

CHAPTER 3

Forest Composition and Structure

St. Louis Moraines, Tamarack Lowlands, Nashwauk Uplands, and Littlefork-Vermilion Uplands Subsections

Part 1

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Table 3.4 North-4 Subsections

Graphics (i.e., Tables, Charts, and Maps) referring to all four subsections combined (St. Louis Moraines, Tamarack Lowlands, Nashwauk Uplands, and Littlefork-Vermilion Uplands) are indicated by a “North-4 Subsections” after the chart designation (e.g., Table 3.2 North-4 Subsections).

Graphics referring to the St. Louis Moraines Subsection only are indicated by a “slm” after each chart designation (e.g., Chart 3.2 slm).

Graphics referring to the Tamarack Lowlands Subsection *only* are indicated by a “tl” after each chart designation (e.g., Map 3.2 tl).

Graphics referring to the Nashwauk Uplands Subsection *only* are indicated by a “nu” after each chart designation (e.g., Map 3.2 nu).

Graphics referring to the Littlefork-Vermilion Uplands *only* are indicated by a “lvu” after each chart designation (e.g., Map 3.2 lvu).

Notes relating to this chapter:

Color maps may be viewed as PDF files on the St. Louis Moraines, Tamarack Lowlands, Nashwauk Uplands, and Littlefork-Vermilion Uplands Subsection Forest Resource Management Plan (SFRMP) Web site at:

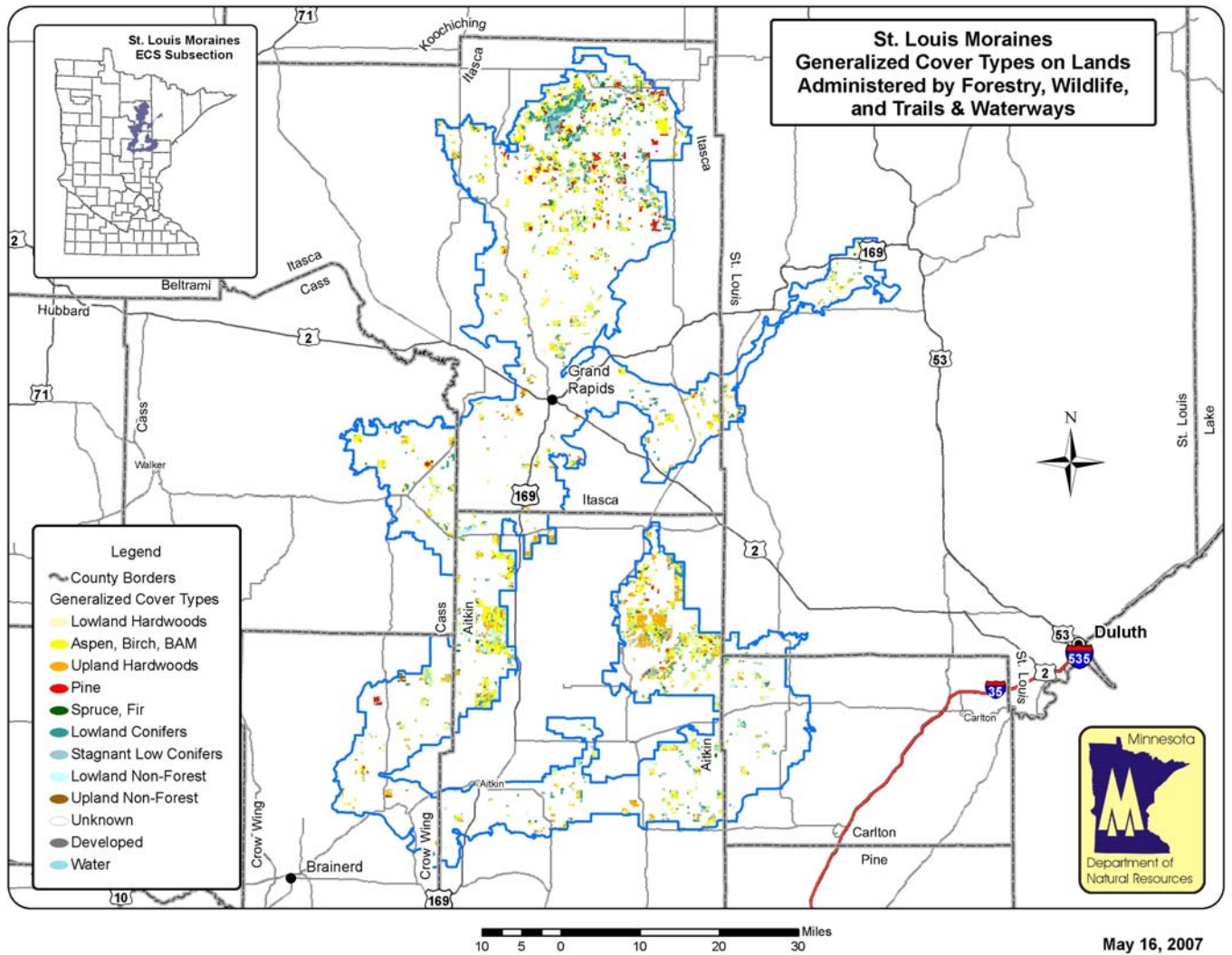
http://www.dnr.state.mn.us/forestry/subsection/north_4subsections/assessment.html

Maps in this chapter depict information for an area within a “planning boundary.” This boundary is designed to closely approximate the subsection while capturing data summary and planning efficiencies by using survey or jurisdiction lines in some cases.

Printed documents will be available for review at the Minnesota DNR Grand Rapids Region Headquarters at 1201 E Hwy 2, Grand Rapids, Minnesota, and on compact disk by request to Lynn Sue Mizner at (218) 927-7511 or lynn.mizner@dnr.state.mn.us.

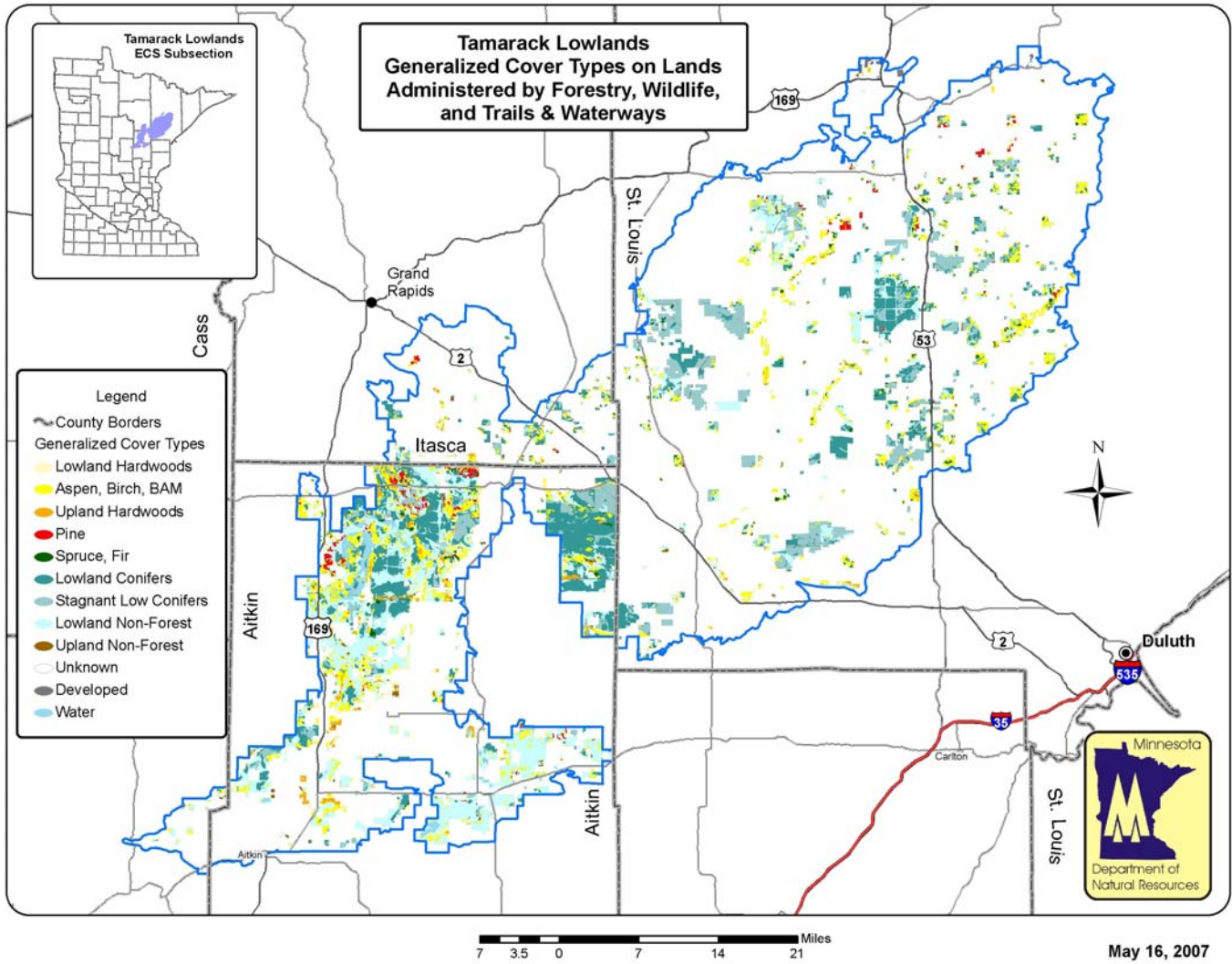
3.1 Forest Cover-Type Acres on State Land Administered by DNR Forestry, Trails and Waterways, Fish and Wildlife – Wildlife Section, - North-4 Subsections

