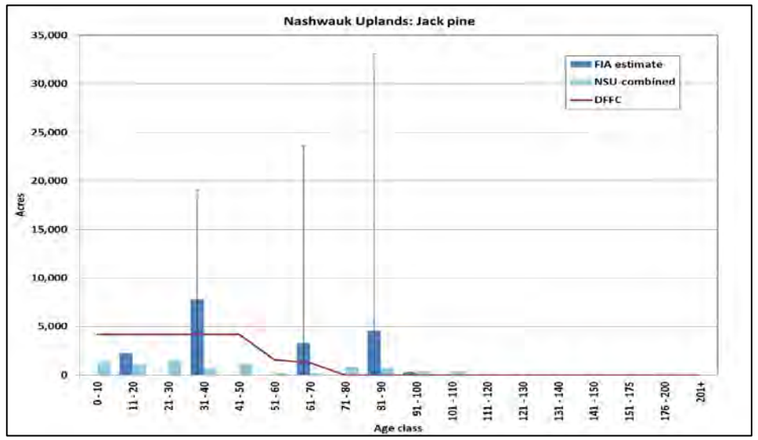


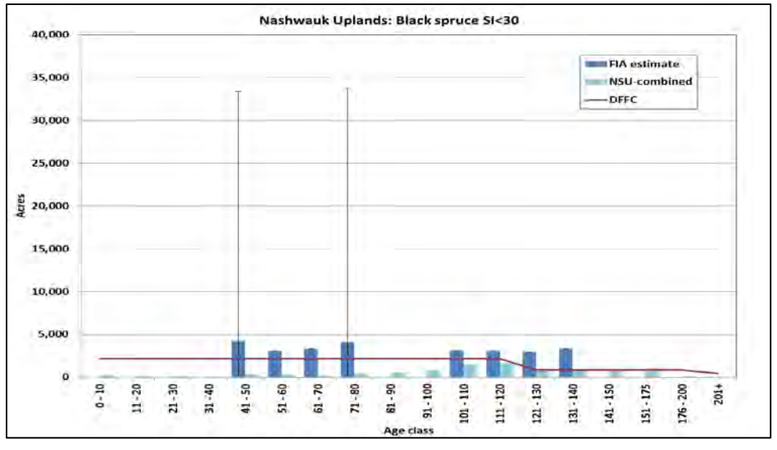
Figure 9.3. Age-class distribution charts for forest cover types in the Nashwauk Uplands Subsection

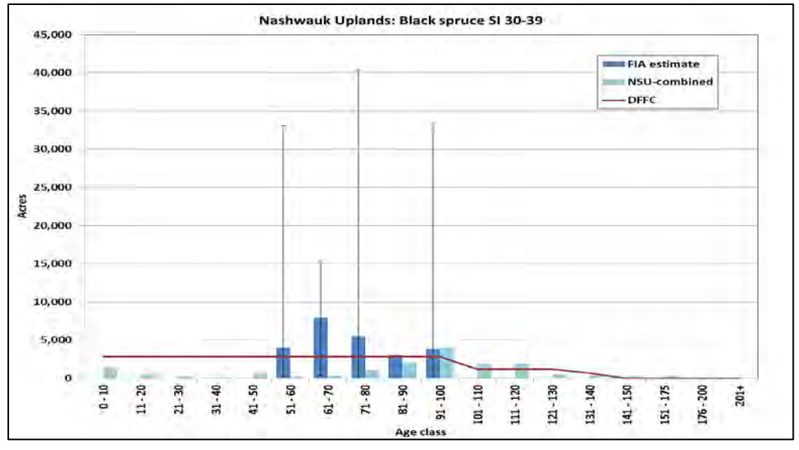
Each cover type, or cover type subset by site index is displayed in an individual chart.

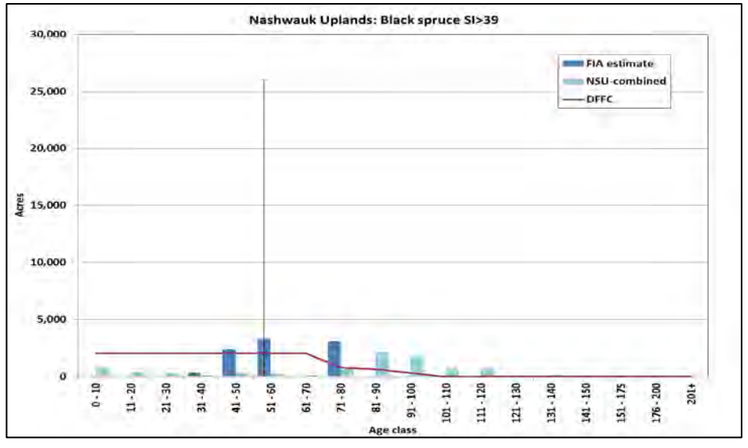


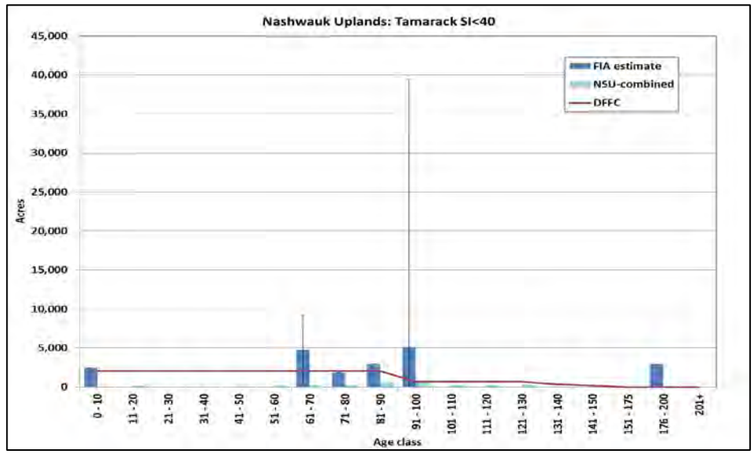


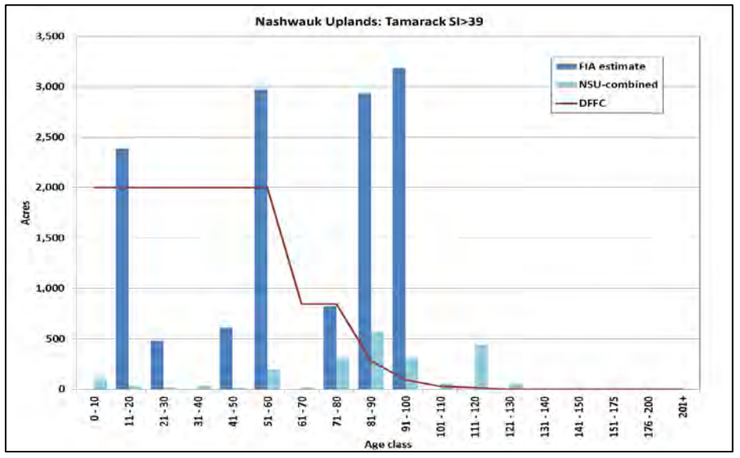









Nashwauk Uplands: Tamarack SI<40
FIA estimate
NSU-combined
DFFC
Acres
Age class
0 - 10
11 - 20
21 - 30
31 - 40
41 - 50
51 - 60
61 - 70
71 - 80
81 - 90
91 - 100
101 - 110
111 - 120
121 - 130
131 - 140
141 - 150
151 - 175
176 - 200
201+


