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Note: Large format color maps will be available for viewing at the open houses in Two Harbors and St. Paul. The maps (in color) and this report are available on CD and also the DNR Web site at <http://www.dnr.state.mn.us/forestry/subsection/northshorearea/index.html>.

APPENDIX A

Ecological Classification System (ECS)

Contents

- I. Definition
- II. Purpose
- III. End Products

I. Definition

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

Ecological Classification System 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, 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 association: Landscapes within subsections, characterized by glacial formations, bedrock types, topographic roughness, lake and stream patterns, depth to ground water table, and soil material. Example: Alexandria Moraine.

Land type: The individual elements of land type associations, defined by recurring patterns of uplands and wetlands, soil types, plant communities, and fire history. Example: fire-dependent xeric pine-hardwood association.

Community: Unique combinations of plants and soils within land types, defined by characteristic trees, shrubs and forbs, elevation, and soil moisture. Example: sugar maple-basswood forest

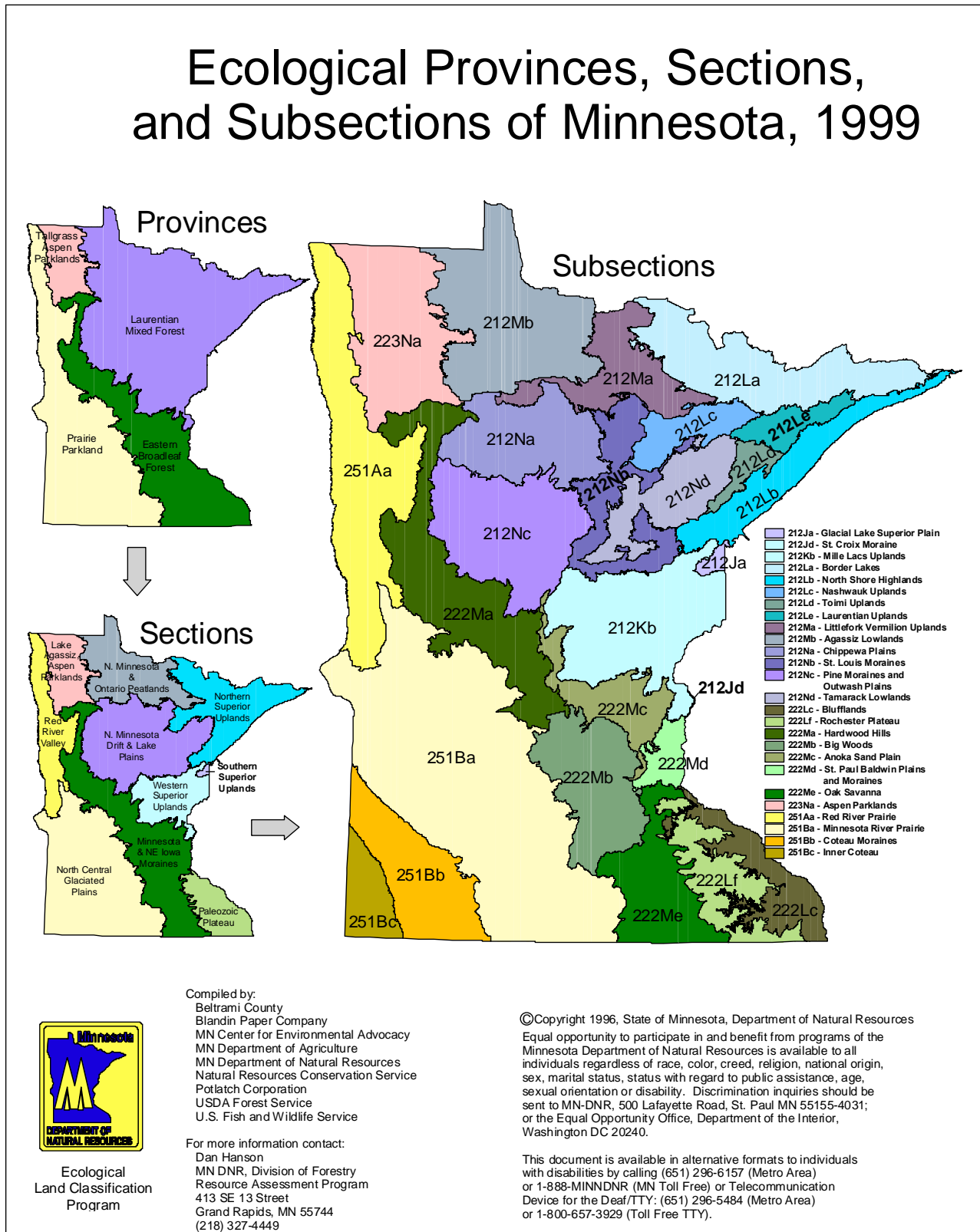
II. Purpose of an Ecological Classification System

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

III. 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.

Figure A.1: Ecological Provinces, Sections, and Subsections of Minnesota, 1999



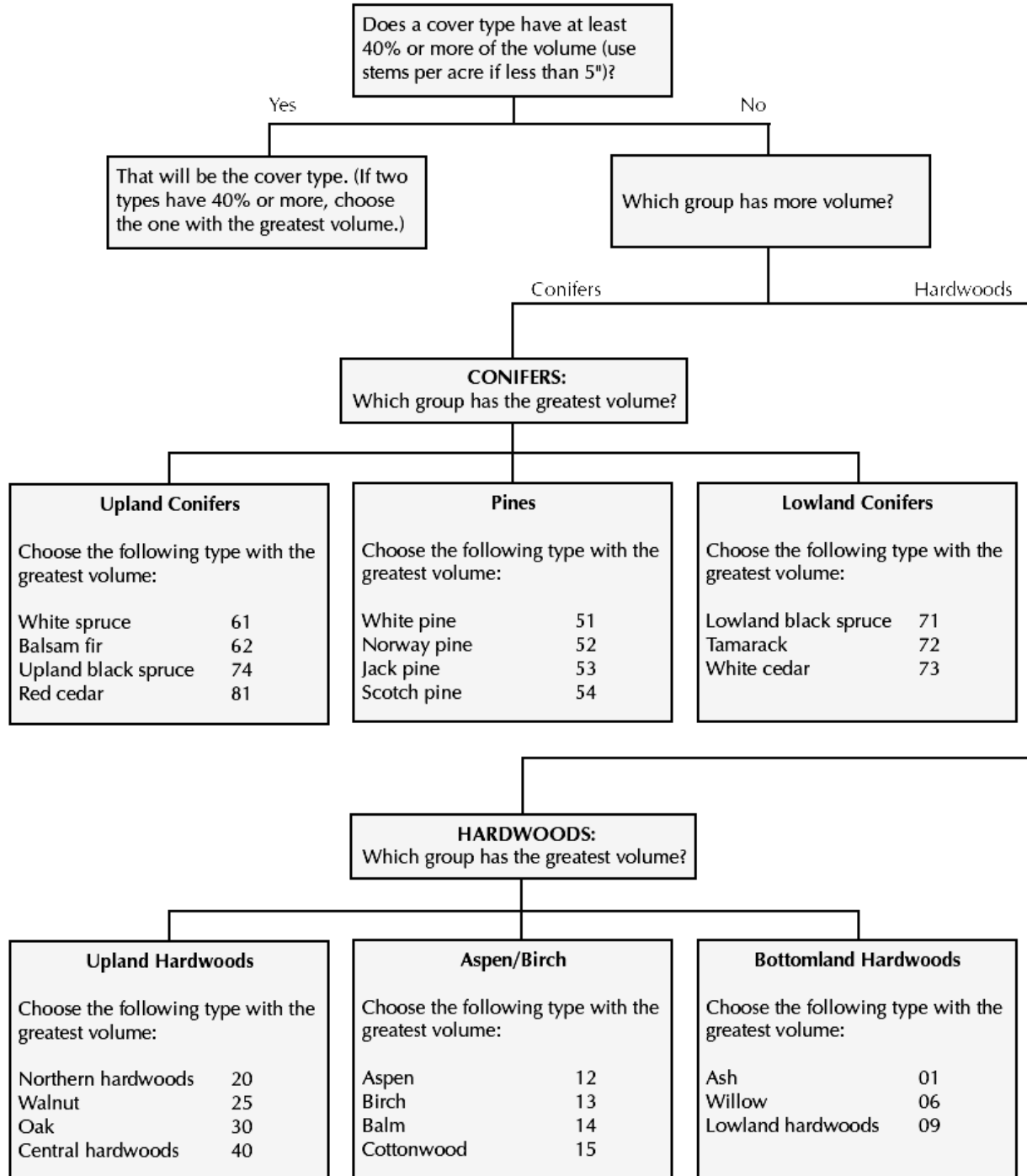
APPENDIX B

Tree Species in the North Shore Highlands, Toimi Uplands, and Laurentian Upland Subsections

Common name	Latin name	Cover Type Code
Aspen		A
Quaking Aspen.....	<i>Populus tremuloides</i>	
Bigtooth Aspen	<i>Populus grandidentata</i>	
Balm of Gilead (Balsam Poplar).....	<i>Populus balsamifera</i>	BG
Balsam Fir	<i>Abies balsamea</i>	BF
Birch.....		Bi
Paper Birch.....	<i>Betula papyrifera</i>	
Heartleaf Birch.....	<i>Betula cordifolia</i>	
Black Spruce	<i>Picea mariana</i>	BSL (lowland) BSU (upland)
.....		
Jack Pine	<i>Pinus banksiana</i>	JP
Lowland Hardwoods.....		LH
Black Ash.....	<i>Fraxinus nigra</i>	Ash
Green Ash	<i>Fraxinus pennsylvanica</i>	Ash
American Elm	<i>Ulmus americana</i>	
Silver Maple.....	<i>Acer saccharinum</i>	
Box Elder	<i>Acer negundo</i>	
Northern Hardwoods.....		NH
Sugar Maple	<i>Acer saccharum</i>	
Red Maple.....	<i>Acer rubrum</i>	
Basswood	<i>Tilia americana</i>	
Yellow Birch.....	<i>Betula alleghaniensis</i>	
Ironwood.....	<i>Ostrya virginiana</i>	
Oak	(often included with NH)	O
Northern Red Oak	<i>Quercus rubra</i>	
Bur Oak.....	<i>Quercus macrocarpa</i>	
Red Pine (Norway Pine)	<i>Pinus resinosa</i>	NP
Tamarack.....	<i>Larix laricina</i>	T
White Cedar	<i>Thuja occidentalis</i>	C
White Pine.....	<i>Pinus strobes</i>	WP
White Spruce.....	<i>Picea glauca</i>	WS

APPENDIX C

Key for Main Cover Type Determination



Some of the types may switch between groups depending on the physiographic class.

Number after cover type name is the cover type code.

From: Cooperative Stand Assessment (CSA) Users' Manual, DNR Division of Forestry, 2001.

APPENDIX D

Analysis of Old Forest Used to Determine the Desired Amount of Extended Rotation Forest (ERF).

The process included: Direction from DNR's ERF guidelines, further direction included in department memos, and DNR Directions 2000¹; information from the range of natural variation (RNV) analysis; current age structure of forest on DNR administered lands and other public and industrial ownerships; and consideration of social/economic factors, biodiversity, wildlife management, and growth and mortality of tree species.

The three subsections primarily consist of five RNV ecosystem types (Frelich 1999)². They are the mesic birch-aspen-spruce-fir, jack pine-black spruce, mesic white pine-red pine, lowland conifer, and sugar maple ecosystems. In the past, these ecosystems were driven by stand-replacing fire and wind events. Under natural disturbance regimes, the frequency of these events determined the composition and age-class structure of the landscape.

General Land Office (GLO) bearing tree data and the RNV analysis model (White & Host 2000)³ for the Northern Superior Uplands ECS Section indicate that land use practices have caused a reduced occurrence of conifer species, notably white spruce, white pine, jack pine, white cedar, and tamarack. Aspen and balsam fir show the greatest increase in abundance. White spruce, white pine, white cedar, and tamarack are more long-lived and need more time since disturbance to be established. Mesic birch-aspen-spruce-fir and mesic white pine-red pine ecosystem succession normally moves from young deciduous vegetation growth stages to coniferous mid-and old-age growth stages. In areas where these ecosystems were prominent, old forest goals will help establish more conifers.

For the purposes of determining desired qualities and quantities of old forest, it was assumed that old forest characteristics develop gradually over time. Primary consideration was given to cover type age classes that exhibit old forest characteristics including (but not limited to) structural diversity, species diversity, coarse woody debris, snags, quality sawtimber, etc. Also, it was assumed that some timberland cover types will be held to an age that provides old forest conditions, and some portions of reserved areas (e.g., state parks and SNAs) that are young now will age to become old forest.

To develop cover type goals for ERF, smaller geographic areas known as land type associations (LTAs) were assessed for their potential ecosystem type and then compared with existing vegetation. Opportunities for sustaining biodiversity and managing for wildlife were considered.

¹ Minnesota Department of Natural Resources. 2000. *Directions 2000: The Strategic Plan*. St. Paul, MN.