Map 3.1 slm



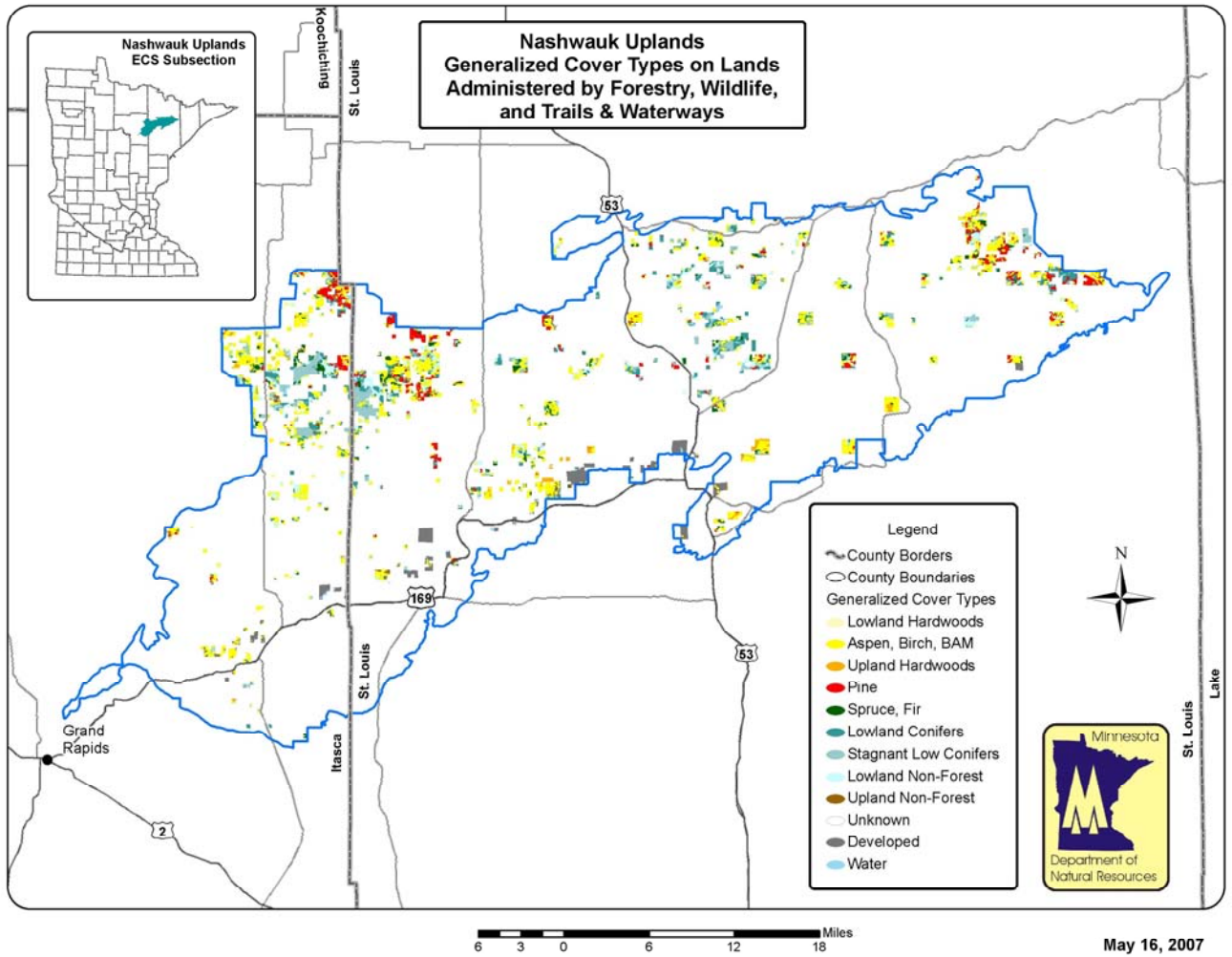
Source: 2007 Minnesota DNR Cooperative Stand Assessment (CSA) forest inventory.

Map 3.1 tl



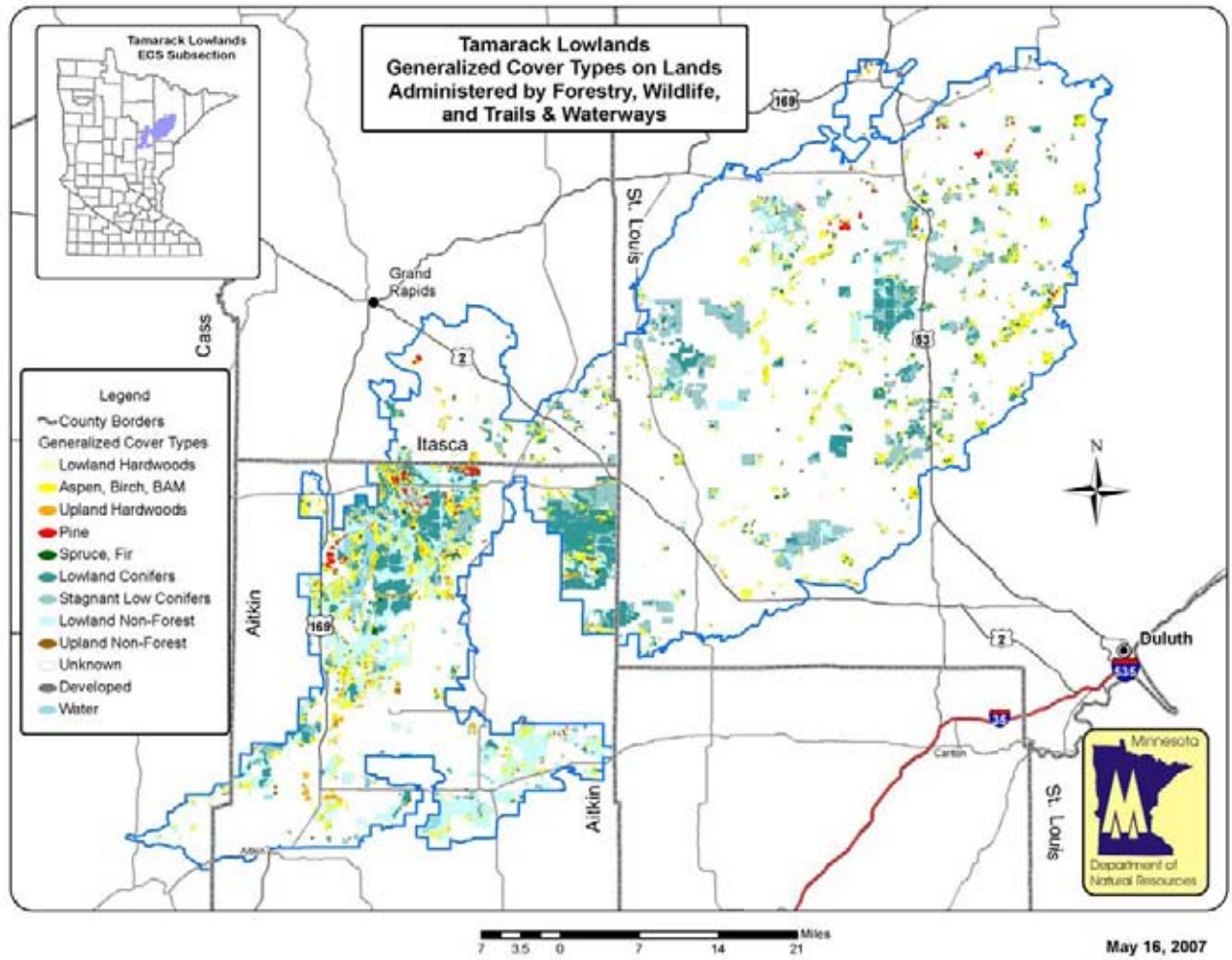
Source: 2007 Minnesota DNR Cooperative Stand Assessment (CSA) forest inventory.

Map 3.1 nu



Source: 2007 Minnesota DNR Cooperative Stand Assessment (CSA) forest inventory.

Map 3.1 *tlu*



Source: 2007 Minnesota DNR Cooperative Stand Assessment (CSA) forest inventory.

Table 3.1 North-4 Subsections

COVER TYPE	AGE CLASS													TOTAL	% OF GRAND TOTAL
	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-110	111-120	120+		
Ash/Lowland Hardwoods															
Total	199	834	1297	1033	496	742	2302	4353	6487	7147	7637	6198	13889	52614	7.39%
Littlefork-Vermilion Uplands	154	497	944	763	359	488	1166	1479	2359	2730	2954	3163	8865	25921	
Nashwauk Uplands	7	111	28	48	0	12	23	24	252	400	398	427	794	2524	
St. Louis Moraines	0	70	88	92	20	101	460	742	1386	1867	2107	1447	2318	10698	
Tamarack Lowlands	38	156	237	130	117	141	653	2108	2490	2150	2178	1161	1912	13471	
Aspen/Balm of Gilead															
Total	39944	63990	43342	28439	16137	21254	24019	17408	5146	621	195	34	26	260555	36.62%
Littlefork-Vermilion Uplands	18197	26429	17169	11834	7499	10374	11128	8102	1519	300	115	11	22	112699	
Nashwauk Uplands	3767	8067	4253	2352	570	1106	1242	2084	637	76	43	0	0	24197	
St. Louis Moraines	9694	17034	13968	8593	4487	3715	5886	3614	1526	114	21	23	0	68675	
Tamarack Lowlands	8286	12460	7952	5660	3581	6059	5763	3608	1464	131	16	0	4	54984	
Balsam Fir															
Total	833	628	992	3345	2459	1610	2868	3127	1826	845	301	44	46	18924	2.66%
Littlefork-Vermilion Uplands	391	293	647	1921	1880	868	1749	1723	986	587	244	0	40	11329	
Nashwauk Uplands	12	68	105	274	77	45	130	143	95	17	11	0	0	977	
St. Louis Moraines	205	163	136	759	404	472	411	508	385	69	8	3	6	3529	
Tamarack Lowlands	225	104	104	391	98	225	578	753	360	172	38	41	0	3089	
Birch															
Total	653	177	160	353	181	995	1705	2693	2226	1185	248	78	44	10698	1.50%
Littlefork-Vermilion Uplands	17	55	0	142	92	111	268	241	177	126	140	32	34	1435	
Nashwauk Uplands	188	35	27	6	3	111	431	672	950	481	55	7	10	2976	
St. Louis Moraines	331	51	133	14	86	436	703	1199	901	426	48	14	0	4342	
Tamarack Lowlands	117	36	0	191	0	337	303	581	198	152	5	25	0	1945	
Black Spruce, Upland															
Total	385	134	281	87	111	184	93	137	22	52	3	11	37	1537	0.22%
Littlefork-Vermilion Uplands	111	70	189	5	47	179	70	9	9	44	0	11	37	781	
Nashwauk Uplands	144	28	10	58	21	0	18	64	13	0	0	0	0	356	
St. Louis Moraines	67	36	22	0	43	5	5	27	0	0	3	0	0	208	
Tamarack Lowlands	63	0	60	24	0	0	0	37	0	8	0	0	0	192	

