APPENDIX N

Land Type Association (LTA)
Assessment and Analysis Documents

Land Type Association (LTA) Assessment and Analysis Documents were prepared to provide forest management information at a smaller landscape scale within the CP and PMOP subsections. They contain reference information organized in overview, description, land management, and vegetation sections for individual LTAs. One purpose of these LTA documents is to provide additional information to DNR field staff as stand management decisions are made during the life of CP-PMOP Plan.

A LTA document template with section descriptions is included in this Appendix. All LTA documents are available on the CP-PMOP website at:
http://www.dnr.state.mn.us/forestry/subsection/cp_pmop/plan.html

LTA Assessment and Analysis documents have been prepared for the following LTAs found within the Chippewa Plains and Pine Moraines and Outwash Plains subsections:

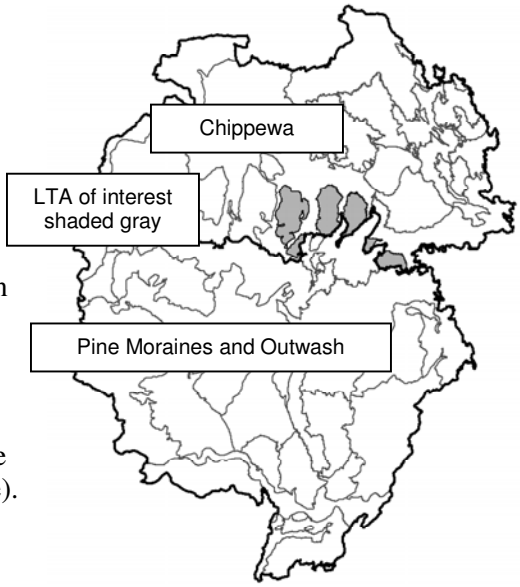
Chippewa Plains

1.	Guthrie Till Plain	212Na03
2.	Bemidji Sand Plain	212Na07
3.	Bena Dunes and Peatlands	212Na08
4.	Rosey Lake Plain	212Na09
5.	Deer River Peatlands	212Na10
6.	Bowstring Till Plain	212Na11
7.	Blackduck Till Plain	212Na16
8.	Blackduck Moraine	212Na18
9.	Alida Till Plain	212Na21
10.	Becida Till Plain	212Na22

Pine Moraines & Outwash Plains

1.	Crow Wing Sand Plain	212Nc01
2.	St. Croix Moraine	212Nc02
3.	Swan Creek Sand Plain	212Nc08
4.	Nimrod Drumlin Plain	212Nc10
5.	Park Rapids Sand Plain	212Nc11
6.	Spring Brook Till Plain	212Nc13
7.	Outing Moraine	212Nc14
8.	Itasca Moraine	212Nc16
9.	Shell Lake Moraine	212Nc28
10.	Itasca Moraine Steep	212Nc30
11.	Two Inlets Moraine	212Nc31
12.	Bass Lake Moraine	212Nc32
13.	Naytahwaush Moraine	212Nc34

LTA Name (LTA code)



OVERVIEW

This LTA Assessment and Analysis Guide contains section explanations, data descriptions, acronyms, and references for the 23 LTA Assessment and Analysis documents that were written for the Chippewa Plains and Pine Moraines and Outwash Plains subsections. Of the 36 total LTAs in these two subsections, these 23 LTAs were chosen because they contain $\geq$ 5% state land (Forestry, Parks, and Wildlife).

Acronyms in this document include: LTA (Land Type Associations), GAP (Gap Analysis Program), CSA (Cooperative Sand Assessment), FIA (Forest Inventory and Analysis), CP-PMOP (Chippewa Plains and Pine Moraines and Outwash Plains subsections), SFRMP (Subsection Forest Resource Management Planning), MFRC (Minnesota Forest Resources Council), OFMC (Old Forest Management Complex), EILC (Ecologically Important Lowland Conifers), and ERF (Extended Rotation Forests).