Nashwauk Uplands: Tamarack SI>39
FIA estimate
NSU-combined
DFFC
Acres
Age class

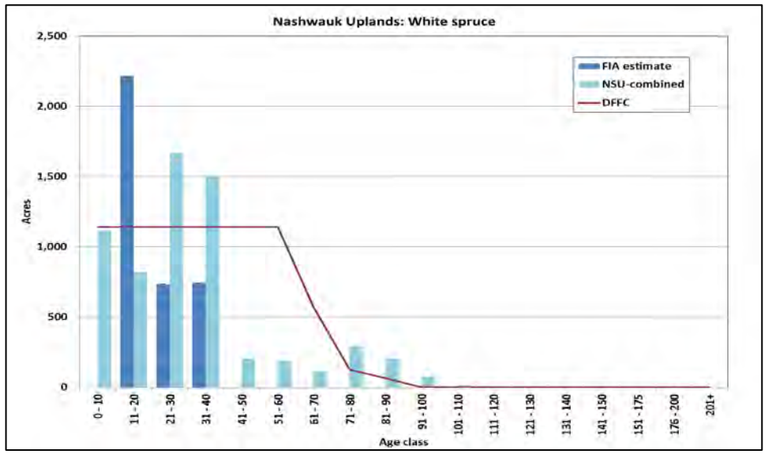
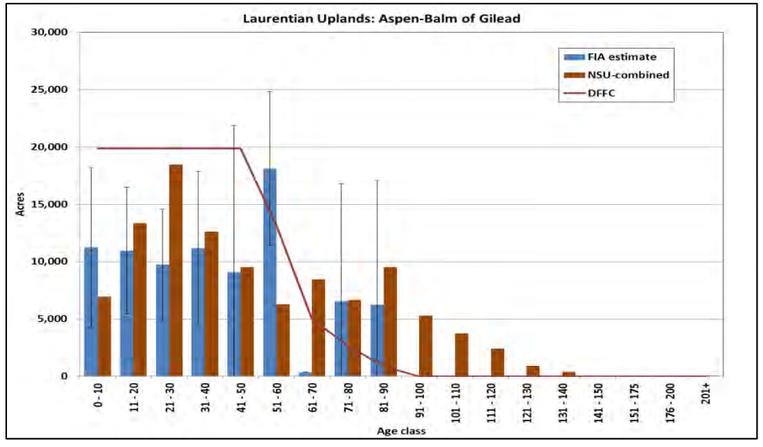
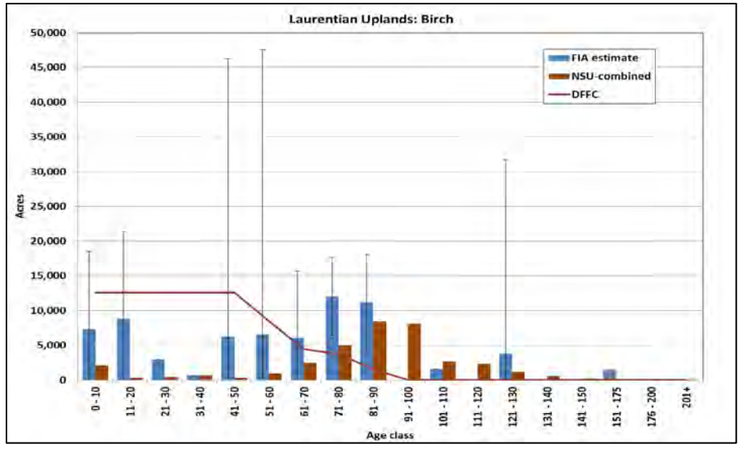
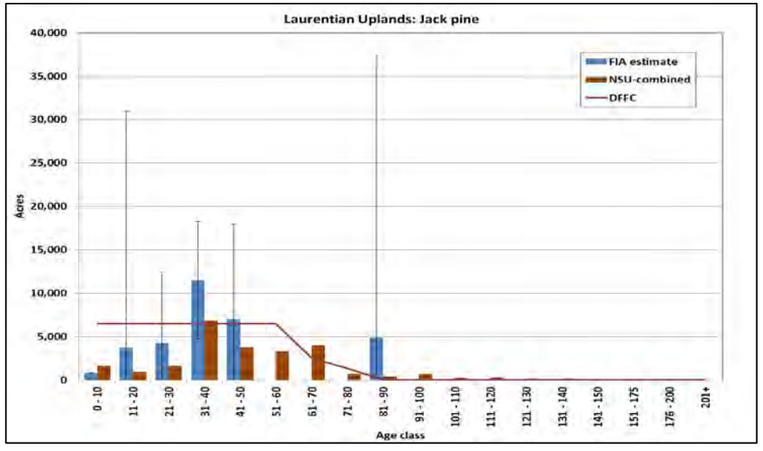

Nashwauk Uplands: White spruce
FIA estimate
NSU-combined
DFFC
Acres
Age class

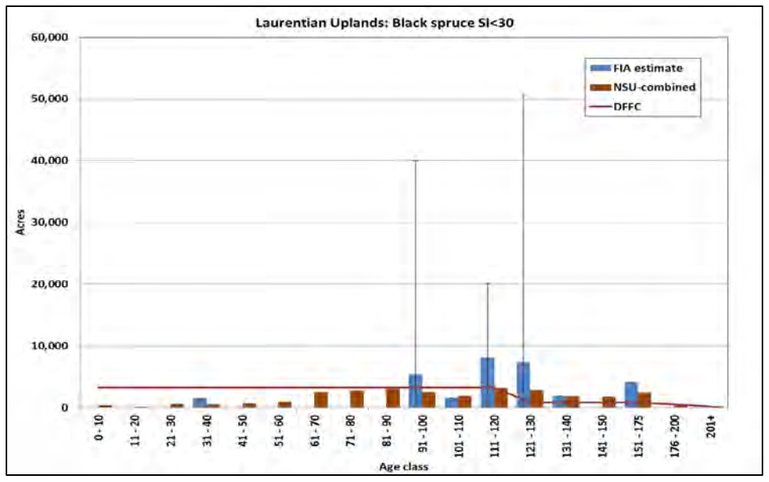
Figure 9.4. Age-class distribution charts for forest cover types in the Laurentian Uplands Subsection

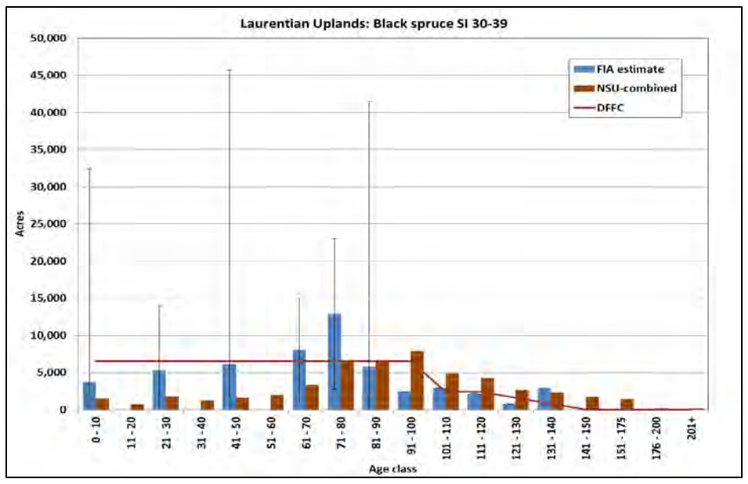
Each cover type, or cover type subset by site index is displayed in an individual chart

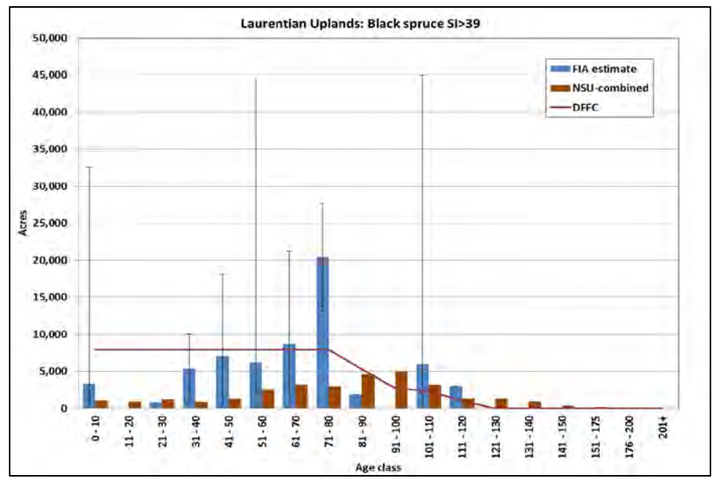


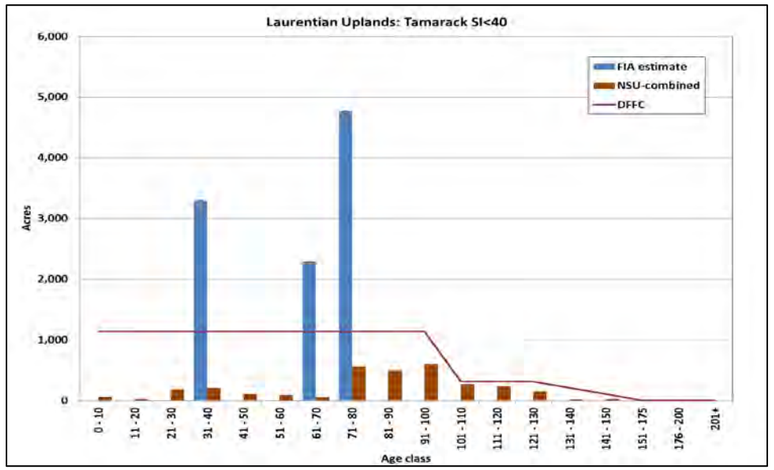


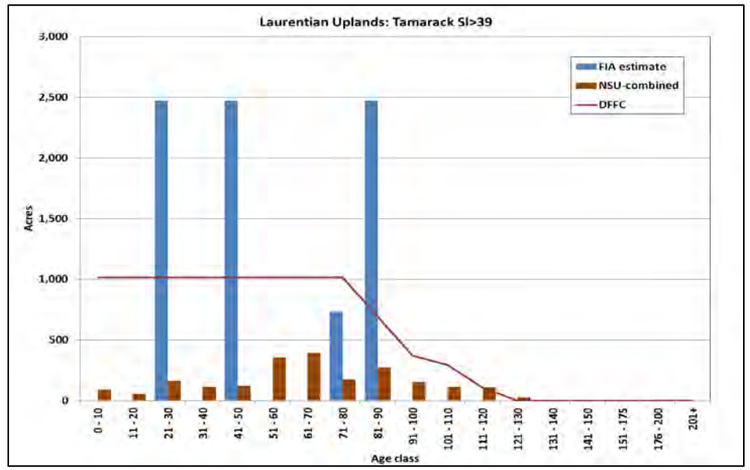









Laurentian Uplands: Tamarack SI<40
FIA estimate
NSU-combined
DFFC
Acres
6,000
5,000
4,000
3,000
2,000
1,000
0
0 - 10
11 - 20
21 - 30
31 - 40
41 - 50
51 - 60
61 - 70
71 - 80
81 - 90
91 - 100
101 - 110
111 - 120
121 - 130
131 - 140
141 - 150
151 - 175
176 - 200
201+
Age class