COVER TYPE	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-110	111-120	120+	TOTAL	% OF GRAND TOTAL
<i>Black Spruce, Lowland</i>															
Total	15664	12883	10574	17068	10754	6933	8765	12018	13291	13494	14674	12770	29916	178804	25.13%
Littlefork-Vermilion Uplands	12804	10747	9053	11161	6080	5159	6414	7880	8727	9254	10158	8635	22404	128476	
Nashwauk Uplands	747	453	107	404	516	168	326	610	692	1015	460	378	688	6564	
St. Louis Moraines	1327	956	812	1916	1367	407	651	1433	1618	1190	1085	1984	2812	17558	
Tamarack Lowlands	786	727	602	3587	2791	1199	1374	2095	2254	2035	2971	1773	4012	26206	
<i>Cedar</i>															
Total	32	296	208	530	262	208	373	883	1194	2639	5510	5387	25414	42936	6.03%
Littlefork-Vermilion Uplands	32	296	167	530	234	107	373	614	715	1226	2870	2955	19797	29916	
Nashwauk Uplands	0	0	14	0	0	0	0	0	45	96	55	172	824	1206	
St. Louis Moraines	0	0	10	0	3	12	0	154	145	477	602	883	2523	4809	
Tamarack Lowlands	0	0	17	0	25	89	0	115	289	840	1983	1377	2270	7005	
<i>Northern Hardwoods</i>															
Total	175	129	499	143	480	1175	3793	6585	4200	2231	1166	1322	999	22897	3.22%
Littlefork-Vermilion Uplands	49	4	0	0	37	46	93	442	155	34	99	29	109	1097	
Nashwauk Uplands	38	9	5	28	114	50	240	291	227	102	9	15	0	1128	
St. Louis Moraines	88	116	436	105	212	490	2563	4060	2697	1490	828	1268	525	14878	
Tamarack Lowlands	0	0	58	10	117	589	897	1792	1121	605	230	10	365	5794	
<i>Oak</i>															
Total	102	138	0	64	30	139	304	1284	1664	360	155	99	216	4555	0.64%
Littlefork-Vermilion Uplands	15	39	0	0	0	0	0	0	24	0	0	0	0	78	
Nashwauk Uplands	11	0	0	0	0	0	0	0	83	68	0	0	0	162	
St. Louis Moraines	72	91	0	25	27	131	231	1074	1226	277	5	99	125	3383	
Tamarack Lowlands	4	8	0	39	3	8	73	210	331	15	150	0	91	932	
<i>Red Pine</i>															
Total	2545	2279	4571	1540	3384	599	1263	850	770	1182	955	582	222	20742	2.92%
Littlefork-Vermilion Uplands	1086	443	1045	356	662	134	406	267	230	343	212	50	104	5338	
Nashwauk Uplands	1036	898	660	483	258	16	304	383	307	214	122	165	26	4872	
St. Louis Moraines	334	842	2015	608	1111	265	446	179	209	522	566	323	79	7499	
Tamarack Lowlands	89	96	851	93	1353	184	107	21	24	103	55	44	13	3033	

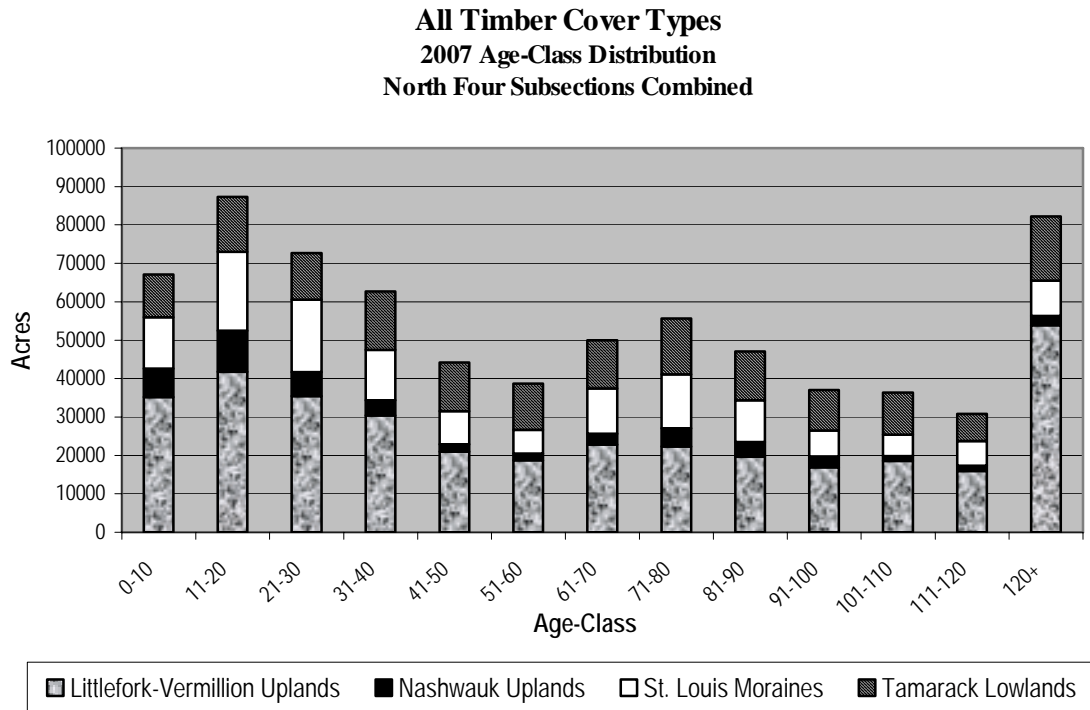
	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-110	111-120	120+	TOTAL	% OF GRAND TOTAL
Jack Pine															
Total	1279	2540	3195	1141	802	572	874	996	277	121	7	0	9	11813	1.66%
Littlefork-Vermilion Uplands	0	1206	1754	739	464	154	538	470	157	0	0	0	0	5482	
Nashwauk Uplands	454	566	380	169	96	80	64	180	77	115	7	0	0	2188	
St. Louis Moraines	588	640	445	124	188	55	86	280	19	6	0	0	9	2440	
Tamarack Lowlands	237	128	616	109	54	283	186	66	24	0	0	0	0	1703	
White Pine															
Total	606	234	41	0	51	34	41	14	36	43	151	144	162	1557	0.22%
Littlefork-Vermilion Uplands	232	105	8	0	0	0	0	0	0	6	42	11	60	464	
Nashwauk Uplands	84	52	8	0	10	0	24	9	7	12	0	0	17	223	
St. Louis Moraines	163	39	5	0	0	18	13	5	17	16	49	26	44	395	
Tamarack Lowlands	127	38	20	0	41	16	4	0	12	9	60	107	41	475	
Tamarack															
Total	2957	1692	3723	14575	7331	4002	3434	5139	9739	6967	5343	4188	11204	80294	10.28%
Littlefork-Vermilion Uplands	1379	1152	2457	1867	2776	978	548	1048	4505	2103	1707	1101	2397	24018	
Nashwauk Uplands	107	44	30	71	147	130	10	284	458	266	83	103	47	1780	
St. Louis Moraines	396	127	123	769	364	83	261	714	724	299	297	379	762	5298	
Tamarack Lowlands	1075	369	1113	4705	4044	2811	2615	3093	4052	4299	3256	2605	7998	49198	
White Spruce															
Total	1670	1369	3798	1504	1738	211	117	143	121	91	15	0	19	10796	1.52%
Littlefork-Vermilion Uplands	709	438	1991	1085	799	134	67	50	96	91	5	0	19	5484	
Nashwauk Uplands	796	353	607	46	154	15	11	24	0	0	0	0	0	2006	
St. Louis Moraines	155	423	747	114	268	31	33	9	12	0	0	0	0	1792	
Tamarack Lowlands	10	155	453	259	517	31	6	60	13	0	10	0	0	1514	
All Cover types															
Total	67044	87323	72681	62659	44216	38658	49951	55630	46999	36978	36360	30857	82203	711559	
Littlefork-Vermilion Uplands	35176	41774	35424	30403	20929	18732	22820	22325	19659	16844	18546	15998	53888	352518	
Nashwauk Uplands	7391	10684	6234	3939	1966	1733	2823	4768	3843	2862	1243	1267	2406	51159	
St. Louis Moraines	13420	20588	18940	13119	8580	6221	11749	13998	10865	6753	5619	6449	9203	145504	
Tamarack Lowlands	11057	14277	12083	15198	12741	11972	12559	14539	12632	10519	10952	7143	16706	162378	

1 Includes only Forestry, Trails and Waterways , Fish and Wildlife – Wildlife Section, —North-4 Subsections administered lands within the Ecological Classification System (ECS) subsection boundary and based on Minnesota DNR 2007 Cooperative Stand Assessment (CSA) forest inventory.