DESCRIPTION

LTA descriptions are from the Preliminary Issues and Assessment document - Chapter 5 (section 5.2) for the Chippewa Plains/Pine Moraines and Outwash Plains (August 2006). This document also contains the citations referenced in these descriptions.

LAND MANAGEMENT

Land Stewardship

Written description of land stewardship and ownership for each LTA. Begins with a summary statement of percentages which is based on the table in this section developed from 2008 GAP stewardship. GAP assigned all open water acreage to an agency (see table note for total acreage). The remaining narrative includes references to counties, major lakes and rivers, protected waters acreage, larger natural resource management units, ownership patterns, significant landowners, and municipalities in or near each LTA or its units.

Natural Resource Management Units

Lists contain known federal, state, county, and other natural resource management units within each LTA with descriptions of portion within the LTA boundaries.

VEGETATION

Pre-settlement Vegetation and Tree Species

Pre-settlement Vegetation (Marshner's Map) summary with percentages in each LTA.

Type and number of generalized vegetation/landscape characteristics from original Public Land Survey notes in this LTA.

Type and number of bearing tree species (some grouped) by LTA from Minnesota's Bearing Tree Database.

Current Land Cover

As referenced from table at end of document:

- Summary of top five GAP land cover classes with percentages on all ownerships (total acres).
- Summary of top five CSA main cover types with percentages on DNR Forestry and Wildlife land in 2007 (total acres).
- List of significant (generally >2 times more or less) percentage differences in land cover between DNR Forestry and Wildlife land (2007 CSA data) and all ownerships (GAP land cover).

Changes in Tree Species Composition

As referenced from table at end of document, the following list of tree species were or are a significant component (>5%) of the forest and their abundance has changed significantly (generally >2 times more or less) since the original land survey. Magnitude of change was calculated by comparing FIA data to original bearing trees. For additional data descriptions and methodology, see the Preliminary Issues and Assessment document - Chapter 3 (section 3.7) for the Chippewa Plains/Pine Moraines and Outwash Plains (August 2006).

50-year Main Cover Type Goals

See main cover type 50-year goals from CP-PMOP SFRMP plan in table at end of document. If applicable, cover types where this is a priority LTA for cover type increase are listed.

Potential Forest Ecosystem Types and Native Plant Communities

Forest (landscape) ecosystem types present in this LTA are listed (Shadis 2000). These ecosystem types were used in MFRC's North Central Landscape planning process. Native Plant Communities Classes that were known to occur in this LTA **(bold text)** or occurred in similar LTAs in 2006 are listed as codes under general community categories (upland forests, wetland forests, and non-forested communities).

Old Growth, Ecologically Important Lowland Conifers, and Extended Rotation Forests

List includes number of old growth stands with associated OFMCs, acres of EILC, and acres of ERF on DNR Forestry and Wildlife land in the LTA.

Age Classes

Figure with age-class distribution of all forested cover types in this LTA (total acres).

Patch Dynamics

Number of designated forest patches on state forestry and wildlife lands in general categories (lowland conifers, upland conifers, lowland hardwoods, and upland hardwoods) with patch names.

Guthrie Till Plain (212Na03)

OVERVIEW

Information presented in this document is specific to this LTA with some reference to the larger ECS subsection. This summary was written to provide additional forest management information in this landscape and includes the following main sections: overview, description, land management, and vegetation. See the LTA Assessment and Analysis Guide for section explanations, data descriptions, acronyms, and references.

DESCRIPTION

Level to rolling till plains formed by the Koochiching Lobe Glacier. The LTA consists of several islands of till separated by narrow sand plains from a different LTA. Uplands occupy 81 percent, wetlands occupy 16 percent, and lakes occupy 3 percent of the LTA (MN DNR, 1998). The majority (85 percent) of the soils have loam and clay loam textures (NRCS, 1994). Minor amounts of sand over loam are present on the edges next to sand plains.