Laurentian Uplands: Tamarack SI>39
FIA estimate
NSU-combined
DFFC
Acres
3,000
2,500
2,000
1,500
1,000
500
0
0 - 10
11 - 20
21 - 30
31 - 40
41 - 50
51 - 60
61 - 70
71 - 80
81 - 90
91 - 100
101 - 110
111 - 120
121 - 130
131 - 140
141 - 150
151 - 175
176 - 200
201+
Age class

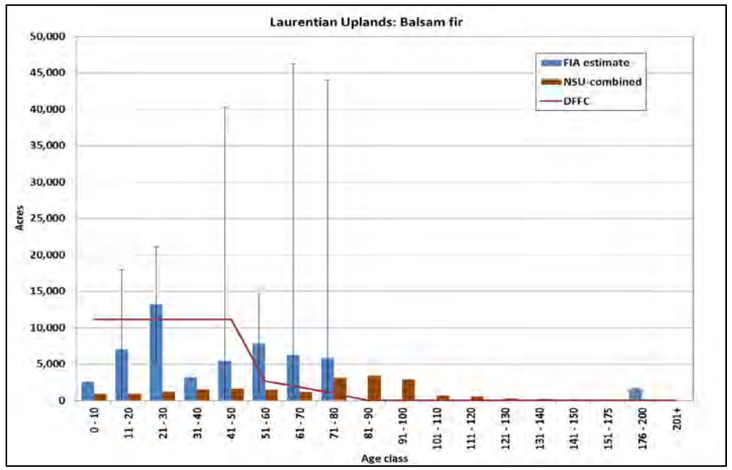
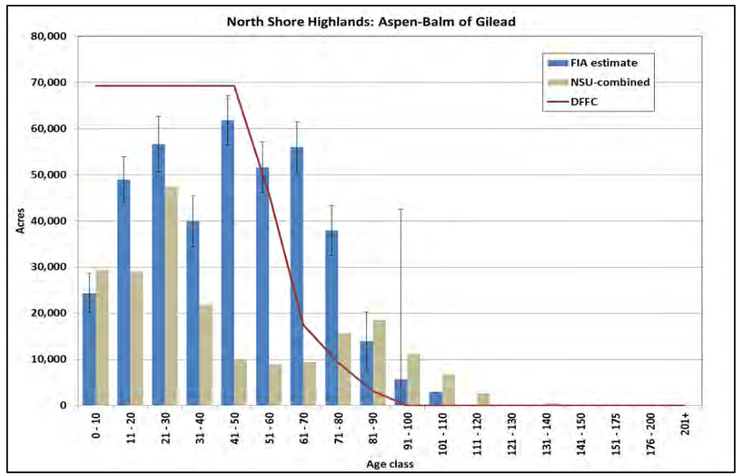
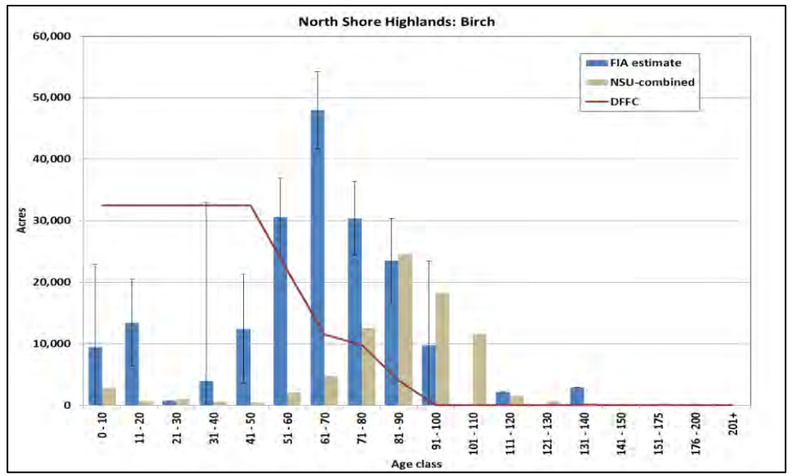
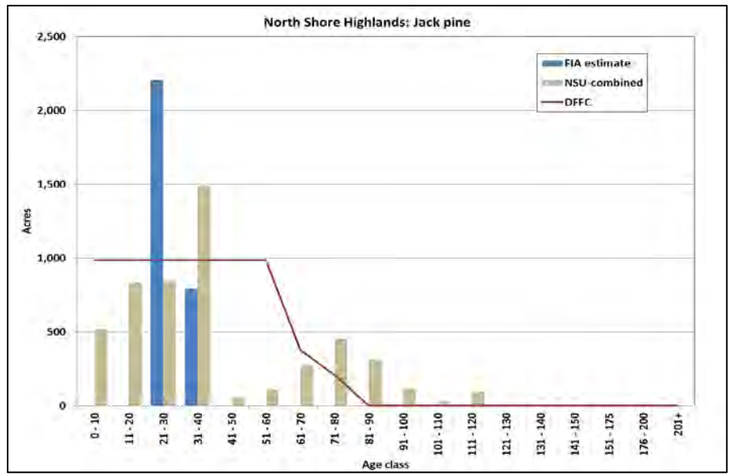

Laurentian Uplands: Balsam fir
FIA estimate
NSU-combined
DFFC
Acres
50,000
45,000
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
0 - 10
11 - 20
21 - 30
31 - 40
41 - 50
51 - 60
61 - 70
71 - 80
81 - 90
91 - 100
101 - 110
111 - 120
121 - 130
131 - 140
141 - 150
151 - 175
176 - 200
201+
Age class

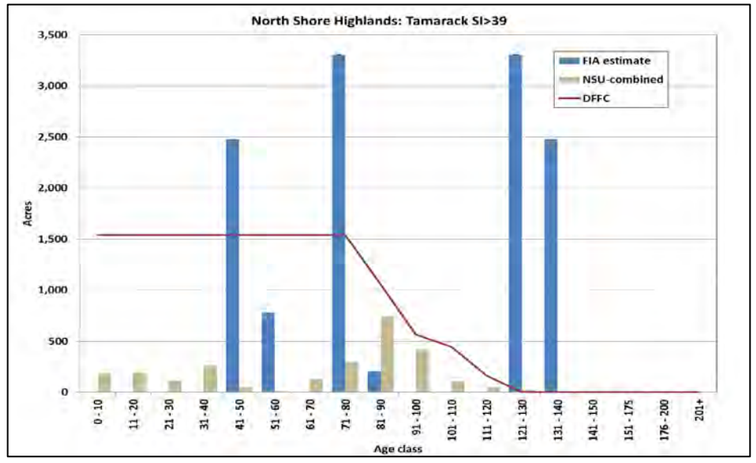
Figure 9.5. Age-class distribution charts for forest cover types in the North Shore Highlands Subsection

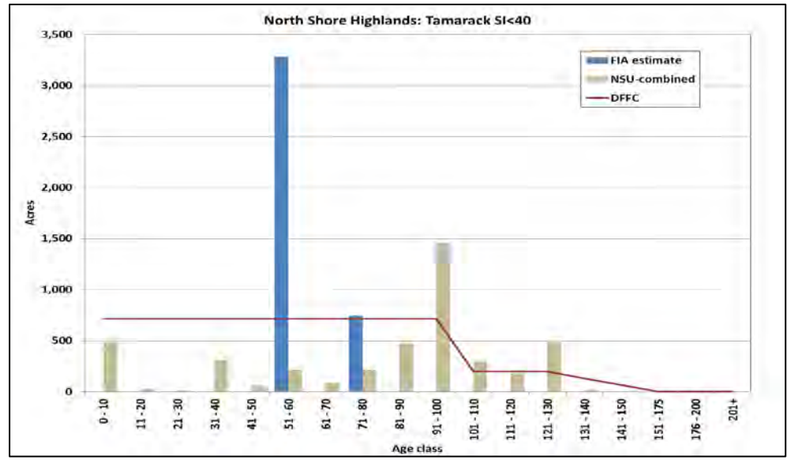
Each cover type, or cover type subset by site index is displayed in an individual chart