2 Timberland is defined as forest land capable of producing timber of marketable size and volume at the normal harvest age, not including lands withdrawn from timber utilization by law or statute (see Appendix D: Glossary)

**3.2 State Timberland Cover-Type Acres 2007
North-4 Subsections**

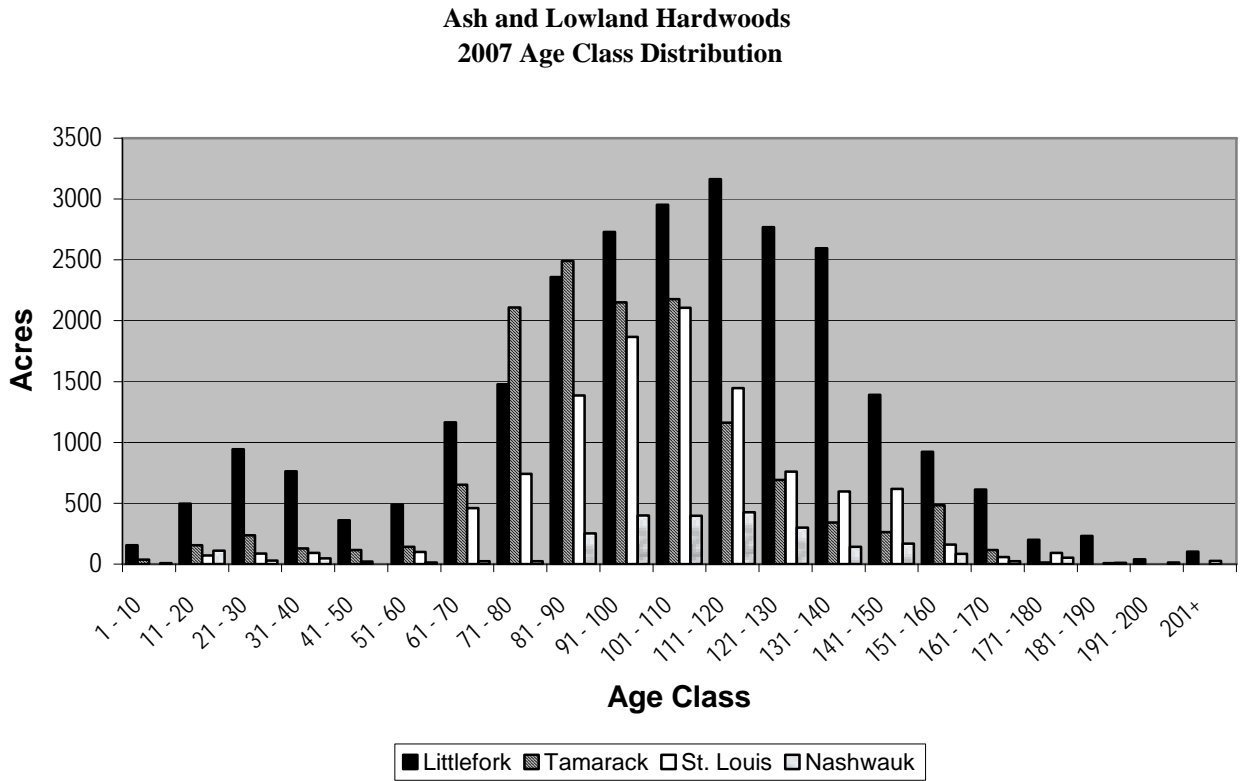
Chart 3.2.1 North-4 Subsections



Source: 2007 Minnesota DNR Cooperative Stand Assessment (CSA) forest inventory.

This chart shows the acreage of all state timberland cover types in 2007 in the four subsections.

Chart 3.2. 2 North-4 Subsections



Source: 2007 Minnesota DNR Cooperative Stand Assessment (CSA) forest inventory.

In 2007, the ash/lowland hardwood cover type amounted to 7.39 percent (52,614 acres) of the state timberlands in the four subsections.

Chart 3.2.3 North-4 Subsections

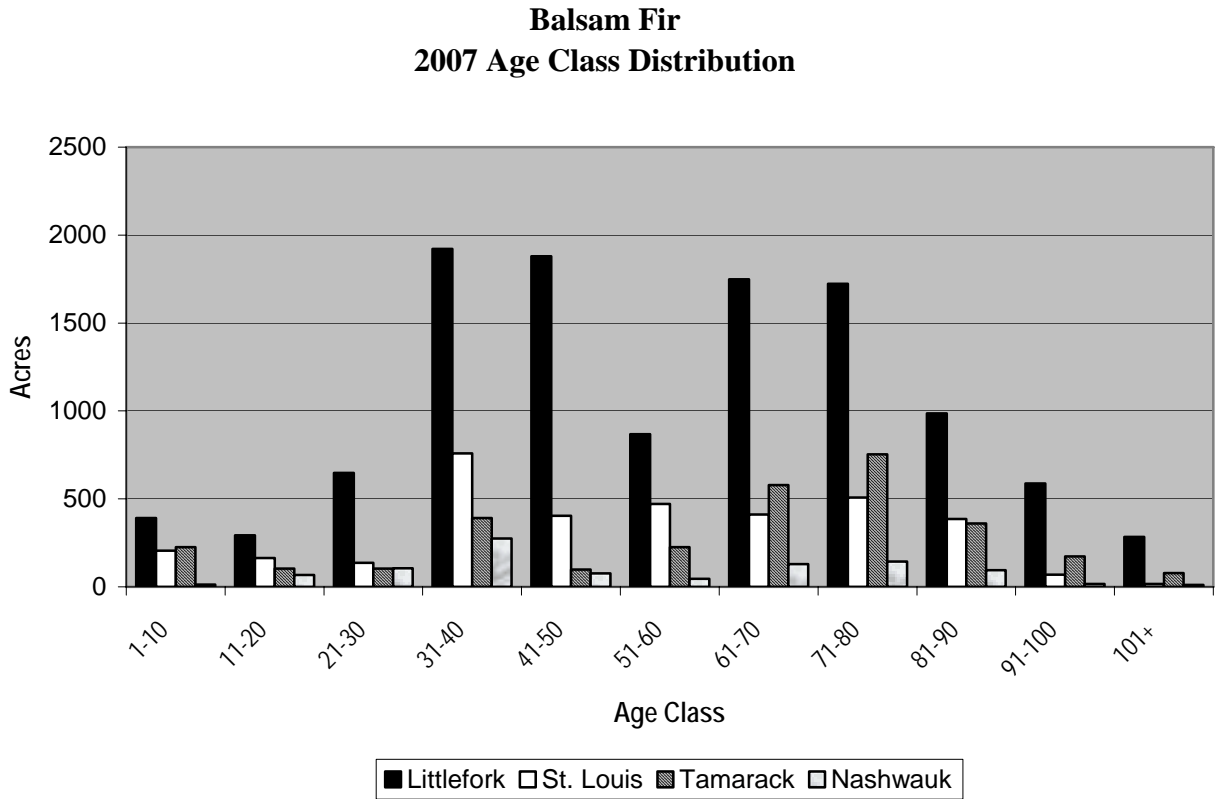
**Aspen and Balm of Gilead
2007 Age Class Distribution**



Source: 2007 Minnesota DNR Cooperative Stand Assessment (CSA) forest inventory.

In 2007, the aspen and balm of Gilead cover types occupied 36.62 percent (260,555 acres) of state-administered timberlands in the four subsections.

Chart 3.2.4 North-4 Subsections

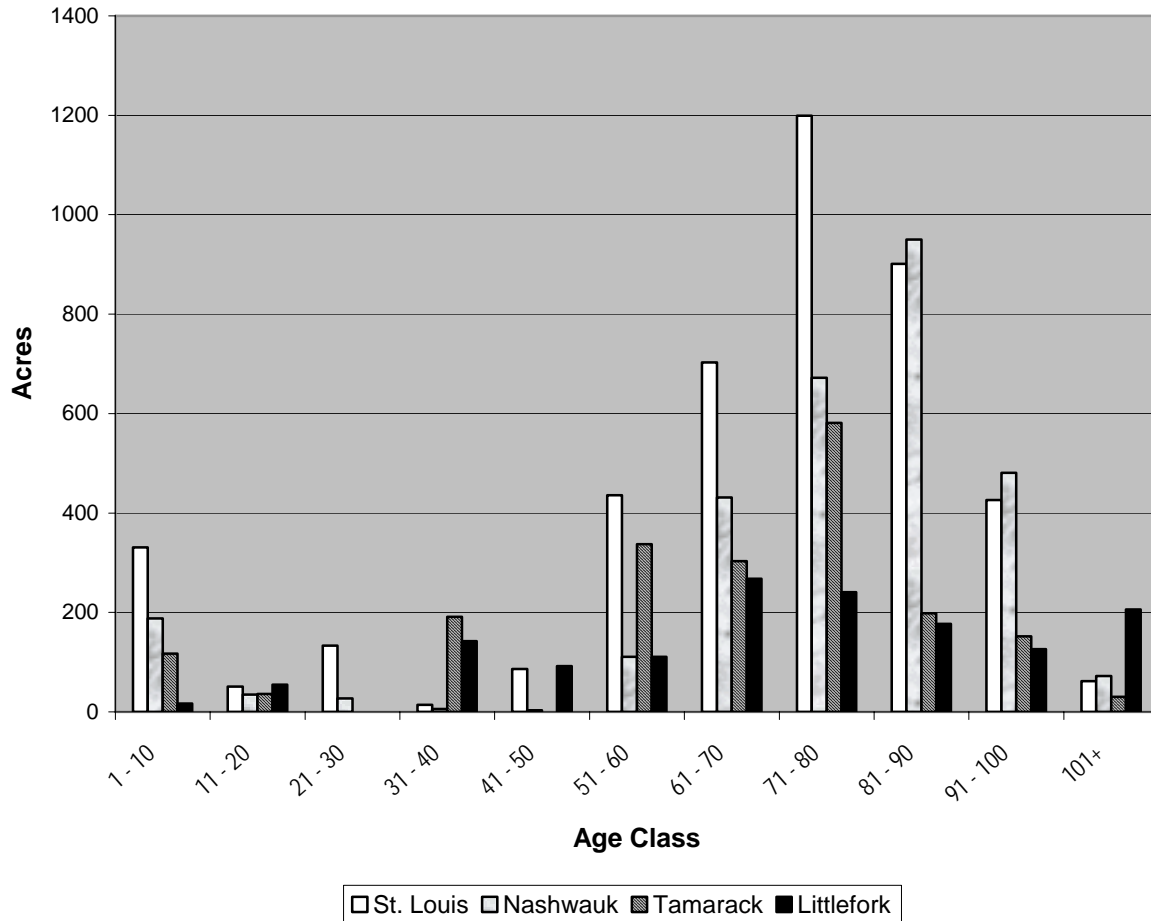


Source: 2007 Minnesota DNR Cooperative Stand Assessment (CSA) forest inventory.