The upland pre-settlement vegetation was mesic northern hardwoods, mixed white pine-red pine, dry-mesic pine-hardwoods, and wet-mesic hardwood-conifer (white pine) (Shadis,1999 and Marschner, 1974). Lowland pre-settlement vegetation was commonly conifer bog and swamp (Marschner, 1974).

LAND MANAGEMENT

Land Stewardship

Based on GAP stewardship data, the majority of this LTA is federal (45.1%), followed by private (38.1%), state (8.1%), and county (8.0%). See table below. This LTA exists as six separate units along and adjacent to Leech Lake in Cass and Hubbard counties. All but the northwestern-most entity borders Leech Lake's east, north, and west shores. The four eastern-most units are entirely within Chippewa National Forest. Nearly all of the LTA is inside Leech Lake Indian Reservation. Over 17,740 acres of protected waters exist in the LTA.

Federal, state, county, and private industrial lands are spread throughout the LTA. No state lands exist in the southeastern unit. The two north-central units contain the largest contiguous blocks of USFS lands. Potlatch Corporation holdings are located in the LTA's northern three units. No municipalities exist inside the LTA, but surrounding communities include Laporte, Cass Lake, Federal Dam, Boy River, and Walker.

Agency (%)	Acres	Percent
State (8.1%)		
DNR Other	40	0.0%
DNR, Fish and Wildlife	25	0.0%
DNR, Forestry	9,184	8.0%
State (Undifferentiated)	47	0.0%
County (8.0%)		
Cass	4,572	4.0%
Hubbard	4,652	4.0%
Federal (45.1%)		
Bureau of Indian Affairs	3,060	2.7%
Leech Lake Reservation	1,540	1.3%
Other	78	0.1%
U.S. Forest Service	47,124	41.0%
Other Public (0.3%)		
City of Cass Lake	302	0.3%
School District	40	0.0%
Private (38.1%)		
Private	42,390	36.9%
Private Industrial	1,412	1.2%
Tribal (0.4%)		
Leech Lake Reservation	86	0.1%
Minnesota Chippewa Indians	381	0.3%
Grand Total	**114,933 acres**	

* note - 3,498 acres of open water are included in the table above

Natural Resource Management Units

Federal

United States Forest Service

- National Forests: Chippewa (west central, southwest, and south central)

State

Minnesota Department of Natural Resources

- State Forests: Paul Bunyan (extreme northeast corner), Welsh Lake (west one third), Bowstring (southwest corner), Battleground (central and southwest)
- Aquatic Management Areas: Henry Kartarik Island, Five Mile Point

County

None known

Other

Leech Lake Indian Reservation

VEGETATION

Pre-settlement Vegetation and Tree Species

The major Pre-settlement Vegetation types in this LTA include: Aspen-Birch (trending to Conifers) (12%), Big Woods - Hardwoods (oak, maple, basswood, hickory) (23%), Conifer Bogs and Swamps (17%), Mixed Hardwood and Pine (Maple, White Pine, Basswood, etc) (13%), Mixed White Pine and Red Pine (20%), and White Pine (5%).

The following list contains the number of section corner notes from the original Public Land Survey by vegetation/landscape characteristic within this LTA, forest, timber-405, scattering oak, scattering timber-16, thicket, brush, underbrush or only tree around-10, dry land, dry ridge, or island-2, lake, slough, pond-15, river, creek, bottom, or valley, ravine-2, marsh or swamp-83, meadow-1, windthrow, windfall-11, and burned area-35.

Bearing trees include: Ash-22, Black Ash-10, Aspen-238, Balm-of-Gilead-5, Balsam Fir-67, Basswood-38, Birch-88, Yellow Birch-18, Cedar-65, Elm-42, Ironwood-25, Maple-68, Sugar Maple-70, Oak-57, Bur Oak-17, Red Oak-46, Pine-3, Jack Pine-35, Red Pine-99, White Pine-189, Spruce-39, Tamarack-118, and Willow-5.