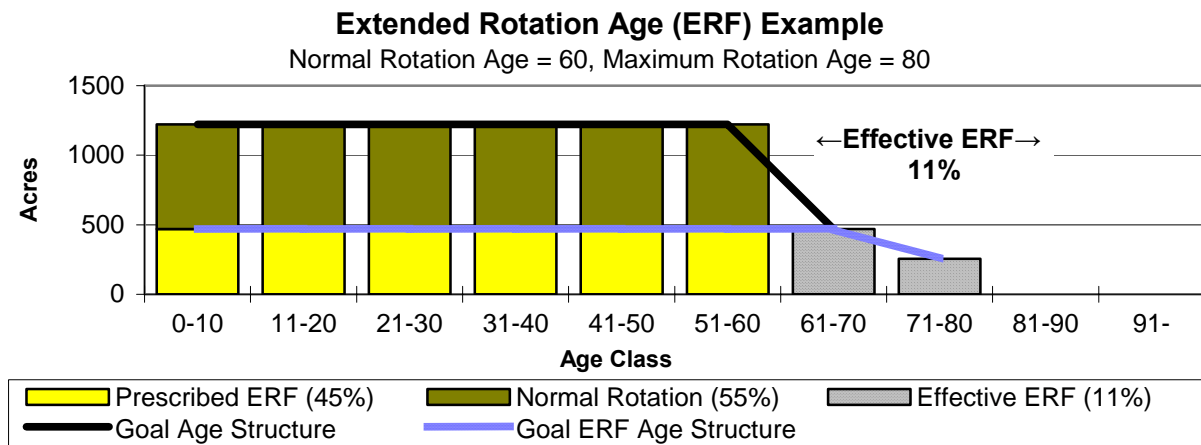
² Frelich, L. E. 1999. Range of Natural Variability in Forest Structure for the Northern Superior Uplands. Report to the Northeast Landscape Committee September 12, 1999. Minnesota Forest Resources Council.

³ White, M.A & G.E. Host. 2000. Mapping Range of Natural Variation Ecosystem Classes for the Northern Superior Uplands. NRR Tech Rep 2000/39

Common Forest Inventory⁴ data was used to assess the age structure across the landscape. Available data indicated that the forest age structure on other ownerships is generally similar to forest age structures on state land. In addition, subsection goals for cover type changes, demand for forest products, and wildlife management goals were considered. The LTA goals were summed to obtain subsection cover type goals for ERF.

Results were expressed as desired effective ERF (i.e., prescribed ERF beyond the normal rotation age) by cover type for those cover types that are managed by even-aged management methods. Age-class modeling used the normal rotation and maximum rotation ages to determine the amount and age-class distribution of each cover type that needed to be prescribed as ERF to achieve effective ERF goals and the desired declining age-class structure. Figure D.1 provides an example illustrating normal rotation, prescribed ERF, and effective ERF acres.

Figure D.1: Extended Rotation Forest (ERF) Example



⁴ Minnesota Interagency Information Cooperative, 2001. Common Forest Inventory (CCSA-Common Cooperative Stand Assessment). <http://www.iic.state.mn.us/finfo/land/common/csaiicmt.htm>

APPENDIX E

Field Visit Decision Tree

The decision tree below describes management options for all stands that are identified for field visit. These stands include high-risk, low-volume (HRLV) stands, those identified through the stand selection process, and stands being considered for conversion. It is meant to provide guidance to appraisers when the field visit is made. Appraisers must be aware of Subsection acreage goals for conversion, and should consider stand composition, species, site index, structure, and location when deciding whether or not to harvest and/ or convert a particular stand. Use the *Field Guide to the Native Plant Communities of Minnesota: The Laurentian Mixed Forest Province* (NPC Field Guide) and supplemental products (e.g., Suitability of Tree Species by Native Plant Community Table) as guides to appropriate species, cover types, and structural composition for sites.

- I. Stand is merchantable.** (Merchantability will depend on stand volume and quality, its position on the landscape, ease of access, and proximity to other stands planned for harvest. This determination is best left to the appraiser.)

Determine the regeneration goal and appraise for harvest

A. Goal is to regenerate existing cover type on site.

1. Design harvest to regenerate the current cover type.
2. Use harvesting techniques to enhance species, age, and structural diversity.
3. If the amount and species of desirable advanced regeneration is present, allow natural changes in stand to occur without active management.

B. Goal is to increase the proportion of secondary tree species in the stand following harvest. The main species in the current cover type will be reduced in abundance following regeneration.

1. Design harvest to favor secondary species at expense of main species. For example: summer harvest to reduce aspen suckering and increase scarification for natural seeding of secondary species.
2. Reserve areas of advanced regeneration of desirable species.
3. Reserve seed trees of desirable species.
4. Scarify portions of the stand to favor natural seeding.
5. Consider partial planting or direct seeding of the stand following harvest.
6. If the amount and species of desirable advanced regeneration is present, allow natural changes in stand to occur without active management.

C. Goal is to regenerate the stand to a more desirable cover type than the current stand.

1. Use specific harvest systems to protect desirable advanced regeneration and structural components.
2. Prepare the site for planting or seeding (direct or seed tree) when adequate desirable regeneration is lacking.

3. Use forestry tools and techniques to discriminate against undesirable regeneration. For example: harvest aspen in the summer to reduce suckering; eliminate undesirable seed trees; use prescribed fire to eliminate balsam fir and other species; retain enough canopy (crown cover) to reduce shade intolerant species; and use herbicide and/or mechanical methods to control undesirable trees.
4. If the amount and species of desirable advanced regeneration is present, allow natural changes in stand to occur without active management.

D. Goal is to move an even-aged stand toward an uneven-aged stand structure in some cover types: Northern hardwoods, ash/lowland hardwoods, older white spruce, older white pine (greater than 90 years) and cedar. See individual cover type management recommendations for techniques that may apply.

II. Stand is not merchantable.

A. If the amounts and species of desirable regeneration are inadequate:

1. Use techniques such as sheering, herbicide, rock rake or prescribe burning to encourage natural regeneration or followed by seeding, planting.
2. Use non-commercial timber stand improvement (TSI) to control undesirable species.

B. If the amount and species of desirable advanced regeneration is present:

1. Allow natural changes in stand to occur without active management.
2. Use non-commercial TSI to control undesirable species.

APPENDIX F

Ecologically Important Lowland Conifers (EILC): Acreage Goals and Rationale

Rationale:

To provide an acreage goal that would include only those commercial lowland conifer stands that may be included in a future search for lowland conifer old growth. An acreage goal for stagnant conifer types was derived from all the stagnant stands that are located within MCBS Sites ranked as having a biodiversity significance of High. The work group agreed that this EILC acreage goal should not be used in the future as a basis for acreage goal setting for lowland conifer old-growth forest. The principle reason being that selecting EILC goals by this method would likely include far more than the 2X goal (as stated in the Rare Features Section, SFRMP Guidebook) for the potential old-growth pool.

Since designating a stand as EILC only serves to defer it from consideration for harvest for the 10-year planning period, the work group did not see the need to consider commercial lowland conifer stands that would not be old enough to harvest within the planning period. These stands are deferred from harvest by default and due to their younger age would not be likely candidates for old-growth forest consideration.

Using the MCBS staff's preliminary assessment ranking of stands as a pool, we applied the following criteria to select out stands according to the above rationale. We then tallied the acreage totals and used this as our acreage goals. It is important to note that these goals do not include acreage in SNAs.

Black Spruce Lowland: new age ≥ 85 and Eco rank = high
 Tamarack: new age ≥ 85 and Eco rank = high
 Cedar*: new age ≥ 75 and phys class ≥ 4 and Eco rank = high
 Stagnant spruce (Sx): Eco rank = high
 Stagnant tamarack (Tx): Eco rank = high
 Stagnant Cedar (Cx): Eco rank = high

*Upland cedar old growth has already been addressed, so physiographic classes of 4 and 5 (hydromesic and hydric sites) were only considered.

The acreage results from applying the above selection criteria are:

Table F.1: EILC Acreage Goals

	Black Spruce	Tamarack	Cedar	Sx	Tx	Cx
Toimi Uplands	151	70	44	264	17	0
Laurentian Uplands	2233	66	258	6007	2246	1152
North Shore Highlands	1967	513	3893	650	44	1476
Total	4351	649	4195	6921	2307	2628

Table F.2: EILC Percent of Cover Type Acres

	EILC Acres	Cover Type Total Acres¹	% of Cover Type
Black Spruce	4351	29071	15%
Tamarack	649	5485	12%
Lowland Cedar	4195	12115	35%
Sx	6921	16289	42%
Tx	2307	3085	75%
Cx	2628	4556	58%
Total	21051	70601	30%

¹ Totals minus acreage in SNAs.

This rationale was used to develop the acre targets. The stand designation process did not limit EILC selection to only the ranked MCBS sites.

The forest inventory database (NLTCSA) has been modified since the acres listed in this appendix were used for developing EILC goals, so the acres shown here are different than those found in GDS-1A, Strategy g. Also, when stands were selected during the stand designation process there was some variation in the acres selected by cover type, but the overall percentage of lowland conifers selected was 30 percent.

APPENDIX G

Process used to Determine Forest Composition Goals

The range of natural variation (RNV) analysis is a method of characterizing the range of forest ecosystems types and growth stages that would be expected for the ecological conditions and natural disturbance regimes of a given landscape.³ RNV estimates a range of land area that would naturally be occupied by an ecosystem type and vegetation growth stage given the underlying ecological conditions and natural disturbance regimes.⁴ Managing forest composition and structure toward RNV is important to provide, at some level, the range of biotic and abiotic conditions under which native plants, animals, and other organisms have adapted. This will increase the likelihood that the structure and function associated with native ecosystems will persist, such as seed dispersal, moderation of insect and disease outbreaks, the maintenance of interior forest conditions, and the development of structural components associated with wildlife habitat for a diversity of species.

Ten and 50-year forest composition goals were derived by comparing existing forest cover to assessments of historical and modeled forest cover across all ownerships at various landscape scales.⁵ Goals were established for DNR lands by each ECS Landtype Association (LTA) to move forest composition toward RNV.

Each LTA in the three subsections was evaluated for its current condition and compared to what the condition may have been under natural disturbance regimes. Based on the relative abundance of conifers compared to historical data, each LTA was assessed for its potential for developing more conifer-dominated stands.

Each LTA was further assessed for its potential and current vegetative condition to determine which cover types could change in acreage. The acreage of deciduous stands in the high-risk, low-volume (HRLV) pool was also considered to identify existing opportunities for forest composition change toward increasing conifers.

Based on the above analysis, cover type change goals were developed by LTA. Finally, the LTA goals were summed to determine change goals for each subsection (Appendix H and I.).

³ Frelich, L. 1999. Range of natural variability in forest structure for the Northern Superior Uplands. Minnesota Forest Resources Council.

⁴ White, M.A., G.E. Host, T.N. Brown, 2001. Northeast landscape range of natural variation analysis: Methods, data and analysis. Minnesota Forest Resources Council.

⁵ Minn. DNR Cooperative Stand Assessment (CSA), Minnesota Interagency Information Cooperative's Common Forest Inventory - CCSA (Common Cooperative Stand Assessment), ECS Products for Subsection Planning in the Northern Superior Uplands (e.g., LTA analysis of relative abundance of bearing trees and FIA trees), and Wildlife Habitat Assessment and Analysis for the North Shore Highlands, Laurentian Uplands, and Toimi Uplands SFRMP.

Frelich, L. 1999. Range of natural variability in forest structure for the Northern Superior Uplands. Minnesota Forest Resources Council.

Shaddis, Dave, (unpublished). Disturbance Regimes for Laurentian Mixed Forest Province. Great Lakes Assessment.

General Land Office bearing tree data and the RNV analysis model¹ for all subsections within the Northern Superior Uplands ECS Section indicate that under natural conditions, approximately 60-70 percent of the upland forest in the spruce-fir and the two white pine ecosystem types would be dominated by conifers, while the jack pine ecosystem types would all be dominated by conifers. These subsections are predominantly composed of these 4 upland ecosystems (Table 1).

Table G.1: Percent Area of Upland Ecosystem Types Within NSH, LU and TU⁶

Ecosystem	NSH %	LU %	TU %	Plan area %
Mesic <u>white pine</u> -red pine *	24	11	81	29
Dry mesic <u>white pine</u> -red pine *	0	26	1	6
Mesic <u>aspen-birch-spruce-fir</u> *	50	22	19	40
Dry mesic <u>jack pine</u> -black spruce *	0	40	0	9
Sugar maple	26	0	0	17
Total upland Area	100	100	100	100

* Ecosystem types characterized by conifer-dominated vegetation.

Based on an analysis of current conditions on state land, conifer cover types are not as prevalent as the analysis of RNV vegetative growth stages would suggest. The uplands consist of 25%, 46%, and 28% conifer cover types in NSH, LU and TU respectively.

LTAs did not show lower levels of diversity of upland ecosystem types than the subsections. Since LTAs were more likely to contain 1 or 2 ecosystem types, the analysis of potential forest vegetation management was easier to accomplish. Each LTA in the 3 subsections was evaluated for its current condition and compared to what the condition may have been under natural disturbance regimes. Based on the relative abundance of conifers compared to historical data, each LTA was assessed for its potential for developing more conifer-dominated stands.