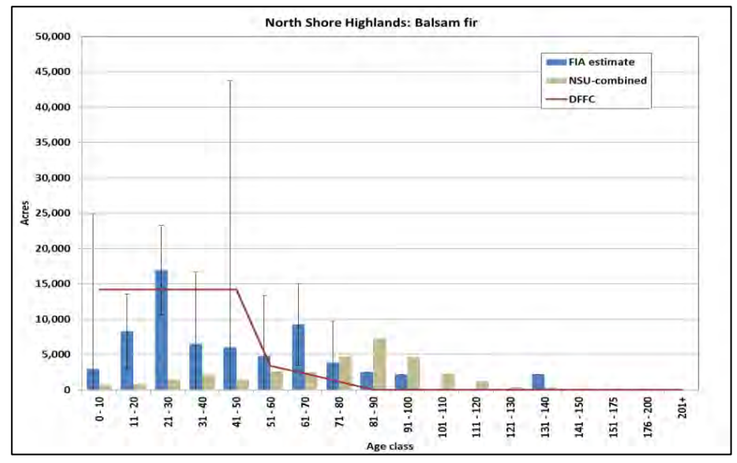


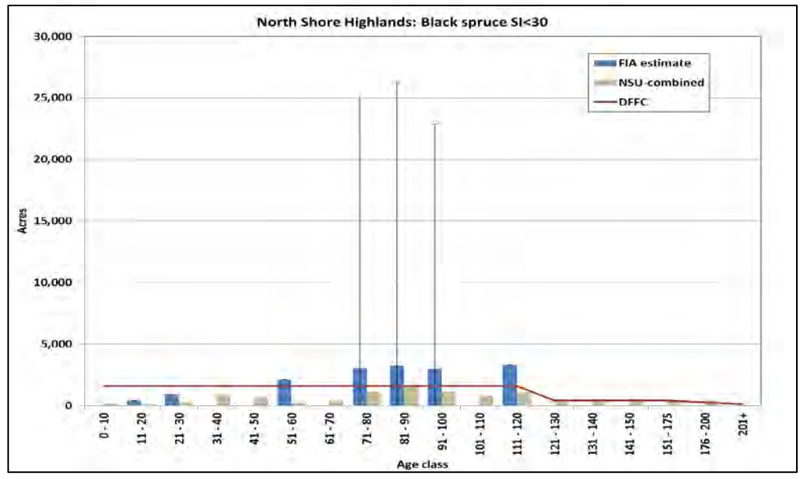


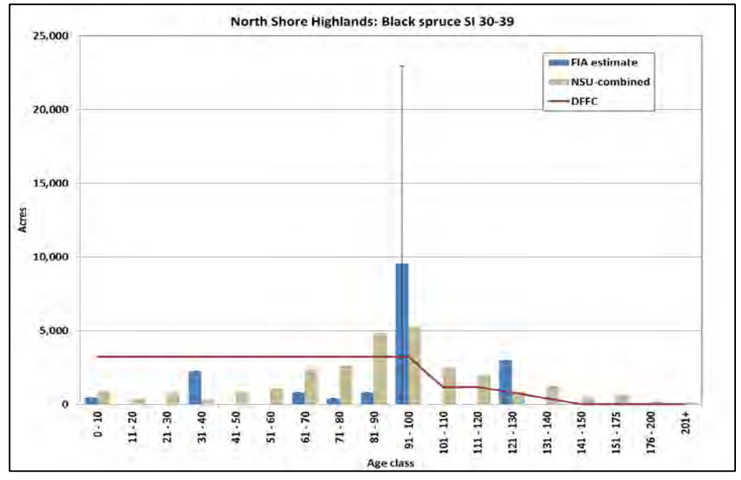












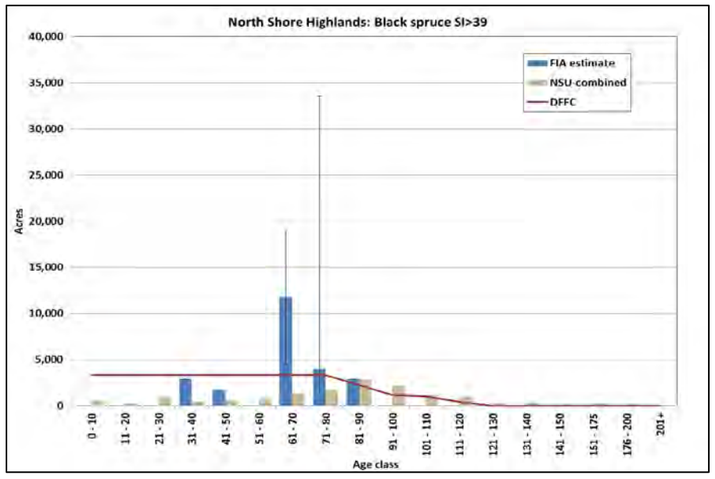
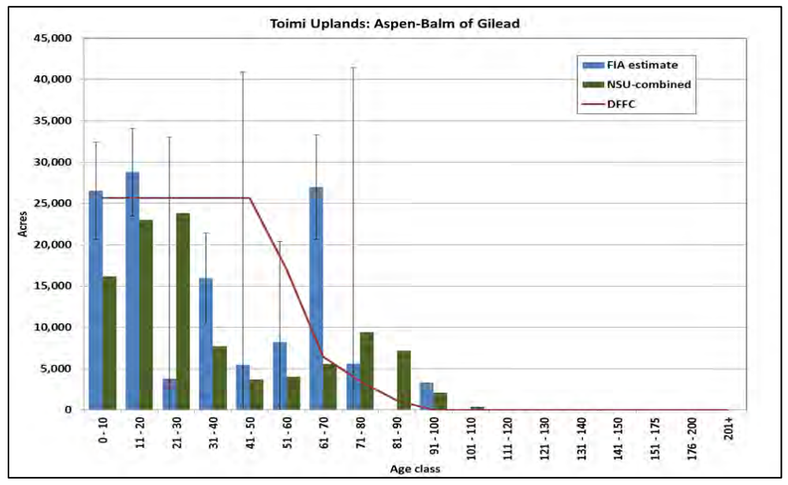
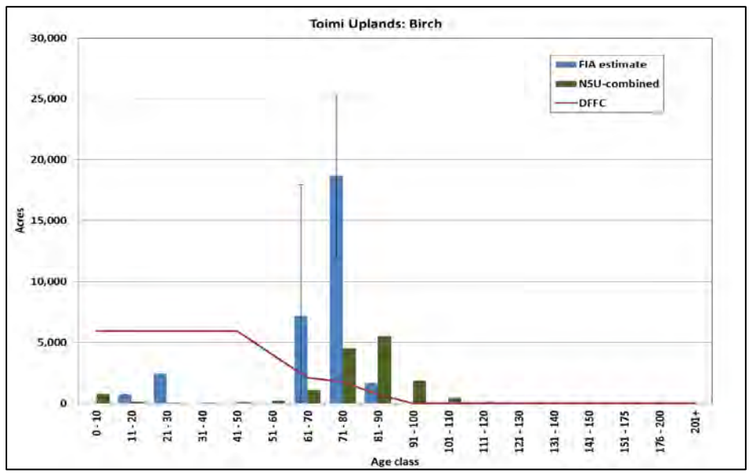
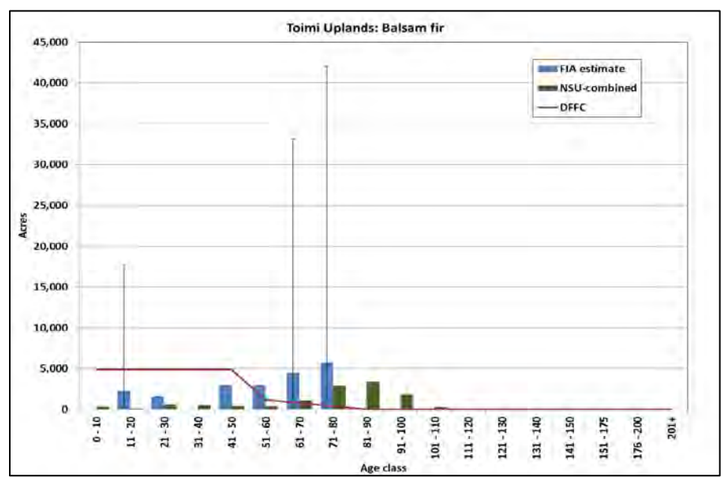