Current Land Cover

As referenced from table on page 6:

- Top five GAP land cover classes on all ownerships (120,562 total acres):
  Aspen/White Birch (32.1%), Upland Deciduous (19.2%), Cropland (10.7%), Maple/Basswood (7.4%), and Lowland Deciduous Shrub (4.8%).

- Top five CSA main cover types on DNR Forestry and Wildlife land (9,748 total acres):
  Aspen (20.1%), Stagnant Cedar (15.2%), Northern Hardwoods (9.7%), Tamarack (9.7%), and Marsh (8.3%).

- Significant percentage differences in land cover between DNR Forestry and Wildlife land and all ownerships:
  DNR land has 25.0 times more Tamarack, 11.6 times more Ash, 10.6 times more White Spruce, 4.3 times more Northern White Cedar, 3.4 times more Marsh, 2.5 times more Muskeg, 2.3 times more Lowland Grass, 2.2 times less Jack Pine, 3.1 times less Upland Grass, 3.3 times less Upland Brush, 5.7 times less Lowland Hardwood, 7.5 times less Agricultural, and 11.1 times less in the Oak group.

Changes in Tree Species Composition

As referenced from table on page 6, the following tree species were or are a significant component of the forest and their abundance has changed significantly since the original land survey (magnitude of change calculated by comparing FIA data to original bearing trees):

There is currently 2.6 times more Red Maple, 2.6 times more Basswood, 2.6 times less White Spruce, 3.2 times less Red Pine, 4.8 times less Tamarack, and 8.2 times less White Pine in this LTA.

50-year Main Cover Type Goals

See main cover type 50-year goals in table on page 6. This is a priority LTA for White Spruce and Northern White Cedar cover type increase.

Potential Forest Ecosystem Types and Native Plant Communities

This LTA contains the following forest ecosystem types: Dry-Mesic Pine, Dry-Mesic Pine/Oak, and Mesic Northern Hardwood. The following Native Plant Communities Classes are known to occur in this LTA **(bold text)** or occur in similar LTAs.

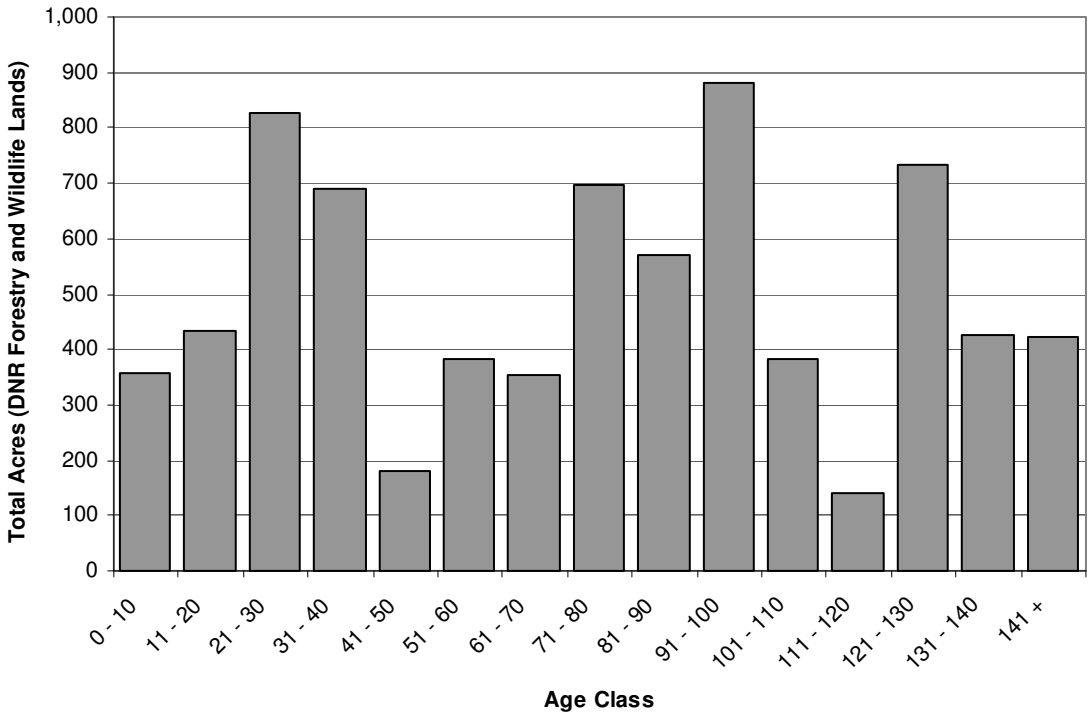
Upland Forests
FDc34, MHn35, MHn44, MHn46, MHn47, MHc26, MHc36, MHs39
Wetland Forests
FFn67, WFn53, **WFn55**, **WFn64, FPn63, FPn82, APn80, APn81**
Non-Forested Communities
OPn81, OPn92, WMn73, WMn82, FPn73