Currently, the mean proportion of upland conifer cover types on state lands in these subsections is 29 percent, ranging from 5 to 80 percent depending on the LTA. Eleven percent of the upland conifer cover types on state lands are in plantations. The magnitude and distribution of desired changes in cover types on state lands were developed from an assessment of the state's existing upland forest conifer:deciduous ratio.

Therefore, the plan will move toward more conifer cover types in upland areas of the subsections where northern hardwoods are not present. Cover type increases will occur primarily in red pine, white pine, jack pine, white spruce, and white cedar. Some minor increases in oak and northern

⁶ White, M.A and G.E. Host. 2000. *Mapping range of natural variation ecosystem classes for the Northern Superior Uplands: Draft map and analytical methods*. NRR Technical Report.

hardwoods are desired. Cover type decreases will occur primarily in the aspen, birch, and balsam fir cover types. See Appendix H and I.

Appendix H: 50-Year + Cover Type Conversion Goals by Land Type Association (LTA)

LTA Code	LTA Name	LTA Acres	CSA acres	A	Bi	BF	JP	WS	C	WP	NP	BSU	NH	O	Percent Assigned To Each Area			
															TH	CLO	HIB	TOW
Le01	Isabella Morain Complex	103,929	11,860	-315	-50	-35	205	0	0	100	0	95	0	0	40	0	0	60
le02	Kelly-Sawbill Landing Till Plan	89,703	5,143	-420	-90	-35	255	0	0	85	75	130	0	0	96	0	0	4
Le03	Timber Freer Till Plain	50,579	1,317	-35	-15	-5	0	0	0	55	0	0	0	0	100	0	0	0
Le04	Temperence River Till Plan	50,222	4,869	-85	0	-26	90	0	0	21	0	0	0	0	100	0	0	0
Le08	Seven Beavers Peatland	29,635	11,689	-30	0	-20	0	0	0	50	0	0	0	0	88	0	1	11
Le09	Phantom Lake Peatland	13,005	8,731	0	0	-16	0	0	0	16	0	0	0	0	100	0	0	0
Le10	Greenwood Lake Till Plan	124,416	27,904	-260	-580	-130	0	296	0	488	0	186	0	0	93	0	6	1
Le11	Big Bird Lake Moraine	105,792	14,527	-365	-119	-20	265	0	0	140	0	99	0	0	0	0	17	83
Laurentian Uplands Total		567,281	86,040	-1,510	-854	-287	815	296	0	955	75	510	0	0				
Lb01	Split Rock Till Plan	123,309	4,150	-490	-175	-27	0	120	185	387	0	0	0	0	100	0	0	0
Lb02	North Shore Till Plan	150,667	11,730	-410	-1367	-21	0	948	400	450	0	0	0	0	100	0	0	0
Lb03	Highland Moraine	355,424	28,452	-900	-335	-197	300	100	221	729	0	82	0	0	70	30	0	0
Lb04	Cloquet Sand Plain	140,475	13,106	-2033	-675	-13	681	0	0	1100	940	0	0	0	21	79	0	0
Lb05	Cabin Lake Till Plan	71,887	29,853	-573	-795	-307	40	122	400	1053	0	60	0	0	100	0	0	0
Lb08	Honeymoon Mountain Till Plan	106,736	12,339	-375	-265	-8	0	338	0	228	0	82	0	0	100	0	0	0
Lb10	Sawtooth Mountain Bedrock Complex	114,398	22,752	-865	-554	-42	0	391	375	635	0	0	0	60	100	0	0	0
Lb11	Tettegouche Till Plan	239,195	23,990	-779	-600	-62	0	325	450	666	0	0	0	0	100	0	0	0
Lb20	Brookston Moraine	110,804	38,591	-3689	641	-93	578	446	0	775	574	0	555	213	0	100	0	0
Lb21	Brimson Sand Plain	68,996	5,141	-255	0	-22	58	0	0	60	69	0	66	24	0	100	0	0
North Shore Highlands Total		1,481,891	190,104	-10,369	-4,125	-792	1,657	2,790	2,031	6,083	1,583	224	621	297				
Ld01	Toimi Drumlin Plain (Toimi Uplands)			-2942	-875	-115	336	500	0	1400	1576	0	120	0	20	55	25	0
3 Subsection Total				-14,821	-5,854	-1,194	2,808	3,586	2,031	8,438	3,234	734	741	297				

Appendix I: 10-Year Cover Type Conversion Goals by Land Type Association (LTA)

LTA Code	LTA Name	A	Bi	BF	JP	WS	C	WP	NP	BSU	NH	O	Total	Percent Assigned To Each Forestry Area			
														TH	CLOQ	HIBB	TOW
Le01	Isabella Morain Complex	-102	-26	-35	81	0	0	44	0	38	0	0	0	40	0	0	60
le02	Kelly-Sawbill Landing Till Plan	-137	-50	-39	101	0	0	38	35	52	0	0	0	96	0	0	4
Le03	Timber Freer Till Plain	-11	-8	-5	0	0	0	24	0	0	0	0	0	100	0	0	0
Le04	Temperence River Till Plan	-19	0	-26	36	0	0	9	0	0	0	0	0	100	0	0	0
Le08	Seven Beavers Peatland	-10	0	-20	0	0	0	30	0	0	0	0	0	90	0	1	12
Le09	Phantom Lake Peatland	0	0	-7	0	0	0	7	0	0	0	0	0	100	0	0	0
Le10	Greenwood Lake Till Plan	-62	-223	-130	0	118	0	223	0	74	0	0	0	94	0	6	1
Le11	Big Bird Lake Moraine	-117	-70	-20	105	0	0	62	0	40	0	0	0	0	0	17	84
	Laurentian Uplands Total	-458	-377	-282	323	118	0	437	35	204	0	0	0				
Lb01	Split Rock Till Plan	-170	-104	-27	0	48	82	171	0	0	0	0	0	100	0	0	0
Lb02	North Shore Till Plan	-133	-625	-28	0	379	178	196	0	33	0	0	0	100	0	0	0
Lb03	Highland Moraine	-286	-98	-197	121	40	98	322	0	0	0	0	0	71	30	0	0
Lb04	Cloquet Sand Plain	-771	-307	-11	270	0	0	358	437	24	0	0	0	21	80	0	0
Lb05	Cabin Lake Till Plan	-86	-498	-307	16	49	177	616	0	33	0	0	0	100	0	0	0
Lb08	Honeymoon Mountain Till Plan	-98	-157	-8	0	137	0	126	0	0	0	0	0	100	0	0	0
Lb10	Sawtooth Mountain Bedrock Complex	-259	-328	-42	0	156	166	281	0	0	0	26	0	100	0	0	0
Lb11	Tettegouche Till Plan	-206	-478	-62	0	130	199	417	0	0	0	0	0	100	0	0	0
Lb20	Brookston Moraine	-1288	0	-93	229	178	0	342	266	0	273	93	0	0	100	0	0
Lb21	Brimson Sand Plain	-103	0	-22	23	0	0	27	32	0	32	11	0	0	100	0	0
	North Shore Highlands Total	-3400	-2595	-797	659	1117	900	2856	735	90	305	130	0				
Ld01	Toimi Drumlin Plain (Toimi Uplands)	-955	-495	-115	133	200	0	443	730	0	59	0	0	19	53	28	0
	3 Subsection Total	-4813	-3467	-1194	1115	1435	900	3736	1500	294	364	130					

NOTE: Figures were adjusted slightly to get the acres to balance when distributing the conversion goals between LTAs. Adjustments may be necessary in future decades. Figures represent a subset of the total 50-year conversion goals to meet the first decade goals.

APPENDIX J

Stand Management Objectives

Draft 6-24-04

OBJECTIVE	Coding used to assign preliminary objectives to stands (e.g., D5D7D9G1). Multiple codes may be assigned. FORIST-SRM will include a drop down menu for assigning objectives to stands after the appraisal is completed.
OBJECTIVE TYPE - 1 st character of code.	OBJECTIVE DESCRIPTION – 2 nd character of code.
A. Maintain cover type – similar species composition and structure	1. Maintain similar species mix
	2. Increase stocking level
	3. Uneven-aged management, similar species mix and diameter classes. Consider gap management.
B. Maintain cover type – change within stand species composition	1. Increase long-lived conifers (e.g., WP, NP, WS, upland cedar, upland tamarack).
	2. Increase long-lived hardwoods (e.g., SMap, Oak, BW, YB)
	3. Increase long-lived conifers and long-lived hardwoods
	4. Increase short-lived conifers (e.g., JP, BSU)
	5. Increase target species (e.g., yellow birch, upland cedar, white pine, etc.)
	6. Stand retains mixed species after TSI or thinning.
C. Maintain cover type – change within stand structural composition	1. To two-aged stand.
	2. To uneven-aged stand
	3. To even-aged stand
	4. Variable density: Thin in clumped or dispersed pattern so residual trees more closely replicate pattern after natural disturbance (e.g., gap management or vary evenly spaced thinning).
	5. Increase coarse woody debris (> 6” diameter)
	6. Legacy patches: Islands of residual vegetation that include tree species present at older growth stages.
	7. Variable retention: Retain tree species and diameters present at older growth stages, in clumps or dispersed, to more closely replicate pattern after natural disturbance. Include retention of large, downed logs.
D. Convert to another cover type with species appropriate to Native Plant Community.	1. To long-lived conifers (e.g., WP, NP, WS, C)
	2. To short-lived conifers (e.g., JP, BSU)
	3. To uneven-aged hardwoods
	4. To even-aged hardwoods
	5. To mixed conifer/hardwoods

	<p>6. Variable density: Harvest, plant or seed in clumped or dispersed pattern to more closely replicate pattern after natural disturbance.</p> <p>7. Increase coarse woody debris (> 6” diameter)</p> <p>8. Legacy patches: Islands of residual vegetation that include tree species present at older growth stages.</p> <p>9. Variable retention: Retain tree species and diameters present at older growth stages, in clumps or dispersed, to more closely replicate pattern after natural disturbance. Include retention of large, downed logs.</p> <p>10. To existing understory</p>
E. Patch management	<p>1. Maintain patch (designated patches)</p> <p>2. Increase patch size</p> <p>3. Manage for small patches (e.g., in an area managed for ruffed grouse.)</p> <p>4. Restore or maintain original stand size</p> <p>5. Move patch type toward patch DFFC</p>
F. Riparian management	<p>1. Increase long-lived conifers</p> <p>2. Maintain shade to the trout stream</p>
G. Conservation of Biodiversity	<p>1. Maintain Native Plant Community composition and structure using ECS guidance. Reserve components of older growth stages to retain the option of moving the stand to older growth stages in the future. For example, in an aspen stand retain a white spruce, white pine, or white cedar component in legacy patches in a northern mesic mixed forest-FDN43.</p> <p>2. Stand has a rare plant or rare animal location. Apply strategies to protect it.</p> <p>3. Provide special management consideration for species or habitat (e.g., goshawk, seasonal ponds, and small mammals).</p> <p>4. Stand has a known rare native plant community. Apply strategies to protect it.</p> <p>5. Use prescribed fire as a silvicultural treatment</p> <p>6. Whenever possible and practical, manage stand cover type conversion with less intensive site preparation or plantation with less intensive TSI.</p>
H. Cultural Resources	<p>1. Stand has a known cultural resource. Applied strategies to protect it.</p>
I. Corridors	<p>1. Maintain identified corridors</p>

Note: As of 9-16-04, the objective coding/descriptions are in the process of being reviewed and revised, so some editing of the preliminary objectives coding may be necessary at a later date.

A P P E N D I X K

MCBS Sites Nominated as Natural Areas by MCBS Staff

Table K.1: MCBS Sites Nominated as Natural Areas by MCBS Staff (Draft - July 2004)

MCBS Site Name	Rank ¹	MCBS Site Total Acres ²	State Forestland Acres	State Timberland Acres	Acres in the 10-Year Stand Selection Pool
Art Lake Hardwood Ridges	O	4671	1280	969	324
Benson Lake Hardwoods - Crosby-Manitou SW ³	O	3894	0	0	0
Horseshoe - Kowalski Hardwood Ridges	O	4571	471	401	308
Horseshoe Bay Shore	O	109	60	60	60
Lookout Mountain - Finland Radar Station-spring fen	O	88	42	42	11
Lower Beaver - Fault Line Ridges	O	5699	908	851	184
Ninemile-Moose-Crooked Lakes and Ridges	O	8156	1557	1268	323
Paccini Lake Ridge	O	2160	133	108	75
Poplar-Agnes	O	5158	415	337	125
Rota Lake	H	5236	2907	1137	367
South Swamp	H	3491	1566	882	324
Spring Beauty	O	1965	51	51	21
Spur End Fen	H	3342	2306	1427	174
Superior Shore- Kennedy Creek Cliffs	O	208	27	16	2
Wilbar Lake	H	5690	2228	1537	602
Total		54,438	13,951	9,086	2,900

¹O = Outstanding, H = High.

² all ownerships.

³state forestland and timberland acres equal zero because the state lands in this MCBS site are now (or will be) administered by the Division of Parks as part of the George Crosby Manitou State Park.

APPENDIX L

Rare Native Plant Communities

Draft - July 2004

Table L.1: Statewide Heritage Conservation Ranks (S-Ranks) for Native Plant Community Types

NPC Type S-Rank	Definition
S1	Critically imperiled.
S2	Imperiled.
S3	Rare or uncommon.
S4	Widespread, abundant, and apparently secure, but with cause for long-term concern.
S5	Demonstrably widespread, abundant and secure.