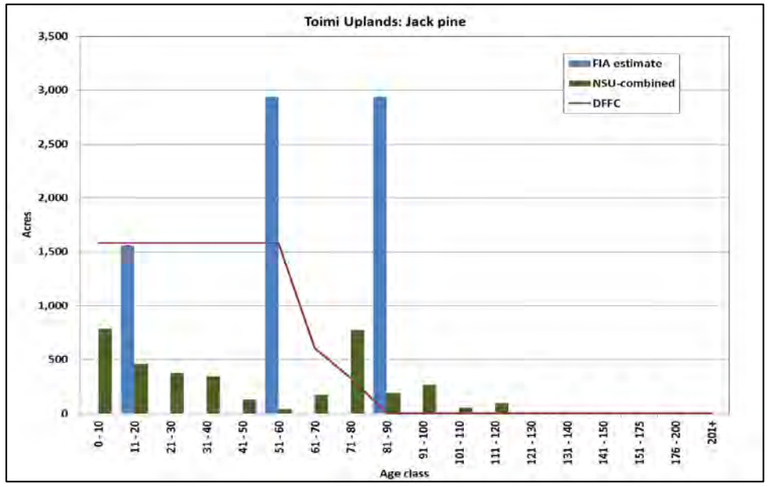
Figure 9.6. Age-class distribution charts for forest cover types in the Toimi Uplands Subsection

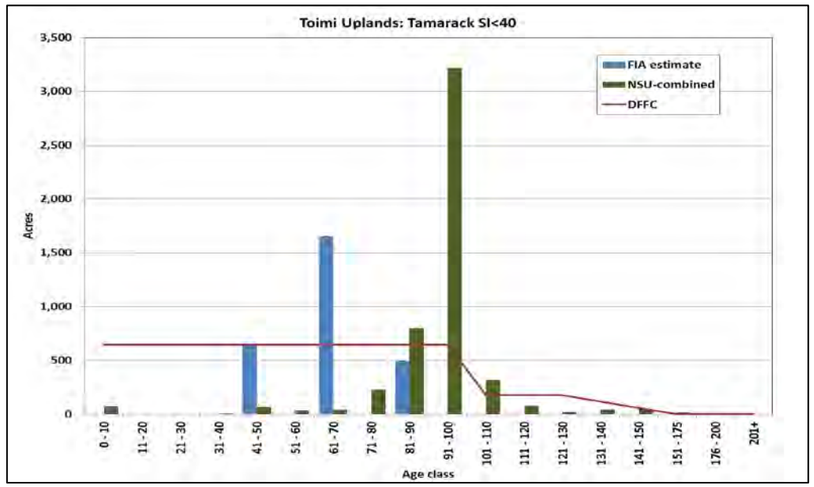
Each cover type, or cover type subset by site index is displayed in an individual chart

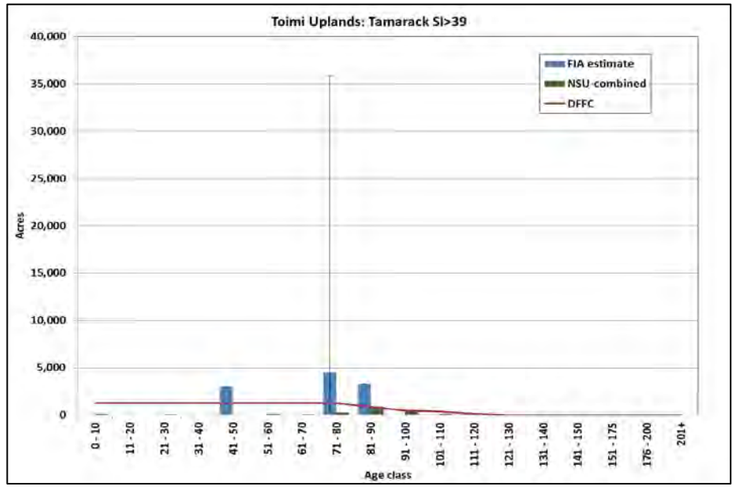


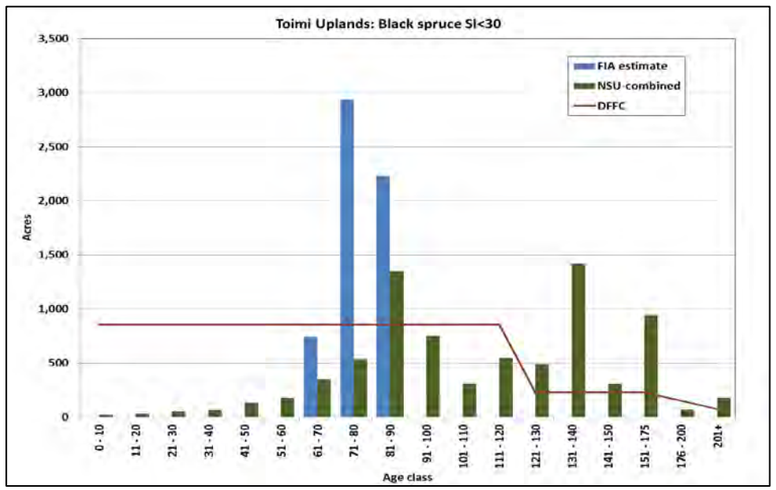


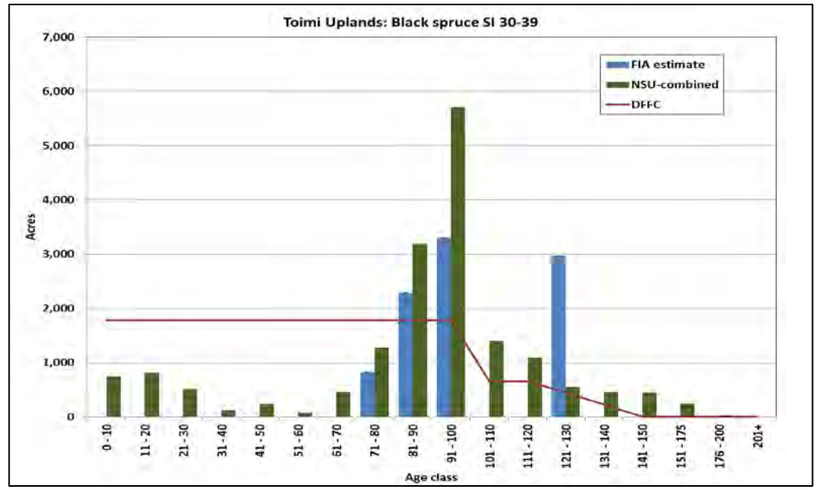


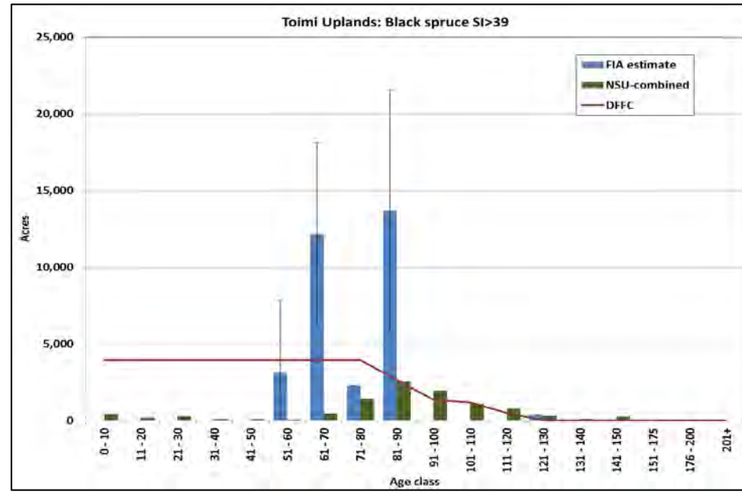

Toimi Uplands: Jack pine
FIA estimate
NSU-combined
DFFC
Acres
Age class
0 - 10
11 - 20
21 - 30
31 - 40
41 - 50
51 - 60
61 - 70
71 - 80
81 - 90
91 - 100
101 - 110
111 - 120
121 - 130
131 - 140
141 - 150
151 - 175
176 - 200
201+


Toimi Uplands: Tamarack SI<40
FIA estimate
NSU-combined
DFFC
Acres
Age class


Toimi Uplands: Tamarack SI>39
FIA estimate
NSU-combined
DFFC
Acres
Age class


Toimi Uplands: Black spruce SI<30
FIA estimate
NSU-combined
DFFC
Acres
Age class


Toimi Uplands: Black spruce SI 30-39
FIA estimate
NSU-combined
DFFC
Acres
Age class


Toimi Uplands: Black spruce SI>39
FIA estimate
NSU-combined
DFFC
Acres
Age class

Appendix E: Representative Sample Areas (RSAs)

(excerpt from Minnesota DNR RSA Fact Sheet)

What Are RSAs?