Old Growth, Ecologically Important Lowland Conifers, and Extended Rotation Forests

This LTA contains 21 old growth stands with associated OFMCs, 214 acres of EILC, and 2,068 acres of ERF on DNR Forestry and Wildlife land.

Age Classes

Figure below shows age-class distribution of all forested cover types in this LTA (7,478 total acres).



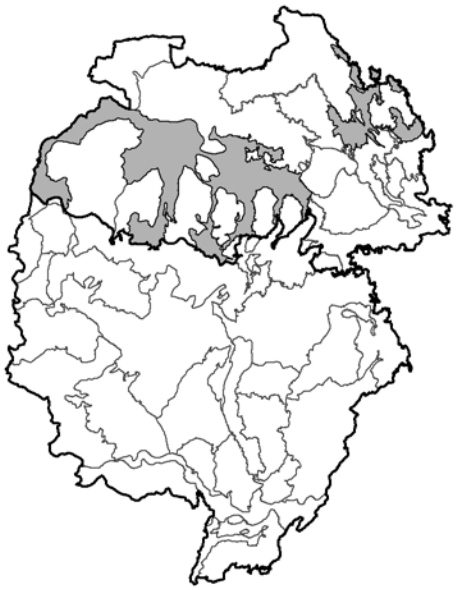
Patch Dynamics

This LTA contains 6 designated forest patches on state forestry and wildlife lands. They include 2 lowland conifer patches (Sucker Bay Conifers West and Sucker Bay Conifers East) and 4 upland hardwood patches (Wilkinson Hardwoods, Sucker Creek Hardwoods, Gould Hardwoods, and Ottertail Point).