NPCs with an S-Rank of S1 or S2 that are known to occur in these subsections are listed in Table L.2. NPC types with S-Ranks of S3 to S5 that are rare, high quality, or otherwise unique in these subsections are listed Table L.3. *Note: At this time, the lists are drafts for these three subsections. The management of native plant communities will receive further review and department direction as NPC Field Guides and other ECS-based products (e.g., acceptable operating season, suitability of tree species, and silvicultural options for NPCs) become available and are integrated into forest management activities on state lands. A complete list of the Statewide S-Ranks for NPC types in Minnesota is available from the Natural Heritage and Nongame Research Program.⁷*

⁷ Minn. DNR 2004. Statewide Heritage Conservation Status Ranks (S-Ranks) for Native Plant Community Types (elements) in Minnesota. Natural Heritage and Nongame Research Program and Minnesota County Biological Survey. Minnesota Department of Natural Resources. St. Paul, MN 55155.

Table L.2: Native Plant Community (NPC) Types and Subtypes with an S-Rank of S1 or S2 Known to Occur in the North Shore Highlands, Laurentian Uplands, or Toimi Uplands Subsections (Draft - April 2004)

Type Code	Subtype Code	Type Name	Subtype Name	State Rank
CTn11c		Dry Thomson Cliff (Northern)		1
CTn11e		Dry Sandstone Cliff (Northern)		1
CTn32c		Mesic Thomson Cliff (Northern)		1
CTn32e		Mesic Sandstone Cliff (Northern)		1
CTn42b		Wet Rove Cliff (Northern)		1
CTn42c		Wet Felsic Cliff (Northern)		1
CTn42d		Wet Sandstone Cliff (Northern)		1
CTu22c		Sheltered Mafic Cliff (Lake Superior)		1
FDn32b		Red Pine - White Pine Woodland (Minnesota Point)		1
FDn32e		Spruce - Fir Woodland (North Shore)		1
LKi32a		Sand Beach (Inland Lake)		1
LKi54b	<i>LKi54b1</i>	Mud Flat (Inland Lake)	<i>Saline Subtype</i>	1
LKu32a		Beachgrass Dune (Lake Superior)		1
LKu32b		Juniper Dune Shrubland (Lake Superior)		1
LKu32c		Sand Beach (Lake Superior)		1
MRu94a		Estuary Marsh (Lake Superior)		1
ROn23b		Bedrock Shrubland (Lake Superior)		1
APn90b	<i>APn90b2</i>	Graminoid Bog	<i>Schlenke Subtype</i>	2
CTn11b		Dry Rove Cliff (Northern)		2
CTs53b		Wet Limestone Dolomite Cliff		2
CTu22b		Exposed Felsic Cliff (Lake Superior)		2
FDn12a		Jack Pine Woodland (Sand)		2
FDn12b		Red Pine Woodland (Sand)		2
FDn22d		Red Pine - White Pine Woodland (Eastcentral Bedrock)		2
FDn32c	<i>FDn32c1</i>	Black Spruce - Jack Pine Woodland	<i>Jack Pine - Balsam Fir Subtype</i>	2
FDn32d		Jack Pine - Black Spruce Woodland (Sand)		2
FDn33c		Black Spruce Woodland		2
LKi32b		Gravel/Cobble Beach (Inland Lake)		2
LKu32d		Beach Ridge Shrubland (Lake Superior)		2
LKu43b	<i>LKu43b1</i>	Wet Rocky Shore (Lake Superior)	<i>Cobble Subtype</i>	2
LKu43b	<i>LKu43b2</i>	Wet Rocky Shore (Lake Superior)	<i>Bedrock Subtype</i>	2
MHn44b		White Pine - White Spruce - Paper Birch Forest		2
MHn45b		White Cedar - Yellow Birch Forest		2

Table L.3: Native Plant Community (NPC) Types with S-Ranks of S3 to S5 that may be Rare or Otherwise Unique in the North Shore Highlands, Laurentian Uplands, or Toimi Uplands Subsections (Draft – April 2004)

Type Code	Subtype Code	Type Name	Subtype Name	State Rank
APn91b		Graminoid Poor Fen (Basin)		3
CTn11d		Dry Felsic Cliff (Northern)		3
CTn12a		Dry Open Talus (Northern)		3
CTn12b		Mesic Open Talus (Northern)		3
CTn24a		Dry Scrub Talus (Northern)		3
CTn24b		Mesic Scrub Talus (Northern)		3
CTn32a		Mesic Mafic Cliff (Northern)		3
CTn32b		Mesic Rove Cliff (Northern)		3
CTn32d		Mesic Felsic Cliff (Northern)		3
CTn42a		Wet Mafic Cliff (Northern)		3
CTu22a		Exposed Mafic Cliff (Lake Superior)		3
FDn22a		Jack Pine Woodland (Bedrock)		3
FDn22b		Red Pine - White Pine Woodland (Northeastern Bedrock)		3
FDn22c		Pin Oak Woodland (Bedrock)		3
FDn32a		Red Pine - White Pine Woodland (Canadian Shield)		3
FDn32c	<i>FDn32c2</i>	Black Spruce - Jack Pine Woodland	<i>Black Spruce - Feathermoss Subtype</i>	3
FDn32c	<i>FDn32c3</i>	Black Spruce - Jack Pine Woodland	<i>Jack Pine - Black Spruce - Aspen Subtype</i>	3
FDn33a	<i>FDn33a1</i>	Red Pine - White Pine Woodland	<i>Balsam Fir Subtype</i>	3
FDn33a	<i>FDn33a2</i>	Red Pine - White Pine Woodland	<i>Mountain Maple Subtype</i>	3
FDn43c		Upland White Cedar Forest		3
FFn57a		Black Ash - Silver Maple Terrace Forest		3
FFn67a		Silver Maple - (Sensitive Fern) Floodplain Forest		3
FPn62a		Rich Black Spruce Swamp (Basin)		3
FPn71a		Rich Black Spruce Swamp (Water Track)		3
FPn72a		Rich Tamarack Swamp (Eastcentral)		3
FPn82b		Extremely Rich Tamarack Swamp		3
LKu43a		Dry Bedrock Shore (Lake Superior)		3
MHn45c		Sugar Maple Forest (North Shore)		3
MHn47a		Sugar Maple - Basswood - (Bluebead Lily) Forest		3
MHn47b		Sugar Maple - Basswood - (Horsetail) Forest		3
OPn91b	<i>OPn91b2</i>	Graminoid Rich Fen (Water Track)	<i>Flark Subtype</i>	3
RVx32b	<i>RVx32b1</i>	Sand Beach/Sandbar (River)	<i>Intermittent Streambed Subtype</i>	3
RVx32b	<i>RVx32b2</i>	Sand Beach/Sandbar (River)	<i>Permanent Stream Subtype</i>	3

WFn53a		Lowland White Cedar Forest (North Shore)		3
WFn53b		Lowland White Cedar Forest (Northern)		3
WFn55b		Black Ash - Yellow Birch - Red Maple - Basswood Swamp (Eastcentral)		3
APn91c	<i>APn91c1</i>	Graminoid Poor Fen (Water Track)	<i>Featureless Water Track Subtype</i>	4
APn91c	<i>APn91c2</i>	Graminoid Poor Fen (Water Track)	<i>Flark Subtype</i>	4
CTn11a		Dry Mafic Cliff (Northern)		4
FPn81a		Rich Tamarack (Sundew - Pitcher Plant) Swamp		4
LKi43b		Bedrock Shore (Inland Lake)		4
LKi54a		Clay/Mud Shore (Inland Lake)		4
LKi54b	<i>LKi54b2</i>	Mud Flat (Inland Lake)	<i>Non-saline Subtype</i>	4
LKu32e		Gravel/Cobble Beach (Lake Superior)		4
MHn35a		Aspen - Birch - Basswood Forest		4
MHn35b		Red Oak - Sugar Maple - Basswood - (Bluebead Lily) Forest		4
MRn83a		Cattail-Sedge Marsh (Northern)		4
OPn91b	<i>OPn91b1</i>	Graminoid Rich Fen (Water Track)	<i>Featureless Water Track Subtype</i>	4
OPn92a		Graminoid Rich Fen (Basin)		4
OPn92b		Graminoid-Sphagnum Rich Fen (Basin)		4
RVn54b	<i>RVx54b1</i>	Clay/Mud Shore (River)	<i>Permanent Stream Subtype</i>	4
RVn54b	<i>RVx54b2</i>	Clay/Mud Shore (River)	<i>Intermittent Streambed Subtype</i>	4
WFn55a		Black Ash - Aspen - Balsam Poplar Swamp (Northeastern)		4
APn80a	<i>APn80a1</i>	Black Spruce Bog	<i>Treed Subtype</i>	5
APn80a	<i>APn80a2</i>	Black Spruce Bog	<i>Semi-Treed Subtype</i>	5

Known locations of the rare Native Plant Community types or subtypes listed in Tables L.2 and L.3 will be documented and may be assigned a relative rank for the quality of the NPC occurrence. Specifications for ranking the quality of NPCs are currently being revised by the Minnesota County Biological Survey and the Natural Heritage and Nongame Research program, based on the recently published classification of the Native Plant Communities of Minnesota (version 2.0) for the Laurentian Mixed Forest Province.^{8[1]} Generally, NPCs are ranked for quality based on factors associated with size, condition, and landscape context. The relative quality of the NPC is assigned on a continuum from “A” through “D”, with an “A” rank indicating an excellent quality NPC, and a “D” rank indicating a poor quality NPC. Because MCBS prioritizes survey efforts within MCBS sites, most documented locations of rare NPCs are within MCBS sites. However, there may also be locations of rare NPCs documented in areas outside MCBS sites.

APPENDIX M

Stand Designation Process for

Patch Management, Extended Rotation Forestry (ERF), Ecologically Important Lowland Conifers (EILC), and Old Forest Management Complexes (OFMC) in the North Shore Highlands, Laurentian Uplands, and Toimi Uplands Subsections SFRMP

A. Goal and Objectives

The goal of this project is to incorporate landscape-level information about existing spatial patterns and forest conditions into stand designation decisions for patch management, extended rotation forests (ERF), ecologically important lowland conifers (EILC), and old forest management complexes (OFMC). Information across ownerships on the spatial patterns of forest composition, age structure, and areas with special management considerations will inform Area Team recommendations for stands selected for patch management, ERF, EILC, and OFMC on state forestry, fisheries, wildlife, and trails and waterways administered lands.

The specific objectives of the project are to:

1. Tag special management areas (e.g., CONEs, RGMAs, DMAs)
2. Finalize recommendations for SMZ and OFMC selections for old-growth stands using the interdisciplinary teams participating in this project. Teams will be comprised of forestry, wildlife, and ecological services staff.
3. Recommend/select stands for large patch management on state-administered lands.
4. Recommend/select EILC stands.
5. Recommend/select ERF stands.
6. Consider rare features in all decisions and tag selected stands that contain rare features using the appropriate code. Tagging stands selected will document that rare features have been looked at as stands are being selected.

B. Before you begin this project:

1. Review all the information handed out in the training packet. This information provides the background Area Teams will need for stand designations.
2. Get the Arcview project (CD provided at training) installed so it will open and run on the computer you will be using for the stand designation process.
3. Review each spatial layer and associated attributes table in the ArcView project to become familiar with the information in each of these shapefiles. Brief descriptions of the shapefiles are listed in Table M.1.
4. Ensure all updates to the project have been added to the initial project distributed on the CD.
5. Coordinate a start date with Doug Tillma. Doug will attend the first day to provide direction on using the Arcview project and interpretation of these written instructions.
6. Have the training packet of information at the computer for reference. Make copies as needed so additional staff attending can follow along or help located information.

7. Be prepared to document your decisions and rationale either using the field for comments for each stand or recording by hand and then sending as the information as Word document along with the project.

C. Complete the Stand Designation Process: It is recommended that you read all these instructions before beginning stand selection. You can complete the project step by step or you may find that it will work best for you to do several of the steps at once.

1. Open the Arcview Project provided on the CD handed out at the training. Area Teams will use the GIS cover named: *NLTCSA2.shp* found in the ArcView project to code selected stands. This is a GIS cover of CSA data to which fields have been added for this stand designation process.
2. Place the Rare Features, Cultural Resources and MCBS LSAs/Sites themes at the top of the project so they are always visible and leave these themes active throughout the project. This will allow you to make decisions to that may lead to better protection of these rare and cultural features, and MCBS sites of biodiversity significance. Placing a number “1” in this field will tag a stand as having a rare feature.
3. Tag Special Management Areas (e.g., CONEs, RGMAs, DMAs) in the TBRM or WHAB Field using appropriate codes that are listed in the SFRMP Codes Table. These SMA designations can be for those areas officially designated as a special unit or just areas where special emphasis will be placed to favor the type of activities coded in these fields. Also designate these stands for special patch management goals – if appropriate. You can do this by selecting all the stands in the management area and use the code PA5UD. This means: P (patch), A (all age classes), 5 (small size less than 40 acres), UD (upland deciduous). The all age class coding designation would be used since a variety of small patch ages would be desired within the management area. An example from the training session would be the RGMA that was designated with management plans to have all stands within the boundary to be managed as small patches. Use other patch codes as appropriate.
4. Preliminary Selection of EILC Stands: To obtain recommended acre goals for EILC, the Area Teams will use NS SFRMP recommended percents by cover type and apply these percents to the total number of acres for that cover type in the Area. NS SFRMP recommended EILC in percents by cover type is included in stand selection training packet. Tag stands using appropriate codes. After you have completed this step and step 4,5,6 you will be asked to look over all your stand selections for the project and make adjustments to your selections as needed.
5. Finalize SMZ and OFMC selections. You will need the CSA theme and the old growth theme. Enter codes in the CSA database. Use Old-Growth Forest Guideline, Amendment #5 as a reference for direction.
 - a. SMZ Field: Tag each SMZ stand with appropriate code. This may already be done for most areas since data was submitted to Paul Olson prior to project being created – but be sure to check. If not you will need to enter the code.
 - b. Tag OFMC Stands. These stands may already be selected. If not, choose stands using the guidelines in Old-Growth Amendment #5 - included in training packet. You will need to enter codes in three different fields for each OFMC designated stand.