In 2007, the balsam fir cover type occupied 2.66 percent (18,924 acres) of state administered timberlands in the four subsections.

Chart 3.2.5 North-4 Subsections

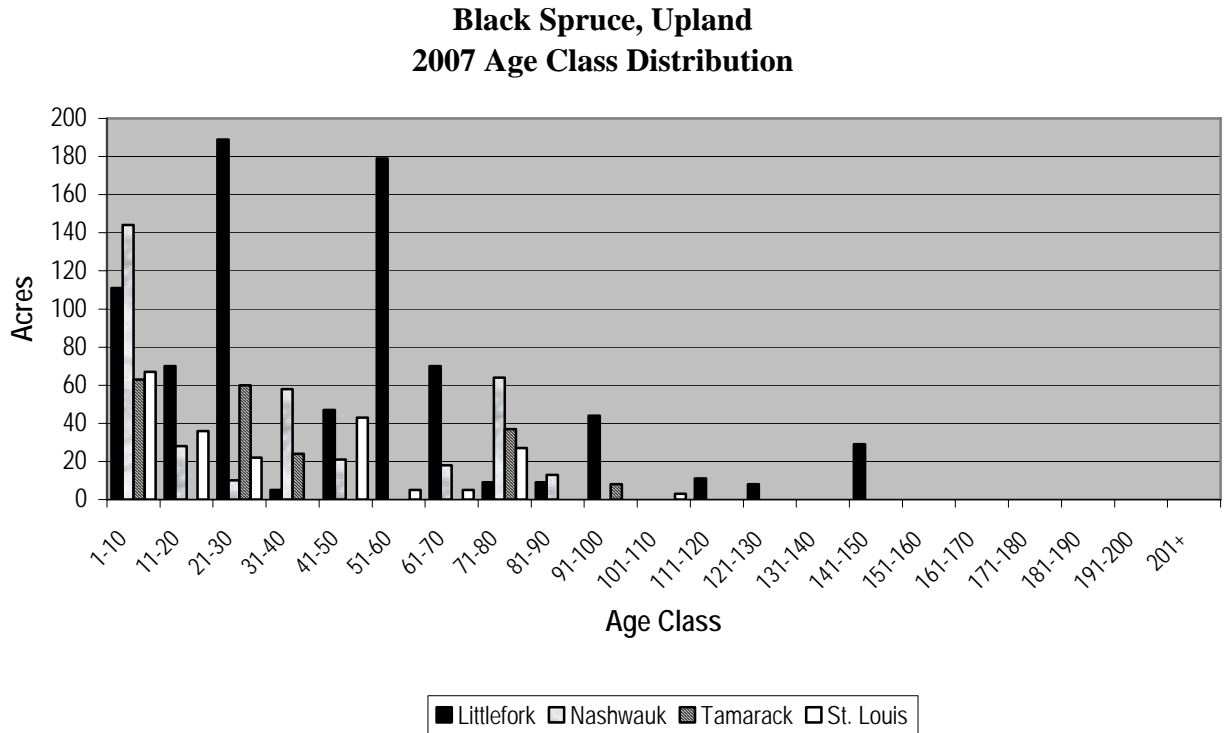
**Birch
2007 Age Class Distribution**



Source: 2007 Minnesota DNR Cooperative Stand Assessment (CSA) forest inventory.

In 2007, the birch cover type occupied 1.50 percent (10,698 acres) of state-administered timberlands in the four subsections.

Chart 3.2.6 North-4 Subsections

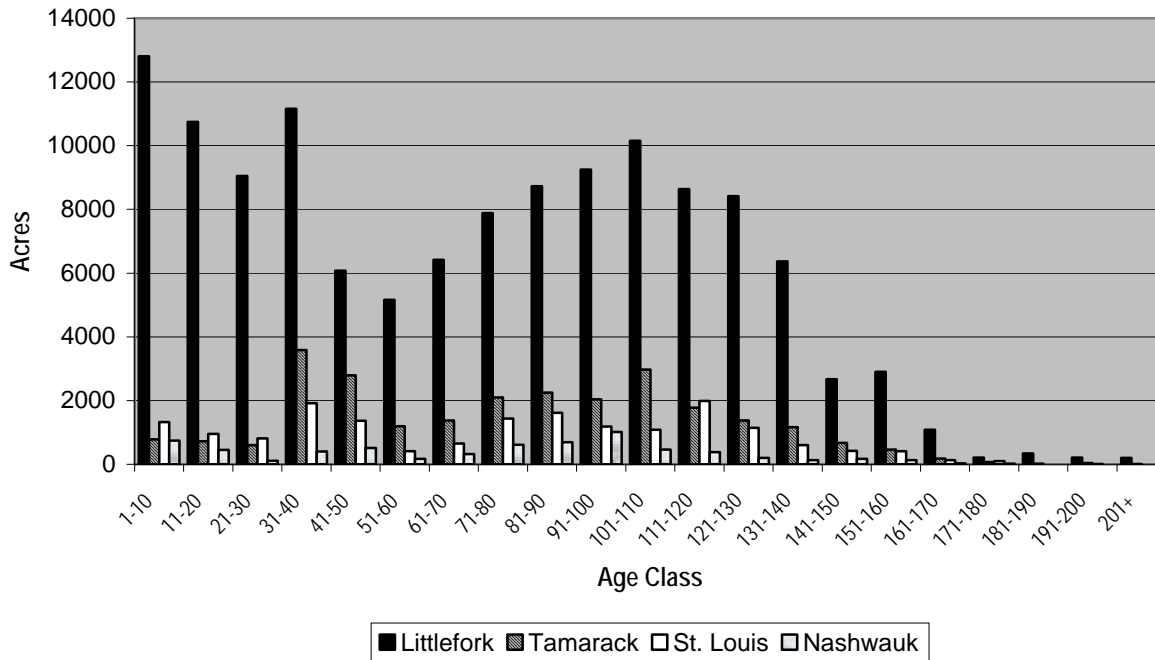


Source: 2007 Minnesota DNR Cooperative Stand Assessment (CSA) forest inventory.

In 2007, the black spruce, upland cover type occupied .22 percent (1,537 acres) of state-administered timberlands in the four subsections.

Chart 3.2.7 North-4 Subsections

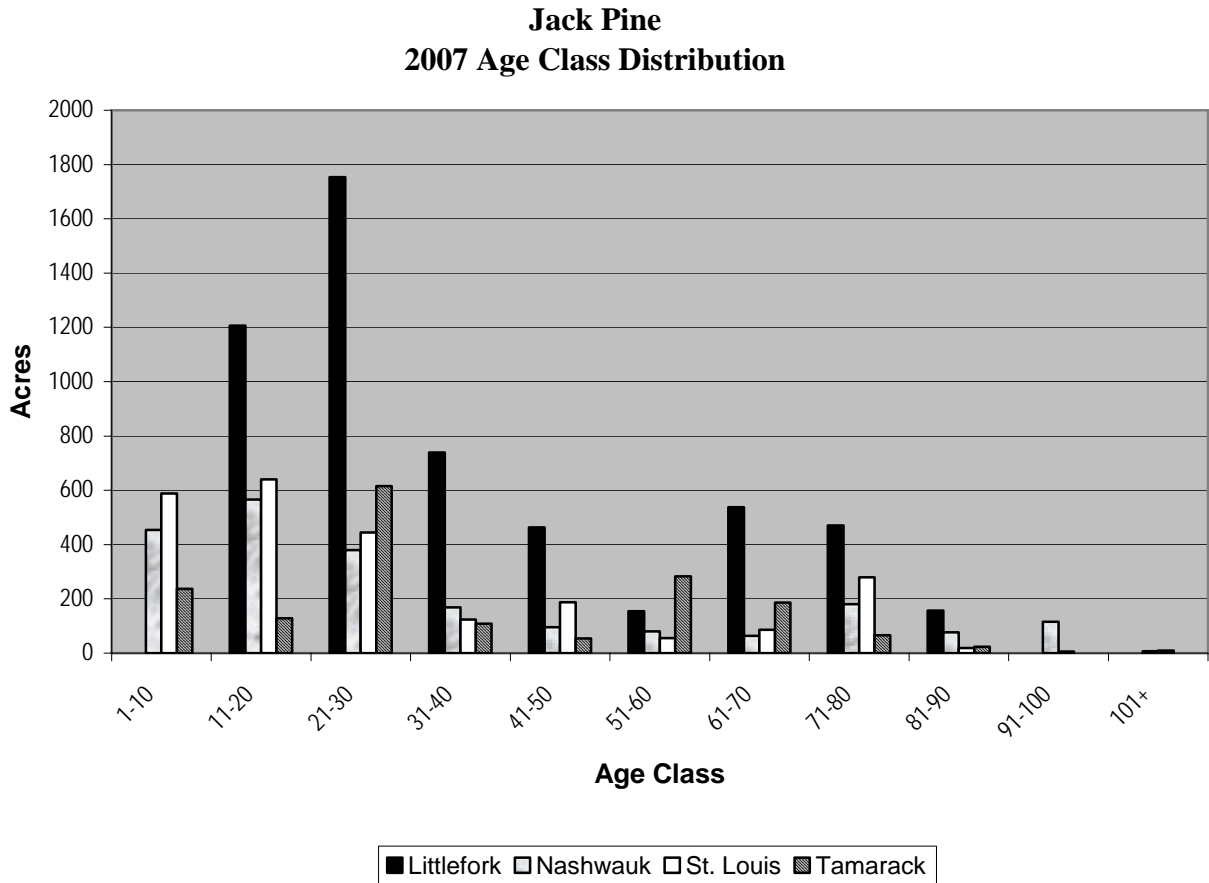
**Black Spruce, Lowland
2007 Age Class Distribution**



Source: 2007 Minnesota DNR Cooperative Stand Assessment (CSA) forest inventory.