Guthrie Till Plain (212Na03)										
	Current GAP Land Cover[1] All Ownerships			Current CSA Land Cover[2] DNR Forestry and Wildlife			Comparison of DNR to All Ownerships[3]	Comparison of FIA data to Original Bearing Trees		CP-PMOP Cover Type 50-year Goal
GROUP	Land Cover Class	Acres	%	Main Cover Type	Acres	%		Tree Species	Change[3]	
UPLAND DECIDUOUS	Aspen/White Birch	38,705	32.1	Aspen	1,957	20.1	-1.3	Aspen	1.73	-7.9%
				Balm of Gilead	60	0.6		Balm of Gilead	-1.67	
				Birch	409	4.2		Paper Birch	1.44	PMOP -5.2%
				Offsite Aspen	0	0.0				
	Maple/Basswood	8,893	7.4	Northern Hardwoods[4]	942	9.7	1.3	Sugar Maple	1.17	-10.8%
								Red Maple	2.58	
								Basswood	2.64	
								Yellow Birch	-1.08	
	Bur/White Oak	1	0.0	Oak	26	0.3	-11.1	Bur Oak	1.98	PMOP -10.9%
	Red Oak	3,590	3.0					Red Oak	1.58	
	Upland Deciduous	23,135	19.2	Offsite Oak	10	0.1				
	Group Sum	74,324	**61.6**	Group Sum	3,404	**34.9**	-1.8			
LOWLAND DECIDUOUS	Black Ash	471	0.4	Ash	441	4.5	11.6	Ash	1.33	-10.7%
	Lowland Deciduous	2,803	2.3	Lowland Hardwood	40	0.4	-5.7	Elm	-1.65	
	Group Sum	3,275	**2.7**	Group Sum	481	**4.9**	1.8			
UPLAND CONIFERS	White Pine mix	0	0.0	White Pine	34	0.3		White Pine	-8.18	112.4%
	Red Pine	2	0.0	Norway Pine[5]	29	0.3	148.4	Red Pine	-3.18	17.1%
	Red/White Pine	3,939	3.3							
	Red/White Pine-Deciduous mix	147	0.1							
	Jack Pine	695	0.6	Jack Pine	25	0.3	-2.2	Jack Pine	1.13	84.4%
	Jack Pine-Deciduous mix	97	0.1							
	White Spruce	53	0.0	White Spruce	45	0.5	10.6	White Spruce	-2.57	2.0%
	Balsam Fir mix	1,430	1.2	Balsam Fir	178	1.8	1.5	Balsam Fir	-1.30	-3.3%
	Spruce/Fir-Deciduous mix	8	0.0							
	Upland Black Spruce	0	0.0	Black Spruce, Upland	0	0.0				0.0%
	Upland Northern White-Cedar	1,410	1.2							
	Upland Conifer	178	0.1							
	Group Sum	7,957	**6.6**	Group Sum	311	**3.2**	-2.1			
LOWLAND CONIFERS	Lowland Black Spruce	1,911	1.6	Black Spruce, Lowland	179	1.8	1.2	Black Spruce	1.00	0.0%
	Tamarack	469	0.4	Tamarack	949	9.7	25.0	Tamarack	-4.76	5.4%
	Lowland Northern White-Cedar	1,831	1.5	Northern White Cedar	640	6.6	4.3	Cedar	-1.48	5.3%
	Group Sum	4,211	**3.5**	Group Sum	1,768	**18.1**	5.2			
STAGNANT LOWLAND CONIFERS	Stagnant Black Spruce	0	0.0	Stagnant Spruce	24	0.3				
	Stagnant Tamarack	0	0.0	Stagnant Tamarack	6	0.1				
	Stagnant Northern White-Cedar	0	0.0	Stagnant Cedar	1,484	15.2				
	Stagnant Conifer	0	0.0							
	Group Sum	0	**0.0**	Group Sum	1,514	**15.5**				
SHRUBLAND	Upland Shrub	2,620	2.2	Upland Brush	0	0.0	-3.3			
				Cutover Area	64	0.7				
	Lowland Deciduous Shrub	5,742	4.8	Lowland Brush	570	5.8	1.2			
	Lowland Evergreen Shrub	272	0.2	Muskeg	56	0.6	2.5			
	Group Sum	8,633	**7.2**	Group Sum	690	**7.1**	-1.0			
AQUATIC	Water	3,353	2.8	Permanent Water	0	0.0				
	Floating Aquatic	0	0.0	Non-Permanent Water	413	4.2				
	Broadleaf Sedge/Cattail	2,890	2.4	Marsh	806	8.3	3.4			
	Sedge Meadow	591	0.5	Lowland Grass	112	1.1	2.3			
	Group Sum	6,834	**5.7**	Group Sum	1,330	**13.6**	2.4			
CROP/GRASS	Cropland	12,932	10.7	Agricultural	140	1.4	-7.5			
	Grassland	443	0.4	Upland Grass	11	0.1	-3.1			
	Prairie	0	0.0							
	Group Sum	13,375	**11.1**	Group Sum	151	**1.6**	-7.1			
DEVELOPED	Low Intensity Urban	0	0.0	Development[6]	17	0.2				
	High Intensity Urban	0	0.0							
	Mixed Developed	0	0.0							
	Transportation	320	0.3	Roads	62	0.6	2.4			
	Group Sum	320	**0.3**	Group Sum	79	**0.8**	3.0			
	Other[7]	1,633	1.4	Other[8]	20	0.2				
	LTA TOTAL	120,562	100.0	LTA TOTAL	9,748	100.0				