- 1) Enter a number “1” in the ERF field. All stands within an OFMC should be designated as ERF.
 - 2) In the ERF_OBJ Field enter the letter (code) “O”. The “O” means that the stand is in an old-growth location center.
 - 3) In the SMZ field:
 - a) Enter “all” if the entire stand is included in the SMZ. (Note: some stands were coded as “smz”.)
 - b) Enter “partial” if only a portion of the stand is included in the SMZ.
 - c) Enter “ofmc” if the stand is outside the SMZ but in the OFMC.
 - c. OFMC_Name Field: (*Suggested revision since stand designation step*) Tag all stands within an OFMC with a name for identifying and mapping each OFMC.
6. Large Patch Selection: Be sure to read all of directions in step 5 before beginning this step because you may be implementing all steps at the same time, as you go through the state land in your area. Primary focus for patch designation will be on creating or maintaining young, intermediate, and old, large patches on state land only. However a secondary focus will be to consider adjacent ownerships in respect to how patches of any size on state land could be managed (tagged) to create or enlarge large patches on all ownerships. See below for more direction. If a large patch can not be made, move on to the next portion of state land that is being reviewed. Again – be sure to read all of items (6a. – g.) before beginning this step. You will come back to patches again when you start designating stands as ERF.
- a. Open appropriate themes from the project. Open and overlay the “landpatch” cover early in the stand selection process. These landscape patches represent examples of very large patches with similar management emphasis across ownerships delineated using the same layers and criteria provided in this project. These areas were delineated to provide some examples of places to consider for large patch management on state lands. Incorporate additional GIS layers (e.g., special management areas) to the ArcView project and incorporate detailed information as needed from other resources and staff.
 - b. Use the patch code (PAT_NOM) that best represents what the patch is today, not what it might be in the future. A Field (PATCHDFC) has been added to designate what you want the patch to become in the future (See f.).
 - c. Select stands on state land that when standing alone, or clumped together - would create or maintain large patches (250 plus acres in size) in all three age classifications (young, intermediate, and old) that currently exist on the landscape. You will need to review the definition of a patch and when cover types move from one age classification to the next. You can clump an old black spruce stand and an old aspen stand together and call it a large old patch if combined acres equals 250 plus acre – but you need to remember that the aspen stand will be harvested before the black spruce stand in most cases and there would no longer be a large patch. Ideally patches would be tagged and named that can be managed together and harvested in a fashion that allows the large patch to remain a large patch. You will need to use your best judgment. Tag stands as patches using appropriate codes and give the entire patch a unique name.

- d. Select stands on state land that if harvested during this 10-year management plan, would create new young large patches or expand the boundaries of existing young patches. One example would be an intermediate old patch surrounded by young small, intermediate, or large patches that if the old patch was harvested it would enlarge the young patch. Another example might be an existing old large patch in a location where a young large patch would be appropriate. Tag stands as patches using appropriate codes and give the entire patch a unique name. Also, if you recommend that stands be harvested within this 10-year management period to create a large young patch, tag the stands now to be harvested by entering the appropriate harvest code in the Prescription Field in the Timber Planning Extension of the NLTCSA2.
- e. Select stands on state land that could help create or become part of a large patch if the adjacent ownership also managed their lands for large patches. You will need to have a fair idea what you think the adjacent owners plan to do. One example of this would be the three isolated state forties surrounded by other ownerships that were discussed during the training session. While these forties by themselves would not be classified as large patches they would become part of an existing large patch when included with adjacent ownerships. If you felt that including the state land in the large patch is appropriate knowing that the state land would most likely be harvested at some point, you could tag these as being part of a large patch. These stands need to be tagged differently from large patches that exist strictly on state land. You will place an “M” in front of the code that you would normally use to tagged state land. The “M” represents mixed ownership. Example: MPO1UC will mean Mixed Ownership, Patch, Old, Large (>640Acres), Upland, Conifer. Tag stands using appropriate codes and give the entire patch a unique name. Do not tag any ownership patches other than those on state land even when using the “M” code that identifies the patch as mixed ownership. The mixed ownership patch designation is not intended to mean that we are setting direction for land the state does not administer. Acreage summaries in the plan will only include the state land acres.
- f. Future patches: for state land areas where you want to create a large patch, but it does not meet criteria for a patch designation now, designate these patches with a “F” prefix denoting it is a desired future patch. Using the example in e., the PAT_NOM code would be FMPO1UC. The PATCHDFC code would be MPO1UC.
- g. Consider the following during this patch selection process, along with the directions above and the patch guidelines handed out at the training session.
 - 1) Select groups of stands that managed together will decrease edge, reduce fragmentation, increase interior forest, and increase patch size. Note: One of the main outcomes of patch management will be to aggregate harvests, with "fewer larger" rather than "many smaller" cutting units.
 - 2) The goal is for patches to have a fairly continuous canopy whether young or old (as opposed to patches with stands of widely varying age classes).
 - 3) Locate patches to increase their effective size or to maintain connectivity between them.

- 4) Large patches that are unfragmented by roads, permanent trails, ditches, and utility corridors are preferred.
 - 5) Large patches that are hydrologically intact (i.e., hydrology not impacted by human activities) are preferred.
 - 6) Consider the effects before locating patches adjacent to State Parks, SNAs, pRNAs, WMAs or other areas with special management designation.
 - 7) Consider the effects before locating patches within MCBS sites of biodiversity significance, within or adjacent to special landforms (e.g., large peatland, fen, or cliff), or selecting stands with rare features locations.
 - 8) Consider selecting groups of stands that are part of a wetland or wetland-upland complex. For intermediate and old patches, lowland conifer stands may also be selected as EILC.
 - 9) Consider groups of stands considered inoperable or not manageable at this time, or groups of HRLV stands.
 - 10) Keep in mind that stands selected, as part of intermediate and old patches may be good candidates for mixed forest management of the cover type.
 - 11) Consider timber harvest issues when selecting large patches. Designate stands as part of a large patch only if the patch will be managed as a large patch into the future. The end result should be that all stands within a large patch designation would be harvested within a 5-15 year time frame.
 - 12) Consider if harvesting a large patch would be acceptable to surrounding ownerships. If not, maybe placing the large patch in a different location would be preferred.
 - 13) The guidelines suggest that up to 15% messiness in designating patches. You have some flexibility to exceed this if appropriate and you document your rationale.
7. Select ERF. To obtain recommended acre goals for ERF, Area Teams will use NS SFRMP recommended percents by cover type and apply these percents to the total number of acres for that cover type in the Area. NS SFRMP recommended ERF in percents for aspen/BG and balsam fir were included in your training packet.
- a. Review SFRMP Guidelines for selecting ERF stands included in the stand selection packet.
 - b. Consider how locations of ERF might enhance proposed patches.
 - c. Tag each stand designated as ERF with the appropriate code using the ERF_OBJ codes listed on SFRMP Codes table. Do this stand by stand to be certain that the appropriate reasons are listed. May use one or a combination of codes in this field. For example “RW” means riparian and wildlife reasons for designating as ERF.
 - d. Distribute ERF with the following priorities:
 - 1) Assign ERF to all SMZ and Stands tagged to be part of the OFMC.
 - 2) Assign ERF to stands in large patches and distribute so that there is some ERF patches in all three of the age classes: young, intermediate, and old. This will set the stage to allow these large patches to stay on the landscape until the maximum rotation age of the patch is reached. Need to watch this to ensure not too much ERF is placed in patches so that there will be ERF to distribute for other objectives.

- 3) Assign ERF to stands with rare features or cultural resources, if appropriate. Doing this would lengthen the time between stand entries to carry out forest management activities because of the longer ERF rotation age.
 - 4) Review riparian areas where an ERF designation would be desirable and tag these stands.
 - 5) Distribute remaining ERF with the goal to select ERF based on spatial considerations, with the end result that ERF age classes will follow roughly the current age-class distribution for each cover type. Area Teams should periodically check the age distribution by type of ERF stands being selected to ensure that age-class distribution is adequate for the cover type. Follow the ERF Guidelines for distribution of remaining ERF after the above four items have been completed.
 - 6) In BSL and BSU cover types, avoid designating stands with significant evidence of dwarf mistletoe (Affected code >2?).
 - 7) Where possible, select natural origin stands of pine and white spruce versus plantations for ERF.
8. Review the project. Go back and look at the entire project. Try to look at things from a landscape perspective. Make adjustment to selections of ERF, EILC, and patches as appropriate. Be sure to:
- a. Summarize ERF acres selected by age class. Ensure you are very close to your target goals. Stay within ± 25 acres of your target.
 - b. Ensure ERF is assigned only to even-aged managed timberland cover types.
 - c. Ensure there is an ERF code letter in the ERF_OBJ field for all stands designated as ERF.
 - d. Determine if ERF acres seem to roughly follow the current age-class distribution for each cover type. Make adjustments in stand selection as needed.
 - e. Summarize EILC acres selected and ensure you are within ± 25 acres of your targets. Adjust stand selection as needed.
 - f. Review SMZ and OFMC selections and reach Area Team agreement on their designation so that these can be considered final designations at this time.
 - g. Double check to ensure all stands selected have been evaluated for rare features and ensure that the field is tagged if rare features are found in the stand.
9. After review of stand designation step and the objectives listed in Section A on the first page have been completed, send the NLTCSA2 shapefile to Paul Olson at the Region office. Complete and submit the project by the December 18, 2002 deadline.

Table M.1: GIS Layers Included in the ArcView Project for the Stand Designation Step

Ltas	LTA boundaries	
Twps	Township boundaries in North Shore highlands, Toimi Uplands and Laurentian Uplands subsections.	twps.avl
Lakes	Lakes in North Shore highlands, Toimi Uplands and Laurentian Uplands	lakes.avl
Streams	Streams in North Shore highlands, Toimi Uplands and Laurentian Uplands	streams.avl
Roads	Roads in North Shore highlands, Toimi Uplands and Laurentian Uplands	roads.avl
2H_TMP_patches	Two Harbors Area patches identified in TMP plan (ca. 1998).	2H_TMP_patches
Landpatch	Representative examples of large landscape patches across ownerships. Delineated by NS SFRMP work group 2.	landpatch_age.avl
Eilc_cand_ns	NS SFRMP preliminary assessment of ecologically important lowland conifers in the North Shore Highlands subsection (MCBS).	eilc.avl
Eilc_cand_tu	NS SFRMP preliminary assessment of ecologically important lowland conifers in the Toimi Uplands subsection (MCBS).	eilc.avl
Eilc_cand_lu	NS SFRMP preliminary assessment of ecologically important lowland conifers in the Laurentian Highlands subsection (MCBS).	eilc.avl
Nsh_Isas_signif	MCBS Draft Landscape Study Areas and Sites in the North Shore Highlands subsection (date: 06.19.02). Many Sites with preliminary statewide biodiversity	lsa_sites.avl
Laurtoim_Isas_prior	MCBS Draft Landscape Study Areas and Sites in the Laurentian Uplands and Toimi Uplands subsections (date: 07.03.02).	lsas_prior.avl
mnrft3	Rare Natural Features Locations. Natural Heritage Information System database (download: 11.27.02)	
NS_og	MN DNR Designated old growth NSH,LU,TU Subsections.	og.avl
OG SMZ*	MN DNR Old Growth Special Management Zones. *Queried from NLTCSA2 or will need to code stands in NLTCSA2.	
OFMC*	MN DNR Area Old Forest Management Complexes. *Queried from NLTCSA2 or will need to code stands in NLTCSA2.	ofmc.avl
Snf_og	USFS Designated old growth on Superior National Forest	snf_og.avl
Stlouis_og	St. Louis County Existing and Future Old Growth (dated: 02.28.02)	stlouis_og.avl
Prnas_snf	USFS Potential research natural areas on Superior National Forest	prnas_snf.avl
SNF_SMCs_g	USFS Special Management Complexes on Superior National Forest (Alternative	smcs.avl
SNF_SMCs_b	USFS Special Management Complexes on Superior National Forest (Alternative	smcs.avl
CSA_coa_tbr9*	Lands designated covertime COA or timber status "under development". *Queried	
CSA_hrlv*	MN DNR Forestry administered lands considered high risk or low volume.	
CSA_inop*	MN DNR Forestry administered lands considered inoperable. *Queried from NLTCSA2.	
NLTCSA2	Area Team input file: GIS cover of CSA for ERF, EILC, Patch, OFMC stand selections, rare features tag.	csa_ctypes.avl con_dec
Patch_jn	Patch candidates query by Paul Olson (csa date: 3.14.02)	patch_jn_age.avl
Snas	MN DNR Scientific and Natural Areas	sna_park.avl
Parks	MN DNR State Parks	sna_park.avl
CCSA	Common Forest Inventory data (Common CSA) on public lands.	ccsa patch age.avl con_dec up_low ccsa_ctypes