In 2007, the black spruce, lowland cover type occupied 25.13 percent (178,804 acres) of state-administered timberlands in the four subsections.

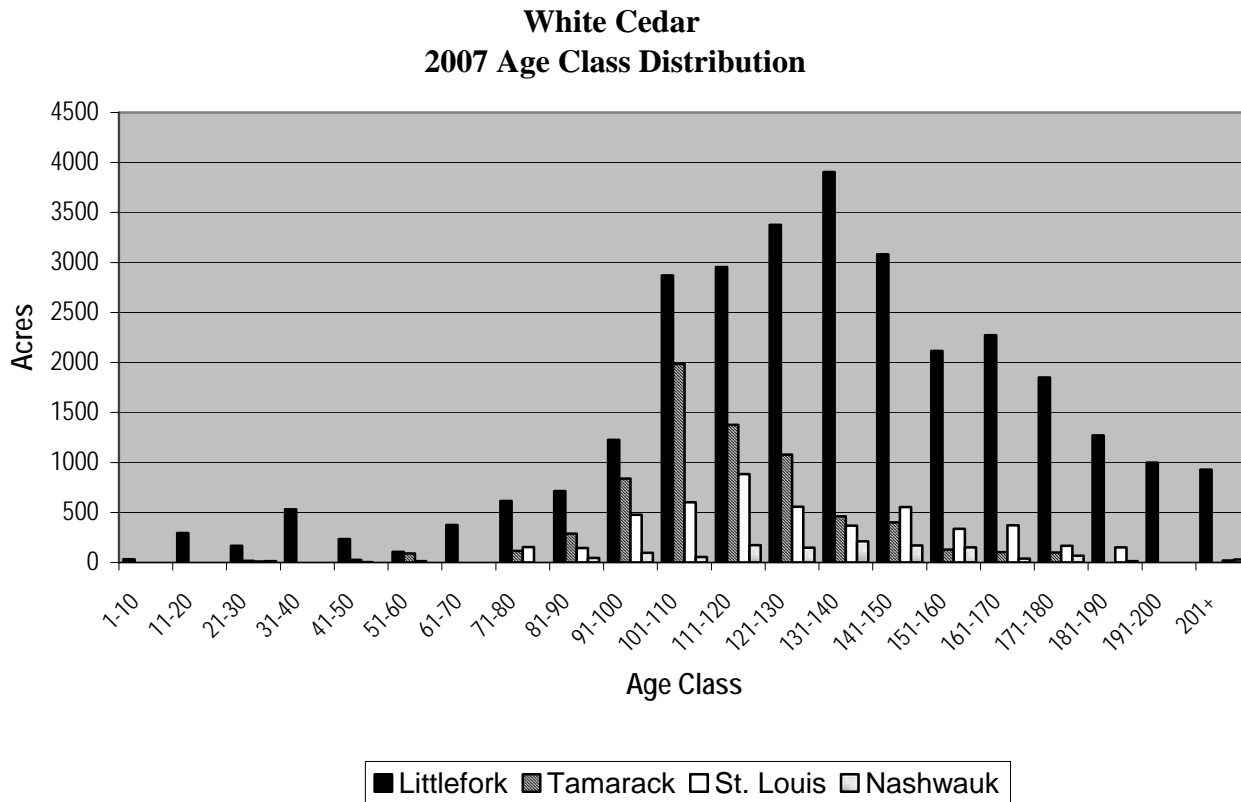
Chart 3.2.8 North-4 Subsections



Source: 2007 Minnesota DNR Cooperative Stand Assessment (CSA) forest inventory.

In 2007, the jack pine cover type occupied 1.66 percent (11,813 acres) of state-administered timberlands in the four subsections.

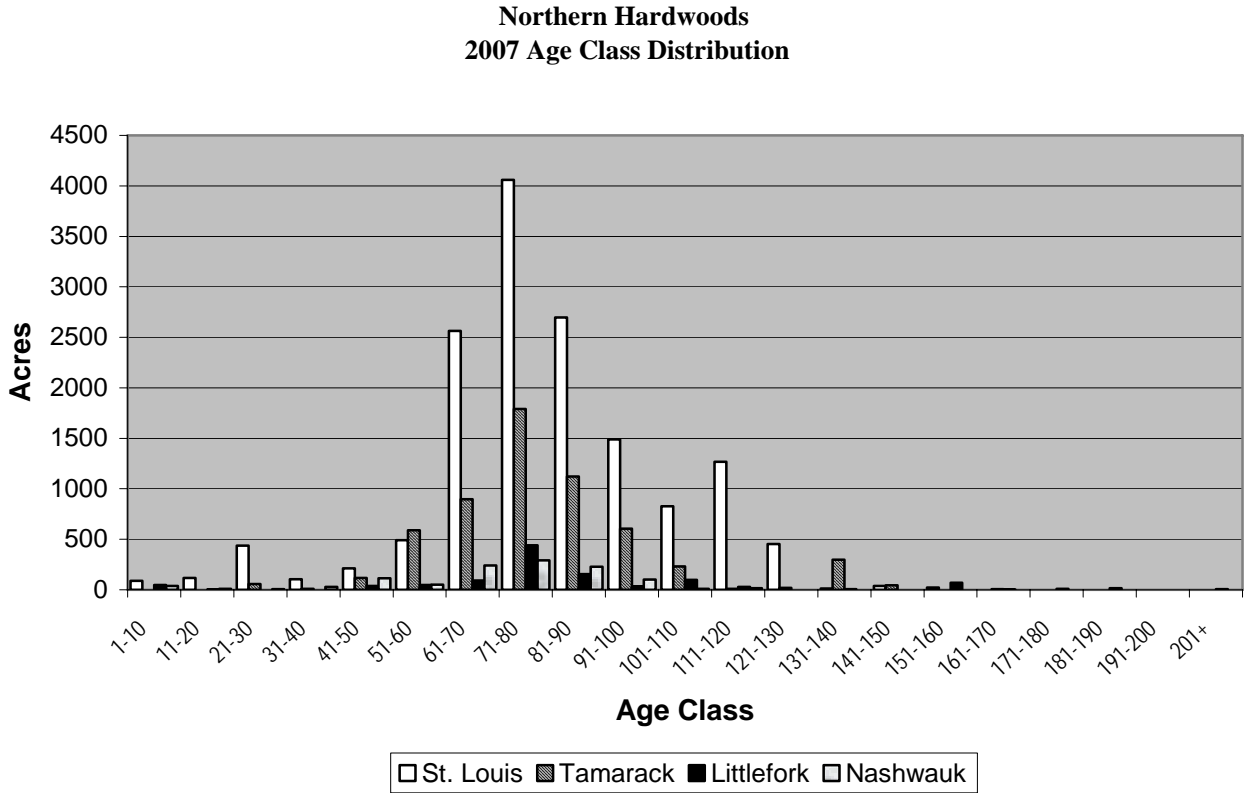
Chart 3.2.9 North-4 Subsections



Source: 2007 Minnesota DNR Cooperative Stand Assessment (CSA) forest inventory.

In 2007, the northern white cedar cover type occupied 6.03 percent (42,936 acres) of state-administered timberlands in the four subsections.

Chart 3.2.10 North-4 Subsections

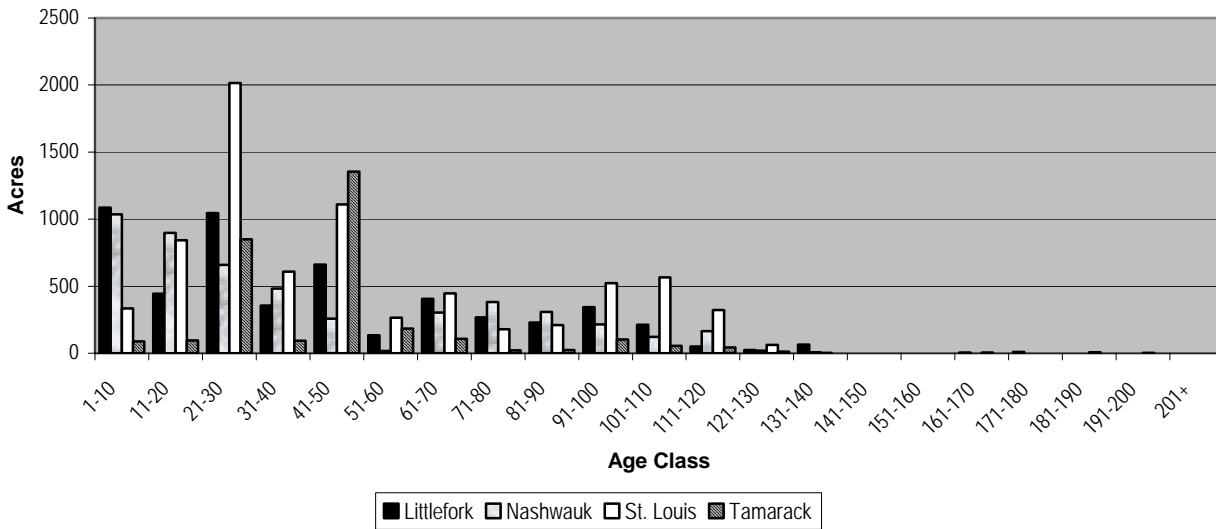


Source: 2007 Minnesota DNR Cooperative Stand Assessment (CSA) forest inventory.

In 2007, the northern hardwoods cover type occupied 3.22 percent (22,879 acres) of state-administered timberlands in the four subsections.