Footnotes: 1. MN GAP data on all ownerships, 2. CSA data on DNR Forestry and Wildlife administered lands, 3. Magnitude of change (ex. -2.0 is a 2-fold decline and 4.5 is a 4.5-fold increase), 4. Includes Central Hardwoods, 5. Includes Scotch Pine, 6. Includes Industrial & Urban Development and Recreation Development, 7. Includes Barren and Lowland Conifer-Deciduous mix, 8. Includes Moss and Rock Outcrop

Bemidji Sand Plain (212Na07)



OVERVIEW

Information presented in this document is specific to this LTA with some reference to the larger ECS subsection. This summary was written to provide additional forest management information in this landscape and includes the following main sections: overview, description, land management, and vegetation. See the LTA Assessment and Analysis Guide for section explanations, data descriptions, acronyms, and references.

DESCRIPTION

A nearly level to gently rolling outwash plain formed by meltwater from the Des Moines Lobe Glacier. Uplands occupy 62 percent, wetlands occupy 23 percent, and lakes occupy 15 percent of the LTA (MN DNR, 1998). There are 0.5 miles of streams per square mile. The majority of upland soils are dry sand. Calcium carbonate has been leached out of the upper six feet or more. Minor amounts of sandy loam or loam soils also occur (NRCS,1994).

The majority of the upland pre-settlement vegetation was dry pine (jack pine) and dry mesic pine-hardwood forests (Shadis, 1999). Lowland pre-settlement vegetation was commonly conifer bog and swamp (Marschner, 1974). Historic fire regimes for the dominant upland types were: a) 30- to 75-year forest replacement and b) 150- to 350-year forest replacement with five- to 50-year forest maintenance, respectively (Shadis, 1999).

LAND MANAGEMENT

Land Stewardship

Based on GAP stewardship data, the majority of this LTA is private (45.6%), followed by federal (21.4%), county (17.5%), and state (14.9%). See table below. This LTA exists as seven separate units within eight different counties: Polk, Mahnomen, Clearwater, Beltrami, Hubbard, Cass, Itasca, and Koochiching. The Mississippi River meanders through the LTA. Over 184,133 acres of protected waters exist inside the LTA. Lakes within or adjacent to the LTA include Lower Rice, Bemidji, Plantagenet, Cass, Winnibigoshish, Leech, and Bowstring.

Parts of the LTA are inside Leech Lake and White Earth Indian Reservations and Chippewa National Forest. Federal, state, county, and private industrial lands are scattered throughout the LTA. Large tracts of contiguous USFS lands are adjacent to Lake Winnibigoshish. The majority of state, county, and Potlatch Corporation lands are located in the LTA's west unit. Municipalities include Cass Lake, Laporte, Leonard, Wilton, Bagley, Squaw Lake, and Bemidji.

Agency (%)	Acres	Percent
State (14.9%)		
DNR, Ecological Resources	194	0.0%
DNR, Fish and Wildlife	2,140	0.5%
DNR, Forestry	60,705	13.9%
DNR, Parks	1,368	0.3%
DNR, Trails and Waterways	46	0.0%
Other	275	0.1%
State (Undifferentiated)	376	0.1%
County (17.5%)		
Beltrami	33,802	7.7%
Cass	1,216	0.3%
Clearwater	6,901	1.6%
Hubbard	33,690	7.7%
Itasca	101	0.0%
Mahnomen	1,048	0.2%
Federal (21.4%)		
Bureau of Indian Affairs	3,997	0.9%
Leech Lake Reservation	1,069	0.2%
Minnesota Chippewa Indians	85	0.0%
Other	511	0.1%
U.S. Forest Service	87,331	19.9%
White Earth Reservation	630	0.1%
Other Public (0.3%)		
City of Bagley	123	0.0%
City of Bemidji	752	0.2%
City of Cass Lake	20	0.0%
City of Solway	40	0.0%
School District	270	0.1%
Private (45.6%)		
Private	187,043	42.7%
Private Industrial	12,694	2.9%
Tribal (0.3%)		
Leech Lake Reservation	251	0.1%
Minnesota Chippewa Indians	519	0.1%
White Earth Reservation	549	0.1%
Grand Total	**437,746 acres**	