APPENDIX N

SFRMP Codes

Table N.1: Codes used for Tagging Stands in the North Shore Subsections ArcView NLTCSA Shapefile

Field Name and Codes	Description
ECS	Code used to identify the subsection
21	North Shore Highlands
22	Toimi Uplands
23	Laurentian Uplands
EILC	Ecologically important lowland conifers – Reserve during this 10-year plan.
1	EILC designated stand
SMZ	Special management zone (SMZ) and other stands tagged relating to old-growth forest management complexes (OFMC).
all	entire stand is in the SMZ
partial	only a portion of the stand is in the SMZ
Smz	all or part of the stand is in the SMZ
og	old-growth stand
ofmc	stands in the OFMC that are not in the SMZ or old-growth stands
ERF	Extended Rotation Forest (ERF)
1	ERF designated stand
ERF_OBJ	Extended Rotation Forest Objective Codes
C	Corridors. Connectivity-linking other old forest areas.
D	Deer yard
O	Old-growth location center (outside of SMZ)
P	Plant community protection
R	Riparian zone
S	Soil erosion/compaction concerns
T	Timber management

V	Visual or recreation concerns
W	Wildlife habitat
CRW	Example of multiple ERF coding for corridor, riparian, and wildlife. List in alphabetical order.
CRITERIA	Identifies the stands that meet the stand selection criteria. It provides the pool of stands to choose from for stand treatments in the 10-year plan.
HIGH RISK LOW VOLUME	Stand meets the criteria established for HRLV stands.
HARVEST	Stand that meets the harvest criteria
UNEVEN AGED HARVEST	Stand that meets the uneven-aged harvest criteria
THIN	Stand that meets the thinning criteria
FIELD VISIT	Stand that requires a field visit to determine a prescription.
UNDER MGMT,TBR=9	Stand is currently a timber sale or on a FY harvest plan.
INOPERABLE	Inoperable stands identified by field staff.
1	Stand is inoperable. Stand acres will be removed from the base acres for the cover type. These stands were designated before harvest pool acres were determined.
PRNA	Potential Research Natural Area (PRNA) - USFS
1	Stand adjacent to PRNA. Refer to Region memo for direction.
PAT_NOM	<p>Identify the patch with the coding that best represents the current age, size class, etc. (Use PATCHDFC Field to define the desired patch type). All codes used may not be included in this table.</p> <p>Patch Codes – Patch; Age Class (O-old, I-intermediate, Y-young, V-uneven-aged managed stand); Size Category Class (1-large to 5-small); Upland/Lowland; Cover Type Group (Deciduous, Conifers, Mixed Deciduous and Conifers)</p> <p>M - Mixed Ownership Patches: Add “M” in front of any patch code when the patch would involve other ownership than state land. Use only when fairly certain adjacent landowners would support development and retention of the patch over time.</p> <p>F - Add “F” in front of patch code for future patch. Use where you desire a patch to be located, but the group of stands currently do not meet the definition of a patch.</p>
<i>Patch nomenclature used in the North Shore Subsections SFRMP:</i>	

Patches – Large (1)	Greater than 640 acres
PI1LC	Patch, Intermediate age, Large size, Lowland, Conifers
PI1LUC	Patch, Intermediate age, Large size, Lowland and Upland, Conifers
PI1UC	Patch, Intermediate age, Large size, Upland, Conifers
PO1UD	Patch, Old age, Large size, Upland, Deciduous
PO1ULM	Patch, Old age, Large size, Upland and Lowland, Mixed Deciduous and Conifers
PV1UD	Patch, Uneven-aged, Large size, Upland, Deciduous
PV1ULM	Patch, Uneven-aged, Large size, Upland and Lowland, Mixed Deciduous and Conifers
PV1UM	Patch, Uneven-aged, Large size, Upland, Mixed Deciduous and Conifers
PY1ULM	Patch, Young age, Large size, Upland and Lowland, Mixed Deciduous and Conifers
PY1UM	Patch, Young age, Large size, Upland, Mixed Deciduous and Conifers
MPO1SLC	Mixed Ownership, Patch, Old age, Large size, Stagnant Lowland Conifers
MPO1UD	Mixed Ownership, Patch, Old age, Large size, Upland, Deciduous
MPO1ULM	Mixed Ownership, Patch, Old age, Large size, Upland and Lowland, Mixed Deciduous and Conifers
MPV1UC	Mixed Ownership, Patch, Uneven-aged, Large size, Upland, Conifers
MPV1UD	Mixed Ownership, Patch, Uneven-aged, Large size, Upland, Deciduous
MPV1ULM	Mixed Ownership, Patch, Uneven-aged, Large size, Upland and Lowland, Mixed Deciduous and Conifers
MPY1UD	Mixed Ownership, Patch, Young age, Large size, Upland, Deciduous
FMPV1ULM	Future, Mixed Ownership, Patch, Uneven-aged, Large size, Upland and Lowland, Mixed Deciduous and Conifers
FMPV1UM	Future, Mixed Ownership, Patch, Uneven-aged, Large size, Upland, Mixed Deciduous and Conifers
FMPY1UD	Future, Mixed Ownership, Patch, Young age, Large size, Upland, Deciduous
FMPY1UM	Future, Mixed Ownership, Patch, Young age, Large size, Upland, Mixed Deciduous and Conifers

FPY1UD	Future, Patch, Young age, Large size, Upland, Deciduous
FPY1ULM	Future, Patch, Young age, Large size, Upland and Lowland, Mixed Deciduous and Conifers
Patches - Med Large (2)	251 – 640 acres
PO2LC	Patch, Old age, Med-large size, Lowland, Conifers
PO2LM	Patch, Old age, Med-large size, Lowland, Mixed Deciduous and Conifers
PO2UC	Patch, Old age, Med-large size, Upland, Conifers
PO2UD	Patch, Old age, Med-large size, Upland, Deciduous
PO2ULM	Patch, Old age, Med-large size, Upland and Lowland, Mixed Deciduous and Conifers
PO2UM	Patch, Old age, Med-large size, Upland, Mixed Deciduous and Conifers
PV2UD	Patch, Uneven-aged, Med-large size, Upland, Deciduous
PY2LC	Patch, Young age, Med-large size, Lowland, Conifers
PY2UC	Patch, Young age, Med-large size, Upland, Conifers
PY2UD	Patch, Young age, Med-large size, Upland, Deciduous
PY2ULC	Patch, Young age, Med-large size, Upland and Lowland, Conifers
PY2ULM	Patch, Young age, Med-large size, Upland and Lowland, Mixed Deciduous and Conifers
PY2UM	Patch, Young age, Med-large size, Upland, Mixed Deciduous and Conifers
MPV2UD	Mixed ownership, Patch, Uneven-aged, Med-large size, Upland, Deciduous
MPV2ULM	Mixed ownership, Patch, Uneven-aged, Med-large size, Upland and Lowland, Mixed Deciduous and Conifers
MPY2UD	Mixed ownership, Patch, Young age, Med-large size, Upland, Deciduous
MPY2UM	Mixed ownership, Patch, Young age, Med-large size, Upland, Mixed Deciduous and Conifers
FPY2UC	Future, Patch, Young age, Med-large size, Upland, Conifers
FPY2UD	Future, Patch, Young age, Med-large size, Upland, Deciduous
FPY2UM	Future, Patch, Young age, Med-large size, Upland, Mixed Deciduous and Conifers
Patches - Other	Patches - Nontimberland and Nonforestland patches (<i>not used in this SFRMP plan</i>)

P1SLC	Patch, Large (>640 Acres), Stagnant Lowland Conifers
P1UX	Patch, Large (>640 Acres), Upland, Non-Forest
P1LX	Patch, Large (>640 Acres), Lowland, Non-Forest
P1LBM	Patch, Large (>640 Acres), Lowland, Brush and Muskeg
P1LGM	Patch, Large (>640 Acres), Lowland, Grass and Marsh
P2SLC	Patch, Medium Large (251-640 Acres), Stagnant Lowland Conifers
P2UX	Patch, Medium Large (251-640 Acres), Upland, Non-Forest
P2LX	Patch, Medium Large (251-640 Acres), Lowland, Non-Forest
P2LBM	Patch, Medium Large (251-640 Acres), Lowland, Brush and Muskeg
P2LGM	Patch, Medium Large (251-640 Acres), Lowland, Grass and Marsh
	<i>For smaller patch sizes 3 - 5, use similar coding scheme.</i>
PAT_NAM	Provide a name to identify each patch. Tag all stands within a patch with the same name.
PATCHDFC	Use the same coding method as listed under PAT_NOM Field. Use to identify patches where you want to change the age, size, even-aged vs. uneven-aged, or cover type group from what currently exists in the short term (10 years) or move toward in the longer term (50 years). Stands identified as future patches (F-prefix) in the PAT_NOM Field should have the desired patch nomenclature identified here.
TBRM	Timber Management Related Codes
AE	Aspen Emphasis Area. Identifies areas where habitat and timber management emphasis should be the maintenance and promotion of the aspen cover type. Recommendation is to maintain or increase aspen/BG cover types in these areas.
CONE	Conifer Emphasis Area (Upland). Identifies areas where habitat and timber management emphasis is managing toward extensive areas of predominantly upland conifer cover types. Recommendations: 1. Maintain current conifer stands as conifer cover types. 2. Conversion of aspen to upland conifer (where site appropriate) is the preferred alternative when planning for regeneration on harvested stands. 3. Use strategies and prescriptions to maximize the within-stand conifer component.

FML	This code tags DNR Fisheries administered lands. These lands will be included in the pool of acres considered for management during the 10-year planning period. These lands are primarily riparian, and will be managed primarily for enhancement of water quality and riparian values. Opportunities for conversion to conifers, ERF, and old growth will be emphasized. Final field approval of sale design rests with the Area Fisheries Supervisor.
WHAB	Wildlife Habitat Management Area Codes
DMA	Deer Management Area. Identifies areas where the management emphasis should be to maintain or increase white-tailed deer habitat. Recommendations: <ol style="list-style-type: none"> 1. Maintain a diversity of age classes in the upland deciduous cover types. 2. Preferred size of harvest area is 10-40 acre blocks. 3. Maintain or increase within stand diversity. 4. Maintain forest openings
DMAY	Deer Management Area - Yard. Identifies areas where the management emphasis is to optimize thermal (conifer) cover for deer. Recommendations: <ol style="list-style-type: none"> 1. Maintain or increase white cedar cover type and/or component. 2. Maintain or increase the conifer component in aspen, birch, and balm of gilead cover types. 3. Put some emphasis on browse production within selected conifer and mixed species stands. 4. Some deciduous stands within a yard will be managed for browse production.
GMAR	Ruffed Grouse Management Area. Identifies areas where the management emphasis is to maintain or increase ruffed grouse habitat. Not limited to officially designated ruffed grouse management areas. Recommendations: <ol style="list-style-type: none"> 1. Maximize diversity of age classes in the upland deciduous cover types. 2. Maximize the age difference between adjacent stands to create more edge. 3. Manage stands under normal rotation versus ERF. 4. Minimize conversion to conifer. 5. Reserve snags in islands. 6. Harvest in 10-30 acre blocks (10-15 acres preferred).
GMAS	Sharp-tail Grouse Management Area
MMA	Moose management area. Identifies areas where the management emphasis is to maintain or increase moose habitat. Recommendations: <ol style="list-style-type: none"> 1. Harvest in patch classes 3-4 (41-250 acres). 2. Maintain a diversity of age classes.

	<p>3. Promote mixed coniferous/deciduous stands.</p> <p>4. Promote development of coniferous stands near riparian areas or in proximity to browse areas.</p>
OLMA	Open landscape management area.
SMA	Special Management Area. The revised version of standardized fields for SFRMP plans combines TBRM, WHAB, and other special management area coding in this field.
MCBS	MCBS sites have been ranked according to the 7 levels listed below in order to communicate the relative significance for native biological diversity of surveyed areas to natural resource professionals, state and local government officials, and the public. Important factors in ranking MCBS sites include Element Occurrence rank (EO rank) for rare species and native plant community (NPC) elements, the size of NPC element occurrences, and the context within which the element(s) occur.
1	MCBS Site of Outstanding Statewide Biodiversity Significance (NSH). MCBS sites containing the best occurrences of the rarest species, the most outstanding examples of the rarest native plant communities, and/or the largest, most intact functional landscapes present in the state
2	MCBS Site of High Statewide Biodiversity Significance (NSH). MCBS sites containing the “best of the rest”, such as sites with very good quality occurrences of the rarest species, high quality examples of the rarest native plant communities, and/or important functional landscapes.
3	MCBS Site of Moderate Statewide Biodiversity Significance (NSH). MCBS sites containing significant occurrences of rare species, and/or moderately disturbed native plant communities and landscapes that have a strong potential for recovery.
4	MCBS Site that is Below the Minimum Threshold for Biodiversity Significance (NSH). MCBS sites lacking significant populations of rare species and/or natural features that meet MCBS minimum standards for size and condition. These include areas of conservation value at the local level, such as habitat for native plants and animals, corridors for animal movements, buffers surrounding higher quality natural areas, and open space areas.
5	MCBS LSA or Site with Preliminary Survey Priority of High (LU or TU).
6	MCBS LSA or Site with Preliminary Survey Priority of Moderate (LU or TU).
7	MCBS LSA or Site with Preliminary Survey Priority of Low (LU or TU).