Chart 3.2.11 North-4 Subsections

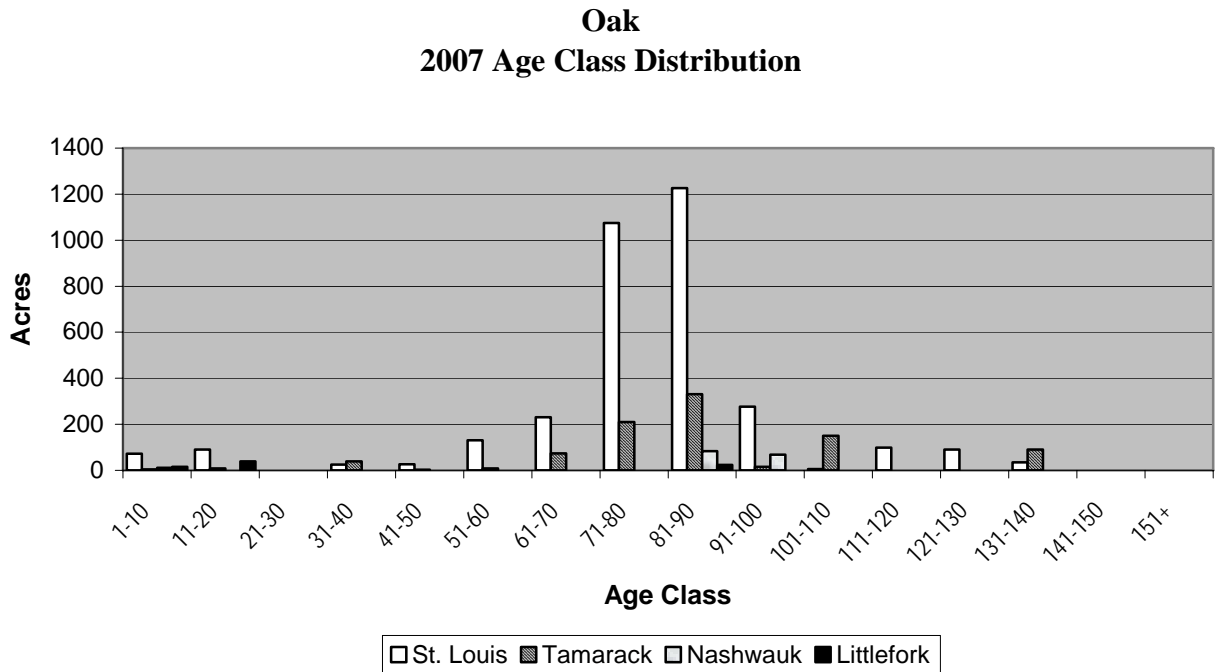
**Red Pine
2007 Age Class Distribution**



Source: 2007 Minnesota DNR Cooperative Stand Assessment (CSA) forest inventory.

In 2007, the red pine cover type occupied 2.92 percent (20,742 acres) of state-administered timberlands in the four subsections.

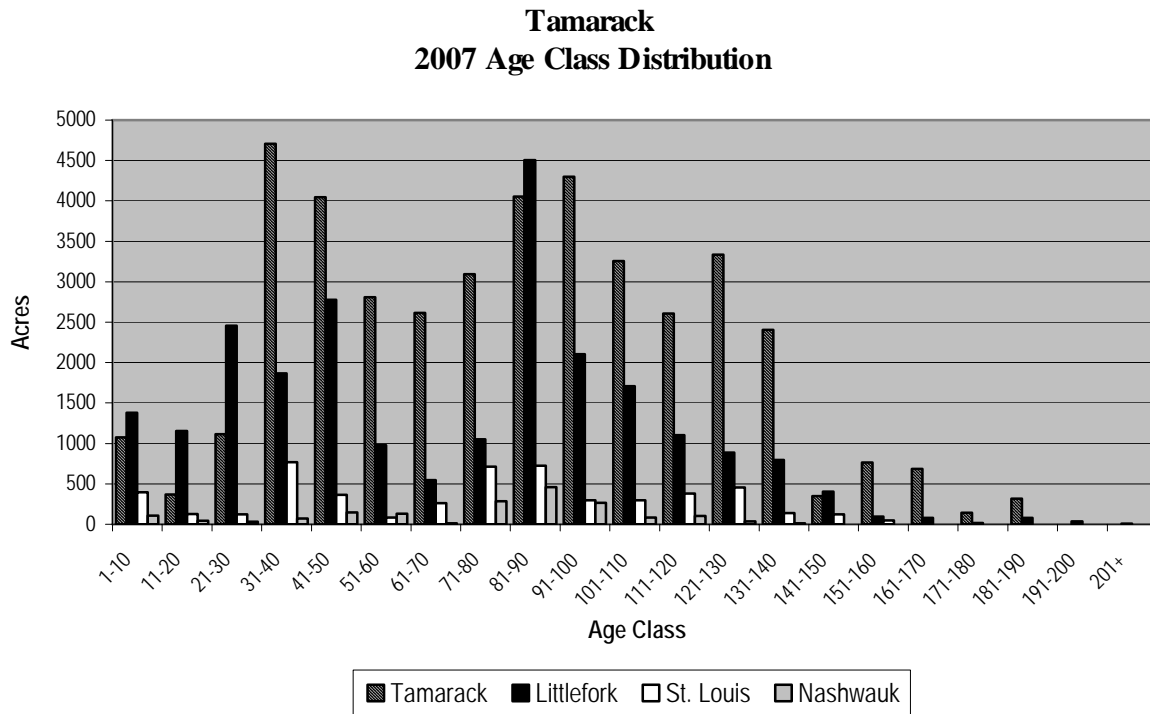
Chart 3.2.12 North-4Subsections



Source: 2007 Minnesota DNR Cooperative Stand Assessment (CSA) forest inventory.

In 2007, the oak cover type occupied .64 percent (4,555 acres) of state-administered timberlands in the four subsections.

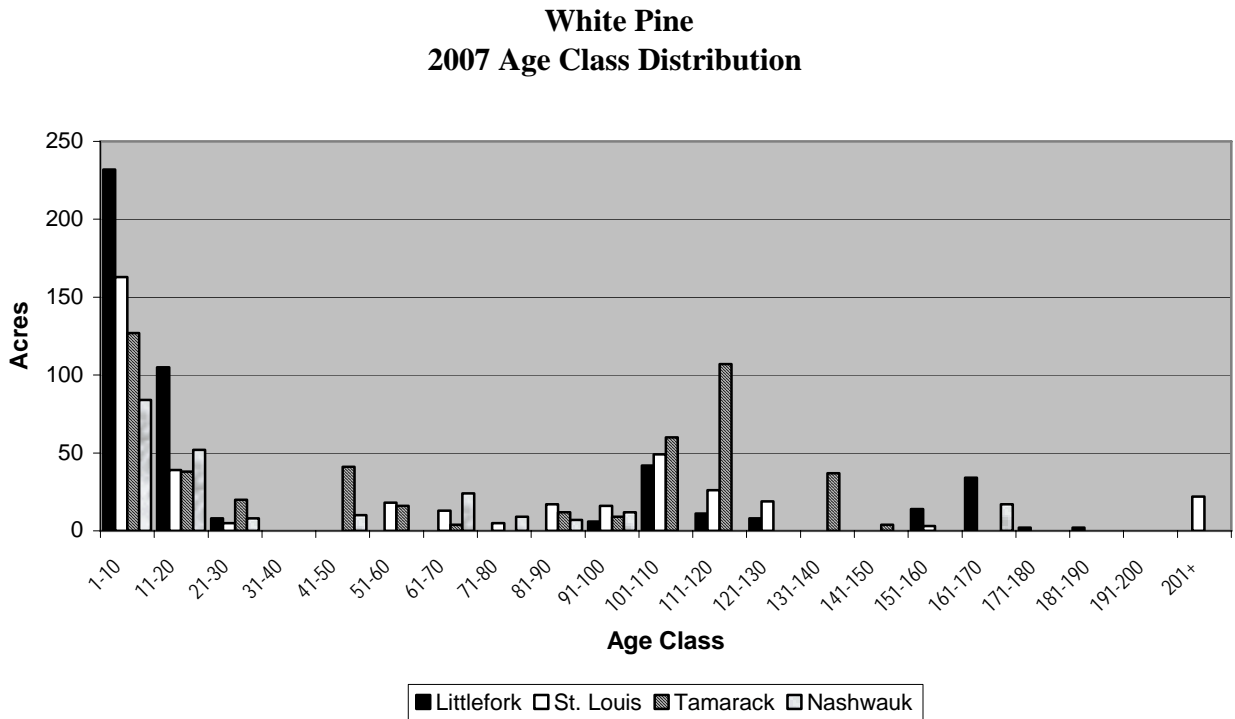
Chart 3.2.13 North-4 Subsections



Source: 2007 Minnesota DNR Cooperative Stand Assessment (CSA) forest inventory.

In 2007, the tamarack cover type occupied 10.28 percent (73.131 acres) of state-administered timberlands in the four subsections.