FSC's Definition and Guidance

"Representative Sample Areas (RSAs) are ecologically viable representative samples designated to serve one or more of three purposes:

1) To establish and/or maintain an ecological reference condition; or
2) To create or maintain an under-represented ecological condition …; or
3) To serve as a set of protected areas or refugia for species, communities and community types not captured in other Criteria of this Standard.

One of the primary provisions in FSC Criterion 6.4 is to ensure that examples of ecosystem types that are not protected elsewhere in this Standard are protected in their natural state within the landscape.

As a general guideline, if at least five (5) multiple samples of a specific ecosystem type are protected in a landscape (e.g., ecological section) then no additional samples for that RSA purpose need to be protected … Five is not to be considered an absolute number; fewer or more might be appropriate …"

Note: The language above is a direct excerpt from FSC- US' National Forest Management Standard – Draft 8.1. This language is subject to change as FSC-US works to finalize their new National Standard in July 2010. Updated information will be provided as needed.

FSC's RSA Requirements

Criterion 6.4 of the Forest Stewardship Certification Council (FSC) US Standard requires that ***"Representative samples of existing ecosystems within the landscape shall be protected in their natural state and recorded on maps, appropriate to the scale and intensity of operations and the uniqueness of the affected resources."*** In order to satisfy this criterion, the land manager must conduct an analysis to identify gaps in the protection of existing ecosystems within each section across the forest management unit. *(In the case of the DNR, the forest management unit is all DNR Forestry and Wildlife lands within the certified portion of the state.)* When identifying such gaps, managers of certified lands may

take into account those ecosystems/sites that are protected on state lands and other ownerships, such as SNAs, State Parks, National Parks, USFS wilderness areas, and TNC preserves.

Therefore, identifying and protecting RSAs will compliment, rather than duplicate, other efforts.

How Are RSAs Identified?

For Minnesota DNR, identification of potential RSAs dates back to several previous corrective action requests (CARs), assigned after the 2005, 2007 and 2008 audits. Earlier CARs required DNR to complete gap analyses at an Ecological Classification System (ECS) Section level, to identify opportunities that exist on DNR Forestry and Wildlife lands to protect examples of native plant communities (NPCs) that were not protected or poorly represented elsewhere within the landscape. To date, DNR has completed RSA gap analyses for seven of eight ECS Sections (Minnesota DNR's response to FSC Minor CAR 2007.1), plus an earlier gap analysis in the Blufflands subsection (see pilot project below). Per FSC guidance (above), protected DNR lands (State Parks, SNAs, Old Growth, etc.) plus protected lands in other ownerships were taken into account during development and review of the gap-analyses.

Management Implications and Site Designations

Minnesota DNR has carefully reviewed Indicator 6.4.c in FSC-US' Draft Standard, which reads, "Management activities within RSAs are limited to low impact activities compatible with the protected RSA objectives …" RSA site objectives must center around restoring, maintaining, or protecting the ecological condition or NPC for which the site was identified. Timber harvest activities can be conducted in RSAs when they contribute to the RSA objectives. Management options such as tree and shrub removal in oak woodlands/savannas, controlling invasive non-native species, conducting controlled burns to maintain or restore the desired NPC or successional stage, and management for disease and pest control are also appropriate.

Minnesota DNR is required to set short-term RSA targets, demonstrate that those targets have been met, and ensure that sites selected to serve as RSAs are managed in accordance with the FSC-US Standard. In response to its 2008 Major CAR, MN DNR proposed that sites selected to serve as samples of representative ecosystems, be managed under Natural Area Registry Agreements (Registry Agreements). (See page 5 of DNR's "Interdisciplinary Management Coordination Framework" document for more information on Registry Agreements) Registry Agreements and associated Memoranda of Understanding (yet to be developed) will eventually guide future management of these sites.

Until these Registry Agreements are completed, any proposed management within selected sites must be approved by the Regional RSA Project Team(s).

Current Status

Minnesota DNR has made significant progress since receiving its first RSA-related CAR following the 2007 audit. Examples of this progress include:

Step 1 – Formation of Interdisciplinary RSA Project Teams:

Interdisciplinary project teams were assigned to fill the gaps in the existing network of protected ecosystems have based on short term targets.

Step 3 – RSA Site Selection:

The RSA Project Teams were charged with the task of reviewing the short-term targets and selecting specific sites to serve as RSAs based on the identified opportunities. One site is still under review for selection within the NSU planning area. Other sites were selected based on the size and quality of the NPC, the presence of adjacent NPCs that could also be recommended for protection, and the ability to manage the sites to protect their ecological integrity. Because this process will be part of an ongoing, long-term effort, the RSA Project Teams, will receive communication, guidance, and some oversight from FCIT, Regional Managers, and Regional Directors.

Step 4 – Development of Natural Area Registry Agreements to guide management:

The RSA Project Teams, in cooperation with the SNA program, are working to formally protect selected sites via the development of Registry Agreements.

Step 5 – Long-Term Targets:

Minnesota DNR believes that its long-term goals must be flexible and continue to evolve as new data become available. While specific targets have not been established, DNR has developed a process and criteria for identifying the long-term targets. Essentially, DNR accepts FSC-US' suggested goal of protecting "five" examples of each NPC type per Section as an appropriate starting point, while

recognizing that for many NPCs, the portion for which DNR should be responsible will be reduced by a variety of factors. These are clearly outlined in DNR's 2009.1 CAR response.

Appendix F: Native Plant Community Conservation Status Ranks (S-ranks)

The native plant community (NPC) types and subtypes recognized in Minnesota have been assigned conservation status ranks (S-Ranks) that reflect the risk of elimination of the community from Minnesota. There are five ranks:

S1 = critically imperiled
S2 = imperiled
S3 = vulnerable to extirpation
S4= apparently secure; uncommon but not rare
S5 = secure, common, widespread, and abundant

These ranks are determined using methodology developed by the conservation organization NatureServe and its member natural heritage programs in North America. S-ranks were assigned to Minnesota's NPC types and subtypes based on information compiled by DNR plant ecologists on: 1) geographic range or extent; 2) area of range occupied; 3) number of occurrences; 4) number of good occurrences, or percent area of occurrences with good viability and ecological integrity; 5) environmental specificity; 6) long-term trend; 7) short-term trend; 8) scope and severity of major threats; and 9) intrinsic vulnerability.

A range in rank (for example*, S1S2*) indicates there is uncertainty in conservation status but it falls within a given range. For NPC types that are divided into subtypes, the S-rank of the NPC type is listed as the possible S-ranks for the subtypes (for example*, S1 or S2*)

(http://files.dnr.state.mn.us/natural_resources/npc/s_ranks_npc_types_&_subtypes.pdf)

Table 9.7. Northern Superior Uplands NPC Conservation Status Ranks (S-ranks)

NPC	Type Name	State Rank*
OW	Other Water Body	NA
AFP_CX	Alder Swamp/Forested Peatland Complex	NA
APn80	Northern Spruce Bog	S4
APn80a	Black Spruce Bog	S4
APn80a1	Black Spruce Bog: Treed Subtype	S4
APn80a2	Black Spruce Bog: Semi-Treed Subtype	S4
APn81	Northern Poor Conifer Swamp	S4 or S5
APn81a	Poor Black Spruce Swamp	S5
APn81b	Poor Tamarack - Black Spruce Swamp	S4
APn81b1	Poor Tamarack - Black Spruce Swamp: Black Spruce Subtype	S4
APn81b2	Poor Tamarack - Black Spruce Swamp: Tamarack Subtype	S4
APn90	Northern Open Bog	S2 or S3 or S4
APn90a	Low Shrub Bog	S4S5
APn90b	Graminoid Bog	S2 or S3 or S4
APn90b1	Graminoid Bog: Typic Subtype	S4
APn91	Northern Poor Fen	S3 or S4 or S5
APn91a	Low Shrub Poor Fen	S5
APn91b	Graminoid Poor Fen (Basin)	S3
APn91c	Graminoid Poor Fen (Water Track)	S3 or S4
APn91c1	Graminoid Poor Fen (Water Track): Featureless Water Track Subtype	S4
APn91c2	Graminoid Poor Fen (Water Track): Flark Subtype	S3
BD_CX	Beaver Disturbed Complex	NA