JT_VISIT	If coded, joint field visit desired by staff from other divisions. Stands may be tagged during the 10-year stand selection process or during annual harvest plan reviews.
FSH	Contact Area Fisheries staff prior to the field visit. All stands on fisheries lands will receive a field visit designation of FSH, other stands that fisheries staff want to field visit with the appraiser will be tagged during the 10-year selection or annual reviews.
WLD	Contact Area Wildlife staff prior to the field visit. Wildlife staff will tag stands with WLD that they want to do a joint site visit.
ECO	Contact Ecological Services representative prior to the field visit. Eco Services staff will tag stands with ECO that they want to do a joint site visit.
TEAMCOMM	Team comment relating to preliminary objective, etc.

Objective codes used for tagging some stands with preliminary management objectives are included in Appendix J.

APPENDIX O

Terrestrial, Vertebrate Species List

North Shore Highlands, Toimi Uplands, and Laurentian Uplands Subsections^a

^a **Species Common Name:** Are standardized nomenclature for GAP protocol uses through NatureServe and it's related searchable plant, animal and ecological communities database called NatureServe Explorer (2002) located at <www.natureserveexplorer.org>.

^b **Resident Status:** **R**=Regular resident as Breeding, Nesting, or Migratory (acceptable record exists in at least eight of the past ten years); **PR**=Permanent Resident (exists year-round).

^c **State Legal Status:** **E**=State Endangered; **T**=State Threatened; **SC**=State Species of Special Concern; **BG**=Big Game; **SG**=Small Game; **F**=Furbearer; **MW**=Migratory Waterfowl; **UB**=Unprotected Bird; **PB**=Protected Bird; **PWA**=Protected Wild Animal; **UWA**=Unprotected Wild Animal.

^d **Federal Legal Status:** **T**=Federal Threatened; **E**=Federal Endangered; **P**=Federal Protection by Migratory Bird Treaty Act and/or Bald Eagle Protection Act and/or CITES.

^e **ECS Subsection Resident Status:** **B**=Minnesota breeding record exists for the species; **P**=Presence known or predicted, as year around resident; **(L)**=Limited distribution within ECS Subsection; **M**=Spring or fall migrant, non-breeder; **SV**= Summer visitor, non-breeder; **WV**=Winter visitor, non-breeder; **A**=Absent.

Terrestrial, Vertebrate Species List DRAFT 9-27-2004							
Minnesota DNR-Division of Fish and Wildlife - Wildlife Resource Assessment Project							
Common Name ^a	Scientific Name	Resident Status ^b	State Legal Status ^c	Federal Legal Status ^d	North Shore Highlands ^e	Toimi Uplands ^e	Laurentian Uplands ^e
BIRDS							
Common Loon	<i>Gavia immer</i>	R	PB	P	B	B	B
Pied-billed Grebe	<i>Podilymbus podiceps</i>	R	PB	P	B	B	B
Red-necked Grebe	<i>Podiceps grisegena</i>	R	PB	P	B	B	B
Double-crested Cormorant	<i>Phalacrocorax auritus</i>	R	UB	P	B	B	B
American Bittern	<i>Botaurus lentiginosus</i>	R	PB	P	B	B	B
Great Blue Heron	<i>Ardea herodias</i>	R	PB	P	B	B	B
Green Heron	<i>Butorides virescens</i>	R	PB	P	B	A	A
Canada Goose	<i>Branta canadensis</i>	R	PB, MW	P	B	B	B
Wood Duck	<i>Aix sponsa</i>	R	PB, MW	P	B	B	B
American Black Duck	<i>Anas rubripes</i>	R	PB, MW	P	B	B	B
Mallard	<i>Anas platyrhynchos</i>	R	PB, MW	P	B	B	B
Blue-winged Teal	<i>Anas discors</i>	R	PB, MW	P	B	B	B
American Wigeon	<i>Anas americana</i>	R	PB, MW	P	M	B	M

Terrestrial, Vertebrate Species List					DRAFT 9-27-2004		
Minnesota DNR-Division of Fish and Wildlife - Wildlife Resource Assessment Project							
Common Name ^a	Scientific Name	Resident Status ^b	State Legal Status ^c	Federal Legal Status ^d	North Shore Highlands ^e	Toimi Uplands ^e	Laurentian Uplands ^e
Ring-necked Duck	<i>Aythya collaris</i>	R	PB, MW	P	B	B	B
Common Goldeneye	<i>Bucephala clangula</i>	R	PB, MW	P	WV	B	B
Hooded Merganser	<i>Lophodytes cucullatus</i>	R	PB, MW	P	B	B	B
Common Merganser	<i>Mergus merganser</i>	R	PB, MW	P	B	B	B
Red-breasted Merganser	<i>Mergus serrator</i>	R	PB, MW	P	B	M	M
Turkey Vulture	<i>Cathartes aura</i>	R	PB	P	B	B	B
Osprey	<i>Pandion haliaetus</i>	R	PB	P	B	B	B
Bald Eagle	<i>Haliaeetus leucocephalus</i>	R	PB, SC	T, P	B	B	B
Northern Harrier	<i>Circus cyaneus</i>	R	PB	P	B	B	B
Sharp-shinned Hawk	<i>Accipiter striatus</i>	R	PB	P	B	B	B
Cooper's Hawk	<i>Accipiter cooperii</i>	R	PB	P	B	M	B
Northern Goshawk	<i>Accipiter gentilis</i>	PR	PB	P	B	B	B
Broad-winged Hawk	<i>Buteo platypterus</i>	R	PB	P	B	B	B
Red-tailed Hawk	<i>Buteo jamaicensis</i>	R	PB	P	B	B	B
American Kestrel	<i>Falco sparverius</i>	R	PB	P	B	B	B
Merlin	<i>Falco columbarius</i>	R	PB	P	B	B	B
Peregrine Falcon	<i>Falco peregrinus</i>	R	PB, T	P	B	M	M
Spruce Grouse	<i>Falcapennis canadensis</i>	PR	PB, SG		P	P	P
Ruffed Grouse	<i>Bonasa umbellus</i>	PR	PB, SG		P	P	P
Virginia Rail	<i>Rallus limicola</i>	R	PB, SG	P	B	B	B
Sora	<i>Porzana carolina</i>	R	PB, SG	P	B	B	B
Sandhill Crane	<i>Grus canadensis</i>	R	PB	P	M / B (L)	B	B
Piping Plover	<i>Charadrius melodus</i>	R	PB, E	P, E&T	M / B (L)	M	M
Killdeer	<i>Charadrius vociferus</i>	R	PB	P	B	B	B
Spotted Sandpiper	<i>Actitis macularia</i>	R	PB	P	B	B	B
Wilson's Snipe	<i>Gallinago delicata</i>	R	PB, SG	P	B	B	B
American Woodcock	<i>Scolopax minor</i>	R	PB, SG	P	B	B	B
Ring-billed Gull	<i>Larus delawarensis</i>	R	PB	P	B	M	M
Herring Gull	<i>Larus argentatus</i>	R	PB	P	B	B	B
Common Tern	<i>Sterna hirundo</i>	R	PB, T	P	B	M	M

Terrestrial, Vertebrate Species List				DRAFT 9-27-2004			
Minnesota DNR-Division of Fish and Wildlife - Wildlife Resource Assessment Project							
Common Name ^a	Scientific Name	Resident Status ^b	State Legal Status ^c	Federal Legal Status ^d	North Shore Highlands ^e	Toimi Uplands ^e	Laurentian Uplands ^e
Rock Dove	<i>Columba livia</i>	PR	PB		P	P	P
Mourning Dove	<i>Zenaida macroura</i>	R	PB	P	B	M	M
Black-billed Cuckoo	<i>Coccyzus erythrophthalmus</i>	R	PB	P	B	B	B
Great Horned Owl	<i>Bubo virginianus</i>	PR	UB	P	P	P	P
Northern Hawk Owl	<i>Surnia ulula</i>	PR	PB	P	WV	WV	P
Barred Owl	<i>Strix varia</i>	PR	PB	P	P	P	P
Great Gray Owl	<i>Strix nebulosa</i>	PR	PB	P	P (L)	P	P
Long-eared Owl	<i>Asio otus</i>	R	PB	P	B	B	B
Boreal Owl	<i>Aegolius funereus</i>	PR	PB	P	WV /P (L)	WV /P (L)	P
Northern Saw-whet Owl	<i>Aegolius acadicus</i>	R	PB	P	B	B	B
Common Nighthawk	<i>Chordeiles minor</i>	R	PB	P	B	B	B
Whip-poor-will	<i>Caprimulgus vociferus</i>	R	PB	P	B	B	B
Chimney Swift	<i>Chaetura pelagica</i>	R	PB	P	B	B	B
Ruby-throated Hummingbird	<i>Archilochus colubris</i>	R	PB	P	B	B	B
Belted Kingfisher	<i>Ceryle alcyon</i>	R	PB	P	B	B	B
Red-headed Woodpecker	<i>Melanerpes erythrocephalus</i>	R	PB	P	B	B	A
Yellow-bellied Sapsucker	<i>Sphyrapicus varius</i>	R	PB	P	B	B	B
Downy Woodpecker	<i>Picoides pubescens</i>	PR	PB	P	P	P	P
Hairy Woodpecker	<i>Picoides villosus</i>	PR	PB	P	P	P	P
Three-toed Woodpecker	<i>Picoides tridactylus</i>	PR	PB	P	WV	WV	P
Black-backed Woodpecker	<i>Picoides arcticus</i>	PR	PB	P	P	P	P
Northern Flicker	<i>Colaptes auratus</i>	R	PB	P	B	B	B
Pileated Woodpecker	<i>Dryocopus pileatus</i>	PR	PB	P	P	P	P
Olive-sided Flycatcher	<i>Contopus cooperi</i>	R	PB	P	B	B	B
Eastern Wood-Pewee	<i>Contopus virens</i>	R	PB	P	B	B	B

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Yellow-bellied Flycatcher	<i>Empidonax flaviventris</i>	R	PB	P	B	B	B
Alder Flycatcher	<i>Empidonax alnorum</i>	R	PB	P	B	B	B
Least Flycatcher	<i>Empidonax minimus</i>	R	PB	P	B	B	B
Eastern Phoebe	<i>Sayornis phoebe</i>	R	PB	P	B	B	B
Great Crested Flycatcher	<i>Myiarchus crinitus</i>	R	PB	P	B	B	B
Eastern Kingbird	<i>Tyrannus tyrannus</i>	R	PB	P	B	B	B
Purple Martin	<i>Progne subis</i>	R	PB	P	B	B	B
Tree Swallow	<i>Tachycineta bicolor</i>	R	PB	P	B	B	B
Northern Rough-winged Swallow	<i>Stelgidopteryx serripennis</i>	R	PB	P	B	B	B
Bank Swallow	<i>Riparia riparia</i>	R	PB	P	B	B	B
Cliff Swallow	<i>Petrochelidon pyrrhonota</i>	R	PB	P	B	B	B
Barn Swallow	<i>Hirundo rustica</i>	R	PB	P	B	B	B
Gray Jay	<i>Perisoreus canadensis</i>	PR	PB	P	P	P	P
Blue Jay	<i>Cyanocitta cristata</i>	PR	PB	P	P	P	P
American Crow	<i>Corvus brachyrhynchos</i>	PR	PB	P	P	P	P
Common Raven	<i>Corvus corax</i>	PR	PB	P	P	P	P
Black-capped Chickadee	<i>Poecile atricapillus</i>	PR	PB	P	P	P	P
Boreal Chickadee	<i>Poecile hudsonicus</i>	PR	PB	P	P	P	P
Red-breasted Nuthatch	<i>Sitta canadensis</i>	PR	PB	P	P	P	P
White-breasted Nuthatch	<i>Sitta carolinensis</i>	PR	PB	P	P	P	P
Brown Creeper	<i>Certhia americana</i>	R	PB	P	B	B	B
House Wren	<i>Troglodytes aedon</i>	R	PB	P	B	B	B
Winter Wren	<i>Troglodytes troglodytes</i>	R	PB	P	B	B	B
Sedge Wren	<i>Cistothorus platensis</i>	R	PB	P	B	B	B
Golden-crowned Kinglet	<i>Regulus satrapa</i>	R	PB	P	B	B	B
Ruby-crowned Kinglet	<i>Regulus calendula</i>	R	PB	P	B	B	B
Eastern Bluebird	<i>Sialia sialis</i>	R	PB	P	B	B	B
Veery	<i>Catharus fuscescens</i>	R	PB	P	B	B	B
Swainson's Thrush	<i>Catharus ustulatus</i>	R	PB	P	B	B	B