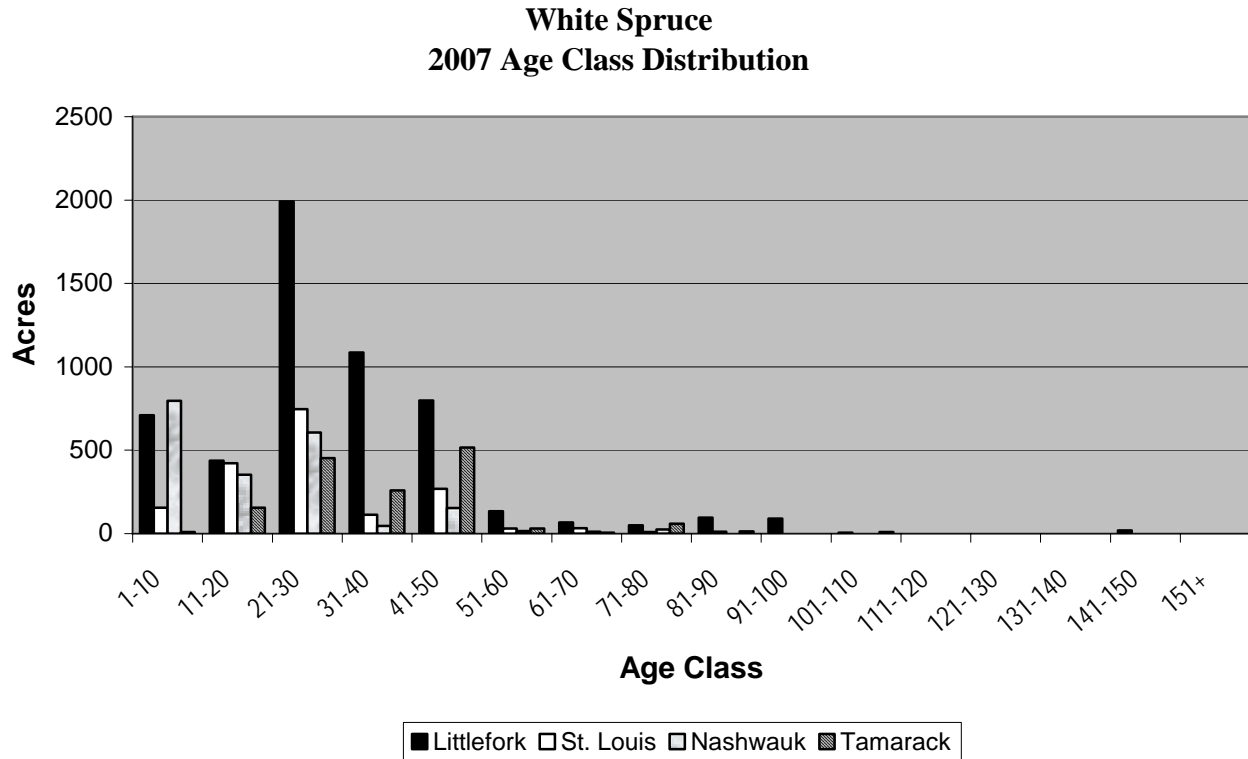
Chart 3.2.14 North-4 Subsections



Source: 2007 Minnesota DNR Cooperative Stand Assessment (CSA) forest inventory.

In 2007, the white pine cover type occupied less than .22 percent (1,557 acres) of state-administered timberlands in the four subsections.

Chart 3.2.15 North-4 Subsections



Source: 2007 Minnesota DNR Cooperative Stand Assessment (CSA) forest inventory.

In 2007, the white spruce cover type occupied 1.52 percent (10,796 acres) of state-administered timberlands in the four subsections.

3.3 Old-Growth Forests

The DNR's old-growth management goal is to identify and protect the highest quality remaining natural old-growth forest communities on state-administered lands. Old-growth forest stands are defined by age, structural characteristics, and relative lack of human disturbance. These forests are essentially free from catastrophic disturbances and contain old trees (generally more than 120 years old), large snags, and downed trees.

Old-growth forest represents the latter stages of succession in forested ecosystems. Remaining old-growth forests are important for their scientific and educational values, as well as their aesthetic and spiritual appeal. Old-growth forests provide special habitats for native plants, important habitat features for wildlife, and examples of the maximum limits of individual tree and stand production. Because old-growth ecosystems developed for a long time without large-scale disturbance, the study of plants, animals, soils, and ecosystem processes in old-growth stands provides important insights into the natural function of forest ecosystems. Such insights can be crucial for future forest management and for maintenance of biological diversity.

Old-growth designations are based on the 1994 DNR Old-Growth Guidelines. Designation of old-growth stands in the North-4 Subsections was completed in 2000. Some of the subsection boundaries have changed since the 1994 goals were set due to revisions made in 1999. **The goals and designated acres provided in this assessment are based on the 1994 subsection boundaries.**

In some cases the 1994 old-growth goals for certain forest communities were not met because an adequate number of stands meeting old-growth criteria simply did not exist in the subsection. In other cases more high quality old growth was found than originally expected, so the designated acreage exceeded the target.

The 1994 goals for acreage and number of sites may be adjusted in the future. If new information becomes available on the extent, quality, and distribution of potential old-growth stands meeting prescribed selection criteria, the goals may be adjusted. If individual stands that appear to meet requirements are discovered on state land during the SFRMP process or in subsequent years, they may be evaluated and given official old-growth status if they qualify.

The following tables provide information on the 1994 goals and the designated acres in the subsections covered in this plan.

Table 3.3 slm

Designated old-growth acres in the St. Louis Moraines Subsection.

From a candidate pool of 2,523 acres, 1,669 acres were designated as old growth (i.e., given official protection) and 854 acres were released from candidacy.

Forest Type	Old-Growth 1994 Acreage Goal	Old-Growth Acres Designated
Black Ash	85	167
White Cedar	170	185
Lowland Hardwoods	115	153
Northern Hardwoods	340	605
Oak	20	47
Red Pine	205	272
White Pine	230	236
White Spruce	25	4
Total	1190	1669

Table 3.3 tl

Designated old-growth acres in the Tamarack Lowlands Subsection.

From a candidate pool of 5,480 acres, 4,289 acres were designated as old growth (i.e., given official protection) and 1,191 were released from candidacy.

Forest Type	Old-Growth 1994 Acreage Goal	Old-Growth Acres Designated
Black Ash	150	1216
White Cedar	210	145
Lowland Hardwoods	390	601
Northern Hardwoods	1615	1973
Oak	40	130
Red Pine	305	133
White Pine	185	91
White Spruce	25	0
Total	2920	4289

Table 3.3 nu

Designated old-growth acres in the Nashwauk Uplands Subsection.

From a candidate pool of 1,575 acres, 1,193 acres were designated as old growth (i.e., given official protection) and 382 were released from candidacy.

Forest Type	Old-Growth 1994 Acreage Goal	Old-Growth Acres Designated
Black Ash	65	63
White Cedar	85	219
Lowland Hardwoods	80	83
Northern Hardwoods	115	211
Oak	0	0
Red Pine	205	254
White Pine	90	206
White Spruce	25	172
Total	665	1193

Table 3.3 lvu

Designated old-growth acres in the Littlefork-Vermilion Uplands

Subsection. From a candidate pool of 4,331 acres, 2,504 acres were designated as old growth (i.e., given official protection) and 1,827 acres were released from candidacy.

Forest Type	Old-Growth 1994 Acreage Goal	Old-Growth Acres Designated
Black Ash	125	254
White Cedar	375	543
Lowland Hardwoods	425	488
Northern Hardwoods	0	0
Oak	0	0
Red Pine	615	746
White Pine	375	385
White Spruce	70	88
Total	1985	2504

3.4 Historical Forest Composition Compared to Today's Forest – An Estimate

Table 3.4 North-4 Subsections

Species	Littlefork-Vermilion Uplands		Nashwauk Uplands		St. Louis Moraines		Tamarack Lowlands	
	BT	FIA	BT	FIA	BT	FIA	BT	FIA
Ash	2.2	7	1.4	3.7	1.9	7.5	1.9	9
Aspen	17.7	28.1	8.4	31	9.7	31.9	10.7	26
Balm of Gilead	1.8	6.3	0.1	2.2	0.1	3.2	0.1	4
Balsam Fir	7.9	14.5	8.8	11.9	8.4	8.3	3.7	11
Paper Birch	8.3	5.7	17.2	16	16.9	11.1	9.1	6.6
Black Spruce	15	14	8.3	8.3	6	4.2	9.7	10.5
Bur Oak	0	0.2	0	0.1	0.6	1.2	0.6	2
White Cedar	9.9	10.6	7.2	5.3	4.9	3.4	5.5	3.7
Elm	1.1	1.4	0.2	0.3	1.1	2	1.1	2.5
Jack Pine	4	1.9	9	4.6	1.9	1.8	4	4.6
Basswood	0.2	0.9	0.4	2.1	1.5	4.7	0.5	1.9
Maple	0.4	0	1.6	0	2.8	0	1	0
Pine	0.9	0	1.6	0	1.4	0	1.6	0
Red Maple	0	0.9	0.3	4.3	0.6	4.6	2.7	4
Red Oak	0	0	0.1	0.7	0.6	3	0.1	1.3
Red Pine	1.3	1.9	4.5	2.3	4.3	2.5	3.4	1.5
Sugar Maple	0	0.6	1.5	2.1	5.2	4.9	0.8	0.5
Tamarack	18.4	2.8	12.4	2.3	17.8	3.3	35.3	9.1
White Pine	1.9	0.6	8	1	7.9	0.6	3.4	0.5
White Spruce	7	2	7.1	1.5	5.4	1	3.8	0.8
Yellow Birch	0	0.1	1	0.3	0.6	0.4	0.1	0.2

Table Explanation

This table shows the relative abundance of public land survey (PLS) bearing tree (BT) species marked as witness trees in the mid-1800s compared to 1990 Forest Inventory and Analysis (FIA) tree species. It provides an estimate by subsection of the abundance of certain kinds of tree species before the land was logged and settled, compared to today's forest.

Methodology

Relative abundance of BT trees is the percent by tree species identified as BTs in the original land survey records in the subsection. FIA data were modified to mimic the establishment of a survey corner by recording only one tree in each quadrant of the FIA sampling point similar to the selection of BT trees in the past. The relative abundance of FIA tree species is based on this estimate. Relative abundance data have been produced at subsection and the LTA (land type association) levels. This assessment includes only the subsection data. The LTA level data can provide land managers more detailed information on where in the larger subsection the composition changes are greater. LTA data can be used to assist in determining where it would be appropriate to attempt restoration of a species, if that is desired, within a subsection.

Summary of Table 3.4

Based on data at the subsection level, species showing a significant increase since the mid-1800s are ash, aspen, balm of Gilead, red maple, and balsam fir. Species showing a significant decline are white pine, white spruce, and tamarack. As can be seen in the table, relative abundance of a species often varies between subsections and so does the amount of change between BT and FIA data. *Note: Where a species is rare in the BT data, the data may not be as reliable.*