NPC	Type Name	State Rank*
BW_CX	Beaver Wetland Complex	NA
BYF_CX	Blowdown Young Forest Complex	NA
CSW_CX	Conifer Swamp Complex NA	NA
CTn11	Northern Dry Cliff	S1 or S2 or S3 or S4
CTn11a	Dry Mafic Cliff (Northern)	S4
CTn11b	Dry Rove Cliff (Northern)	S2
CTn11d	Dry Felsic Cliff (Northern)	S3
CTn12a	Dry Open Talus (Northern)	S3
CTn12b	Mesic Open Talus (Northern)	S2
CTn24	Northern Scrub Talus	S3
CTn24a	Dry Scrub Talus (Northern)	S3
CTn24b	Mesic Scrub Talus (Northern)	S3
CTn32	Northern Mesic Cliff	S1 or S2 or S3
CTn32a	Mesic Mafic Cliff (Northern)	S3
CTn32b	Mesic Rove Cliff (Northern)	S3
CTn32c	Mesic Thomson Cliff (Northern)	S1
CTn32d	Mesic Felsic Cliff (Northern)	S2
CTn42a	Wet Mafic Cliff (Northern)	S2
CTn42b	Wet Rove Cliff (Northern)	S1
CTn42c	Wet Felsic Cliff (Northern)	S1
CTn42d	Wet Sandstone Cliff (Northern)	S1
CTu22a	Exposed Mafic Cliff (Lake Superior)	S3
CTu22b	Exposed Felsic Cliff (Lake Superior)	S2
CTu22c	Sheltered Mafic Cliff (Lake Superior)	S1

NPC	Type Name	State Rank*
DCT_CX	Dry Mafic Cliff (Northern/Northern Talus Complex	NA
DPW_CX	Dry Prairie - Woodland Complex - Central	NA
FCT_CX	Felsic Cliff (Northern)/Northern Talus Complex	NA
FDc34	Central Dry - Mesic Pine - Hardwood Forest	S2 or S3
FDn12	Northern Dry - Sand Pine Woodland	S2
FDn12b	Red Pine Woodland (Sand)	S2
FDn22	Northern Dry - Bedrock Pine (Oak) Woodland	S2 or S3
FDn22a	Jack Pine Woodland (Bedrock)	S3
FDn22b	Red Pine - White Pine Woodland (Northeastern Bedrock)	S3
FDn22c	Pin Oak Woodland (Bedrock)	S3
FDn32	Northern Poor Dry-Mesic Mixed Woodland	S1 or S2 or S3
FDn32a	Red Pine - White Pine Woodland (Canadian Shield)	S3
FDn32b	Red Pine - White Pine Woodland (Minnesota Point)	S1
FDn32c	Black Spruce - Jack Pine Woodland	S2 or S3
FDn32c1	Black Spruce - Jack Pine Woodland: Jack Pine - Balsam Fir Subtype	S2
FDn32c2	Black Spruce - Jack Pine Woodland: Black Spruce - Feathermoss Subtype	S3
FDn32c3	Black Spruce - Jack Pine Woodland: Jack Pine - Black Spruce - Aspen Subtype	S3
FDn32d	Jack Pine - Black Spruce Woodland (Sand)	S2
FDn32e	Spruce - Fir Woodland (North Shore)	S1
FDn33	Northern Dry-Mesic Mixed Woodland	S2 or S3 or S5
FDn33a	Red Pine - White Pine Woodland	S3
FDn33a1	Red Pine - White Pine Woodland: Balsam Fir Subtype	S3
FDn33a2	Red Pine - White Pine Woodland: Mountain Maple Subtype	S3

NPC	Type Name	State Rank*
FDn33b	Aspen - Birch Woodland	S5
FDn33c	Black Spruce Woodland	S2
FDn43	Northern Mesic Mixed Forest	S2 or S3 or S4 or S5
FDn43a	White Pine - Red Pine Forest	S2
FDn43b	Aspen - Birch Forest	S5
FDn43b1	Aspen - Birch Forest: Balsam Fir Subtype	S5
FDn43b2	Aspen - Birch Forest: Hardwood Subtype	S5
FDn43c	Upland White Cedar Forest	S3
FFn57a	Black Ash - Silver Maple Terrace Forest	S3
FFn67a	Silver Maple (Sensitive Fern) Floodplain Forest	S3
FPn62a	Rich Black Spruce Swamp (Basin)	S3
FPn63	Northern Cedar Swamp	S3 or S4
FPn63a	White Cedar Swamp (Northeastern)	S4
FPn63b	White Cedar Swamp (Northcentral)	S3
FPn71a	Rich Black Spruce Swamp (Water Track)	S3
FPn72a	Rich Tamarack Swamp (Eastcentral)	S3
FPn73a	Alder - (Maple - Loosestrife) Swamp	S5
FPn81	Northern Rich Tamarack Swamp (Water Track)	S4
FPn82	Northern Rich Tamarack Swamp (Western Basin)	S4 or S5
FPn82a	Rich Tamarack - (Alder) Swamp	S5
FPn82b	Extremely Rich Tamarack Swamp	S4
FPs63a	Tamarack Swamp (Southern)	S3
FPT_CX	Forested Peatland/Upland Transition Complex	NA
FWMM_CX	Fen/Wet Meadow/Marsh Complex	NA

NPC	Type Name	State Rank*
JPSW_CX	Black Spruce Jack Pine Woodland Complex	NA
LKi32a	Sand Beach (Inland Lake)	S1
LKi32b	Gravel/Cobble Beach (Inland Lake)	S2
LKi43a	Boulder Shore (Inland Lake)	S4
LKi43b	Bedrock Shore (Inland Lake)	S4
LKi54b2	Mud Flat (Inland Lake): Non-Saline Subtype	S3
LKu32a	Beachgrass Dune (Lake Superior)	S1
LKu32b	Juniper Dune Shrubland (Lake Superior)	S1
LKu32c	Sand Beach (Lake Superior)	S1
LKu32d	Beach Ridge Shrubland (Lake Superior)	S2
LKu32e	Gravel/Cobble Beach (Lake Superior)	S4
LKu43	Lake Superior Rocky Shore	S4
LKu43a	Dry Bedrock Shore (Lake Superior)	S4
LKu43b	Wet Rocky Shore (Lake Superior)	S2
LKu43b1	Wet Rocky Shore (Lake Superior): Cobble Subtype	S2
LKu43b2	Wet Rocky Shore (Lake Superior): Bedrock Subtype	S2
MCT_CX	Mesic Mafic Cliff (Northern)/Northern Talus Complex	NA
MF_PDMW_CX	Mesic Forest Poor Dry-Mesic Woodland Complex	NA
MHn35	Northern Mesic Hardwood Forest	S4
MHn35a	Aspen - Birch - Basswood Forest	S4
MHn35b	Red Oak - Sugar Maple - Basswood - (Bluebead Lily) Forest	S4
MHn44	Northern Wet-Mesic Boreal Hardwood-Conifer Forest	S2 or S3 or S4
MHn44a	Aspen - Birch - Red Maple Forest	S4
MHn44b	White Pine - White Spruce - Paper Birch Forest	S2

NPC	Type Name	State Rank*
MHn44c	Aspen - Fir Forest	S3S4
MHn44d	Aspen - Birch - Fir Forest	S3
MHn45	Northern Mesic Hardwood (Cedar) Forest	S2 or S3 or S4
MHn45a	Paper Birch - Sugar Maple Forest (North Shore)	S4
MHn45b	White Cedar - Yellow Birch Forest	S2
MHn45c	Sugar Maple Forest (North Shore)	S3
MHn46	Northern Wet-Mesic Hardwood Forest	S4
MHn46a	Aspen - Ash Forest	S4
MHn46b	Black Ash - Basswood Forest	S4
MHn47	Northern Rich Mesic Hardwood Forest	S3
MHn47a	Sugar Maple - Basswood - (Bluebead Lily) Forest	S3
MMS_CX	Meadow - Marsh - Fen-Swamp Complex	NA
MMWF_CX	Mesic Mix / Wet Forest Complex	NA
MRn83	Northern Mixed Cattail Marsh	S2
MRn83a	Cattail - Sedge Marsh (Northern)	S2
MRn83b	Cattail Marsh (Northern)	S2
MRn93	Northern Bulrush - Spikerush Marsh	S2 or S3
MRn93a	Bulrush Marsh (Northern)	S3
MRn93b	Spikerush - Bur Reed Marsh (Northern)	S2
MRu94a	Estuary Marsh (Lake Superior)	S1
MSM_CX	Meadow- Shrub Swamp - Marsh - Wet-Mesic Hardwood Complex	NA
NPF_CX	Northern Poor Fen Complex	NA
NT_CX	Northern Talus Complex	NA
NWF_CX	Northwestern Upland Hardwood Forest Complex	NA