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Hermit Thrush	<i>Catharus guttatus</i>	R	PB	P	B	B	B
Wood Thrush	<i>Hylocichla mustelina</i>	R	PB	P	B	B	B
American Robin	<i>Turdus migratorius</i>	R	PB	P	B	B	B
Gray Catbird	<i>Dumetella carolinensis</i>	R	PB	P	B	B	B
Brown Thrasher	<i>Toxostoma rufum</i>	R	PB	P	B	B	B
European Starling	<i>Sturnus vulgaris</i>	PR	UB		P	P	P
Cedar Waxwing	<i>Bombycilla cedrorum</i>	R	PB	P	B	B	B
Blue-headed Vireo	<i>Vireo solitarius</i>	R	PB	P	B	B	B
Yellow-throated Vireo	<i>Vireo flavifrons</i>	R	PB	P	B (L)	A	A
Warbling Vireo	<i>Vireo gilvus</i>	R	PB	P	B (L)	A	A
Philadelphia Vireo	<i>Vireo philadelphicus</i>	R	PB	P	B	B	B
Red-eyed Vireo	<i>Vireo olivaceus</i>	R	PB	P	B	B	B
Golden-winged Warbler	<i>Vermivora chrysoptera</i>	R	PB	P	B	B	B
Tennessee Warbler	<i>Vermivora peregrina</i>	R	PB	P	B	B	B
Nashville Warbler	<i>Vermivora ruficapilla</i>	R	PB	P	B	B	B
Northern Parula	<i>Parula americana</i>	R	PB	P	B	B	B
Yellow Warbler	<i>Dendroica petechia</i>	R	PB	P	B	B	B
Chestnut-sided Warbler	<i>Dendroica pensylvanica</i>	R	PB	P	B	B	B
Magnolia Warbler	<i>Dendroica magnolia</i>	R	PB	P	B	B	B
Cape May Warbler	<i>Dendroica tigrina</i>	R	PB	P	B	B	B
Black-throated Blue Warbler	<i>Dendroica caerulescens</i>	R	PB	P	B	M	B
Yellow-rumped Warbler	<i>Dendroica coronata</i>	R	PB	P	B	B	B
Black-throated Green Warbler	<i>Dendroica virens</i>	R	PB	P	B	B	B
Blackburnian Warbler	<i>Dendroica fusca</i>	R	PB	P	B	B	B
Pine Warbler	<i>Dendroica pinus</i>	R	PB	P	B	B	B
Palm Warbler	<i>Dendroica palmarum</i>	R	PB	P	M	B	B
Bay-breasted Warbler	<i>Dendroica castanea</i>	R	PB	P	M	M	B
Black-and-white Warbler	<i>Mniotilta varia</i>	R	PB	P	B	B	B

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American Redstart	<i>Setophaga ruticilla</i>	R	PB	P	B	B	B
Ovenbird	<i>Seiurus aurocapillus</i>	R	PB	P	B	B	B
Northern Waterthrush	<i>Seiurus noveboracensis</i>	R	PB	P	B	B	B
Connecticut Warbler	<i>Oporornis agilis</i>	R	PB	P	B	B	B
Mourning Warbler	<i>Oporornis philadelphia</i>	R	PB	P	B	B	B
Common Yellowthroat	<i>Geothlypis trichas</i>	R	PB	P	B	B	B
Wilson's Warbler	<i>Wilsonia pusilla</i>	R	PB	P	M	B	B
Canada Warbler	<i>Wilsonia canadensis</i>	R	PB	P	B	B	B
Scarlet Tanager	<i>Piranga olivacea</i>	R	PB	P	B	B	B
Northern Cardinal	<i>Cardinalis cardinalis</i>	PR	PB	P	P	WV	WV
Rose-breasted Grosbeak	<i>Pheucticus ludovicianus</i>	R	PB	P	B	B	B
Indigo Bunting	<i>Passerina cyanea</i>	R	PB	P	B	B	B
Chipping Sparrow	<i>Spizella passerina</i>	R	PB	P	B	B	B
Clay-colored Sparrow	<i>Spizella pallida</i>	R	PB	P	B	B	B
Savannah Sparrow	<i>Passerculus sandwichensis</i>	R	PB	P	B	B	B
Le Conte's Sparrow	<i>Ammodramus leconteii</i>	R	PB	P	B	B	B
Song Sparrow	<i>Melospiza melodia</i>	R	PB	P	B	B	B
Lincoln's Sparrow	<i>Melospiza lincolnii</i>	R	PB	P	B	B	B
Swamp Sparrow	<i>Melospiza georgiana</i>	R	PB	P	B	B	B
White-throated Sparrow	<i>Zonotrichia albicollis</i>	R	PB	P	B	B	B
Dark-eyed Junco	<i>Junco hyemalis</i>	R	PB	P	B	B	B
Bobolink	<i>Dolichonyx oryzivorus</i>	R	PB	P	B	B	B
Red-winged Blackbird	<i>Agelaius phoeniceus</i>	R	UB	P	B	B	B
Eastern Meadowlark	<i>Sturnella magna</i>	R	PB	P	B	B	B
Brewer's Blackbird	<i>Euphagus cyanocephalus</i>	R	UB	P	B	A	A
Common Grackle	<i>Quiscalus quiscula</i>	R	UB	P	B	B	B
Brown-headed Cowbird	<i>Molothrus ater</i>	R	PB	P	B	B	B
Baltimore Oriole	<i>Icterus galbula</i>	R	PB	P	B	B	B

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Purple Finch	<i>Carpodacus purpureus</i>	R	PB	P	B	B	B
House Finch	<i>Carpodacus mexicanus</i>	PR	PB	P	P	A	A
White-winged Crossbill	<i>Loxia leucoptera</i>	R	PB	P	B	B	B
Pine Siskin	<i>Carduelis pinus</i>	PR	PB	P	P	P	P
American Goldfinch	<i>Carduelis tristis</i>	R	PB	P	B	B	B
Evening Grosbeak	<i>Coccothraustes vespertinus</i>	PR	PB	P	P	P	P
House Sparrow	<i>Passer domesticus</i>	PR	UB		P	P	P
MAMMALS							
Cinereus Shrew	<i>Sorex cinereus</i>	PR			P	P	P
Water Shrew	<i>Sorex palustris</i>	PR			P	P	P
Smoky Shrew	<i>Sorex fumeus</i>	PR	SC		P	A	P
Arctic Shrew	<i>Sorex arcticus</i>	PR			P	P	P
Pygmy Shrew	<i>Sorex hoyi</i>	PR			P	P	P
Northern Short-tailed Shrew	<i>Blarina brevicauda</i>	PR			P	P	P
Star-nosed Mole	<i>Condylura cristata</i>	PR			P	P	P
Little Brown Bat	<i>Myotis lucifugus</i>	PR			B	B	B
Northern Myotis	<i>Myotis septentrionalis</i>	PR	SC		P	B	B
Silver-haired Bat	<i>Lasionycteris noctivagans</i>	R			B	B	B
Eastern Pipistrelle	<i>Pipistrellus subflavus</i>	PR	SC		P	A	A
Big Brown Bat	<i>Eptesicus fuscus</i>	PR			B	B	B
Eastern Red Bat	<i>Lasiurus borealis</i>	R			B	B	B
Hoary Bat	<i>Lasiurus cinereus</i>	R			B	B	B
Eastern Cottontail	<i>Sylvilagus floridanus</i>	PR	PWA, SG		P	P	P
Snowshoe Hare	<i>Lepus americanus</i>	PR	PWA, SG		P	P	P
Least Chipmunk	<i>Tamias minimus</i>	PR			P	P	P
Eastern Chipmunk	<i>Tamias striatus</i>	PR			P	P	P
Woodchuck	<i>Marmota monax</i>	PR			P	P	P
Thirteen-lined Ground Squirrel	<i>Spermophilus tridecemlineatus</i>	PR			P	P	P

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Franklin's Ground Squirrel	<i>Spermophilus franklinii</i>	PR			P	P	P
Eastern Gray Squirrel	<i>Sciurus carolinensis</i>	PR	PWA, SG		P	A	A
Red Squirrel	<i>Tamiasciurus hudsonicus</i>	PR			P	P	P
Northern Flying Squirrel	<i>Glaucomys sabrinus</i>	PR			P	P	P
American Beaver	<i>Castor canadensis</i>	PR	PWA, SG, F		P	P	P
Woodland Deer Mouse	<i>Peromyscus maniculatus gracilis</i>	PR			P	P	P
White-footed Mouse	<i>Peromyscus leucopus</i>	PR			P	A	A
Southern Red-backed Vole	<i>Clethrionomys gapperi</i>	PR			P	P	P
Eastern Heather Vole	<i>Phenacomys ungava</i>	PR	SC		A	A	P
Meadow Vole	<i>Microtus pennsylvanicus</i>	PR			P	P	P
Rock Vole	<i>Microtus chrotorrhinus</i>	PR			P	A	P
Muskrat	<i>Ondatra zibethicus</i>	PR	PWA, SG, F		P	P	P
Southern Bog Lemming	<i>Synaptomys cooperi</i>	PR			P	P	P
Meadow Jumping Mouse	<i>Zapus hudsonius</i>	PR			P	P	P
Woodland Jumping Mouse	<i>Napaeozapus insignis</i>	PR			P	P	P
North American Porcupine	<i>Erethizon dorsatum</i>	PR	UWA		P	P	P
Coyote	<i>Canis latrans</i>	PR	UWA		P	P	P
Gray Wolf	<i>Canis lupus</i>	PR	SC	P, T	P	P	P
Red Fox	<i>Vulpes vulpes</i>	PR	PWA, SG, F		P	P	P
Gray Fox	<i>Urocyon cinereoargenteus</i>	PR	PWA, SG, F		P	A	A
American Black Bear	<i>Ursus americanus</i>	PR	PWA, BG	P	P	P	P
Northern Raccoon	<i>Procyon lotor</i>	PR	PWA, SG, F		P	P	P
American Marten	<i>Martes americana</i>	PR	PWA, SG, F		P	P	P

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Fisher	<i>Martes pennanti</i>	PR	PWA, SG, F		P	P	P
Ermine	<i>Mustela erminea</i>	PR	UWA		P	P	P
American Mink	<i>Mustela vison</i>	PR	PWA, SG, F		P	P	P
American Badger	<i>Taxidea taxus</i>	PR	PWA, SG, F		P	P	P
Striped Skunk	<i>Mephitis mephitis</i>	PR	UWA		P	P	P
Northern River Otter	<i>Lontra canadensis</i>	PR	PWA, SG, F		P	P	P
Puma	<i>Puma concolor</i>	PR	PWA, SG, SC	P,	P	P	P
Canada Lynx	<i>Lynx canadensis</i>	PR	PWA, SG, F	T, P	P	P	P
Bobcat	<i>Felis rufus</i>	PR	PWA, SG, F	P,	P	P	P
White-tailed Deer	<i>Odocoileus virginianus</i>	PR	PWA, BG		P	P	P
Moose	<i>Alces alces</i>	PR	PWA, BG		P	P	P
AMPHIBIANS AND REPTILES							
Blue-spotted Salamander	<i>Ambystoma laterale</i>	PR			P	P	P
Tiger Salamander	<i>Ambystoma tigrinum</i>	PR			P	P	P
Spotted salamander	<i>Ambystoma maculatum</i>	PR			P	P	P
Four-toed Salamander	<i>Hemidactylium scutatum</i>	PR	SC		P	P	P
Redback Salamander	<i>Plethodon cinereus</i>	PR			P	P	P
Eastern Newt	<i>Notophthalmus viridescens</i>	PR			P	P	P
American Toad	<i>Bufo americanus</i>	PR	PWA		P	P	P
Gray Treefrog	<i>Hyla versicolor</i>	PR	PWA		P	P	P
Western Chorus Frog	<i>Pseudacris triseriata</i>	PR	PWA		P	P	P
Spring Peeper	<i>Pseudacris crucifer</i>	PR	PWA		P	P	P
Green Frog	<i>Rana clamitans</i>	PR	PWA		P	P	P
Northern Leopard Frog	<i>Rana pipiens</i>	PR	PWA		P	P	P
Mink Frog	<i>Rana septentrionalis</i>	PR	PWA		P	P	P

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Wood Frog	<i>Rana sylvatica</i>	PR	PWA		P	P	P
Snapping Turtle	<i>Chelydra serpentina</i>	PR	PWA, SC		P	P	P
Painted Turtle	<i>Chrysemys picta</i>	PR	PWA		P	P	P
Wood Turtle	<i>Clemmys insculpta</i>	PR	PWA, T		P (L)	P	A
Blanding's Turtle	<i>Emydoidea blandingii</i>	PR	PWA, T		P (L)	A	A
Ringneck Snake	<i>Diadophis punctatus</i>	PR			P	A	A
Redbelly Snake	<i>Storeria occipitomaculata</i>	PR			P	P	P
Common Garter Snake	<i>Thamnophis sirtalis</i>	PR			P	P	P

^A **MNWRAP Disclaimer:** This species list is a representation of the current occurrence of these species based upon Minnesota Ecological Classification System Subsections. The species may not occur everywhere within the subsection. Animal distributions are dynamic and occurrence revisions may be made as new information becomes available.