NPC	Type Name	State Rank*
OPn81	Northern Shrub Shore Fen	S5
OPn81a	Bog Birch - Alder Shore Fen	S5
OPn81b	Leatherleaf - Sweet Gale Shore Fen	S5
OPn91	Northern Rich Fen (Water Track)	S2 or S3 or S4
OPn91a	Shrub Rich Fen (Water Track)	S4
OPn91b	Graminoid Rich Fen (Water Track)	S2 or S3
OPn91b1	Graminoid Rich Fen (Water Track): Featureless Water Track Subtype	S3
OPn91b2	Graminoid Rich Fen (Water Track): Flark Subtype	S2
OPn92	Northern Rich Fen (Basin)	S4
OPn92a	Graminoid Rich Fen (Basin)	S4
OPn92b	Graminoid - Sphagnum Rich Fen (Basin)	S4
OSW_CX	Crystalline Bedrock Outcrop (Northern)/Bedrock Shrubland (Inland)/Woodland Complex	NA
ROn12	Northern Bedrock Outcrop	S2 or S4
ROn12a	Sandstone Outcrop (Northern)	S2
ROn12b	Crystalline Bedrock Outcrop (Northern)	S4
ROn23	Northern Bedrock Shrubland	S1 or S3
ROn23a	Bedrock Shrubland (Inland)	S3
ROn23b	Bedrock Shrubland (Lake Superior)	S1
RRS_CX	River/Rocky Shore Complex	NA
RRV_CX	Sand/Gravel/Cobble/Bedrock/Boulder Shore (River) Complex	NA
RSO_CX	Lake Superior Rocky Shore/Bedrock Shrubland/Bedrock Outcrop Complex	NA
RVx32a	Willow Sandbar Shrubland (River)	S4
RVx32b2	Sand Beach/Sandbar (River): Permanent Stream Subtype	S3

NPC	Type Name	State Rank*
RVx32c	Gravel/Cobble Beach (River)	S3
RVx32c2	Gravel/Cobble Beach (River): Permanent Stream Subtype	S3
RVx43a	Bedrock/Boulder Shore (River)	S3
RVx43a1	Bedrock/Boulder Shore (River): Intermittent Streambed Subtype	S3
RVx43a2	Bedrock/Boulder Shore (River): Permanent Stream Subtype	S3
RVx54a	Slumping Clay/Mud Slope (River)	S2
RVx54b	Clay/Mud Shore (River)	S3
RVx54b2	Clay/Mud Shore (River): Permanent Stream Subtype	S3
SFS_CX	Shrub Shore Fen/Low Gradient Stream Complex	NA
WFn53	Northern Wet Cedar Forest	S3 or S4
WFn53a	Lowland White Cedar Forest (North Shore)	S4
WFn53b	Lowland White Cedar Forest (Northern)	S3
WFn55	Northern Wet Ash Swamp	S3 or S4
WFn55a	Black Ash - Aspen - Balsam Poplar Swamp (Northeastern)	S4
WFn55c	Black Ash - Mountain Maple Swamp (Northern)	S4
WFn64	Northern Very Wet Ash Swamp	S4
WFn64a	Black Ash - Conifer Swamp (Northeastern)	S4
WFn64c	Black Ash - Alder Swamp (Northern)	S4
WFn74	Northern Wet Alder Swamp	S3
WFn74a	Alder - (Red Currant - Meadow Rue) Swamp	S3
WFWM_CX	Northern Wet Meadow Wet Forest Complex	NA
WMn82	Northern Wet Meadow/Carr	S4 or S5
WMn82a	Willow - Dogwood Shrub Swamp	S5
WMn82b	Sedge Meadow	S4 or S5

NPC	Type Name	State Rank*
WMn82b1	Sedge Meadow: Bluejoint Subtype	S5
WMn82b3	Sedge Meadow: Beaked Sedge Subtype	S4
WMn82b4	Sedge Meadow: Lake Sedge Subtype	S5
YF_CX	Young Forest Complex	NA

*S-rank is assigned at the type or subtype level. A range of ranks is provided at the class level in this list. NPC complexes are not ranked.
** These NPCs have been identified in the Rove Formation in the NSU, but have not been mapped.

Appendix G: G1-G2 Native Plant Communities (G1-G2 NPCs)

(**Excerpt** from MN DNR G1-G2 NPC Fact Sheet)

What Are G1-G2 NPCs?

The conservation status of native plant communities is assessed and documented at three distinct geographic scales: global (G), national (N), and state (S). Global ranks (G-ranks) are assigned by NatureServe. The conservation rank of native plant communities is based on a one to five scale:

1=critically imperiled
2=imperiled
3=vulnerable to extirpation or extinction
4=apparently secure
5 = demonstrably widespread, abundant, and secure

For example, a G1 rank indicates that a NPC is critically imperiled across its entire range (i.e., globally). In this sense, the community as a whole is regarded as being at very high risk of elimination.

SFI G1-G2 NPC Requirements

The Sustainable Forestry Initiative (SFI) certificate holders are required to have *"plans to locate and protect known sites associated with **viable** occurrences of critically imperiled and imperiled species and communities. Plans for protection may be developed independently or collaboratively and may include Program Participant management, cooperation with other stakeholders, or use of easements, conservation land sales, exchanges, or other conservation strategies."* (2005-2009 Sustainable Forestry Initiative Standard 4.1.3)

SFI does not required certificate holders who have information regarding NPCs existing on their lands to conduct new surveys or inventories. It is important to note that certificate holders are only required to protect ***viable*** G1-G2 NPCs.

What has been done to locate G1-G2 NPCs?

Using information obtained by the Minnesota County Biological Survey (MCBS), MN DNR has taken the following steps to locate known G1-G2 sites and make this information available to resource managers:

1) Ecological Resources GIS staff created a preliminary GIS cover including all the known and *potential* G1 and G2 NPC polygons.
2) This preliminary GIS cover was revised by:
   a. Removing polygons that were determined to not be G1 or G2 plant communities, and
   b. Removing very small polygons (<1.0 acre) that are either not viable or were the result of mapping errors by overlaying DNR Forestry and Wildlife ownership on existing NPC polygons.
3) This statewide GIS cover and list of known and *potential* G2 and G2 NPC polygons, along with written descriptions of National Vegetation Classification associations for these polygons, has been uploaded to the ftp site. (ftp://ftp.dnr.state.mn.us/pub/eco/HCVF/)

Management Implications

Management plans for G1 and G2 NPCs must identify *maintaining or enhancing* the ecological integrity of the NPC as the primary goal. (2005-2009 Sustainable Forestry Initiative Standard 4.1.3) Plans or prescriptions may range from no active management, prescribed fire, active management, or a combination where consistent with the primary goal for the site.

Current Status

Ecological Resources staff will annually update the GIS cover of G1 and G2 NPCs located on MN DNR's SFI-certified land base. Ecological Resources staff will alert Regional and Area Managers of new discoveries of G1-G2 NPC polygons within their work areas as soon as possible upon discovery.

Appendix H: Combined Public Land Forest Inventory Metadata

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DRAFT - February 21, 2014

Data Availability

Existing datasets received from federal and county lands for past work were utilized. The USFS and counties were also contacted by e-mail and asked to provide up-to-date data. No follow up was made for non-responses.

Table 9.8. Public land data used in the combined datasets for the NSU and NMOP sections

Dataset	Delivery Date	Contact	E-Mail
MN DNR CSA Data	Jan 2014	Paul Olson	paul.c.olson@state.mn.us
Superior National Forest	Nov 2013	Teresa Hanson	tmhanson@fs.fed.us
Chippewa National Forest	2011	Darryl Holman	dholman@fs.fed.us
Carlton County	2003	Greg Bernu	greg.bernu@co.carlton.mn.us
Itasca County	Feb 2007	Garrett Ous	garrett.ous@co.itasca.mn.us
Koochiching County	2006		
St. Louis County	Jan 2014	Tom Ziesler	zeislert@stlouiscountymn.gov
Lake County	Mar 2011		
Beltrami County	May 2013	DJ Bakken	DJ.bakken@co.beltrami.mn.us
Clearwater County	2004		

Data Processing

Where necessary (USFS and Itasca County data), cover types were reclassified to standard Minnesota cover types codes (MN_CTYPE, Table 2 and 3). Age information was used to calculate all stands to current age as of 2014. USFS NFS_LAND_C codes were converted to standard DNR timber status codes (Table 4). Inoperable stands (from CSA data and USFS data) were coded to timber status 10, and stands with no timber status information were coded to 99. Carlton stand inventory data seemed to be slightly off spatially and was manually moved to match PLS township and MN DNR CSA data boundaries.

Datasets were combined using the Union tool in ArcGIS using a 5 m tolerance. Only those stands with their centroid within the section boundary were included, with the exception of stands from the DNR CSA data that will be included in the NSU and NMOP plans. Where datasets overlapped, priority (i.e. source data used to populate the combined fields) was given to DNR CSA data where present, then to USFS National Forest data, and finally to county data. County data rarely overlapped other county data, but where this occurred selection was based on the county boundary). Features with an area of zero (i.e. no polygon for the record) were removed.

Data Attributes

Final attributes include source of the inventory data (SOURCE), MN cover type code (CTYPE), age in 2014 (AGE14), year of stand inventory (YEAR), site index (SI), site index species (SISPP), timber status indicating stands reserved from harvest but not those under development.