* note – 80,965 acres of open water are included in the table above

Natural Resource Management Units

Federal

United States Forest Service

- National Forests: Chippewa (west central and north central)

State

Minnesota Department of Natural Resources

- State Forests: Paul Bunyan (north half and southeast), Blackduck (southeast corner), Bowstring (north central and southwest), Mississippi Headwaters (north two thirds), Welsh Lake (east two thirds), Big Fork (west half and south central), Buena Vista (south one third), Pine Island (extreme southwest corner), White Earth (north central)
- Wildlife Management Areas: Kabekona, Birch Creek, Rockwood, Wolf Lake, Henry O. Bjoring, Old Red Lake Trail, Island Lake Fmha, Roy Lake, Minnow Lake, West Four Legged Lake, Perch Lake, Lower Rice Lake
- Aquatic Management Areas: Kabekona, Henry Kartarik Island
- Fish Management Areas: Williams, Andrusia Lake, Trees, Clearwater River, Bemidji Lake, Grace Lake, Necktie River
- Scientific and Natural Areas: Lost Forty, Pennington Bog
- State Parks: Lake Bemidji

County

None known

Other

Leech Lake Indian Reservation
White Earth Indian Reservation

VEGETATION

Pre-settlement Vegetation and Tree Species

The major Pre-settlement Vegetation types in this LTA include: Aspen-Birch (trending to Conifers) (19%), Conifer Bogs and Swamps (18%), Jack Pine Barrens and Openings (31%), Lakes (open water) (13%), and Mixed White Pine and Red Pine (8%).

The following list contains the number of section corner notes from the original Public Land Survey by vegetation/landscape characteristic within this LTA, forest, timber-1,245, pine grove or grove-1, pine openings, pine barrens, scattered pine-104, scattering oak, scattering timber-72, thicket, brush, underbrush or only tree around-53, dry land, dry ridge, or island-6, lake, slough, pond-286, river, creek, bottom, or valley, ravine-34, marsh or swamp-540, meadow-4, wet prairie or prairie-3, windthrow, windfall-20, and burned area-70.

Bearing trees include: Ash-30, Black Ash-2, Aspen-493, Balm-of-Gilead-44, Balsam Fir-68, Basswood-29, Birch-204, Yellow Birch-2, Cedar-135, Cottonwood-4, Elm-60, Ironwood-2, Maple-27, Sugar Maple-12, Oak-83, Bur Oak-19, Northern Pin Oak-1, Red Oak-3, Pine-59, Jack Pine-1779, Red Pine-901, White Pine-199, Spruce-235, White Spruce-1, Tamarack-945, and Willow-10.

Current Land Cover

As referenced from table on page 7:

- Top five GAP land cover classes on all ownerships (535,802 total acres):
  Aspen/White Birch (20.9%), Water (14.7%), Cropland (12.9%), Lowland Deciduous Shrub (8.9%), and Jack Pine (7.9%).

- Top five CSA main cover types on DNR Forestry and Wildlife land (68,029 total acres):
  Aspen (17.8 %), Lowland Brush (13.7%), Marsh (13.1%), Norway Pine (9.8%), and Tamarack (8.6%).

- Significant percentage differences in land cover between DNR Forestry and Wildlife land and all ownerships:
  DNR land has 32.9 times more White Spruce, 22.8 times more White Pine, 9.7 times more Tamarack, 3.5 times more Northern White Cedar, 2.5 times more Balsam Fir, 2.5 times more Lowland Black Spruce, 2.2 times more Marsh, 2.4 times less Lowland Hardwood, and 38.6 times less in the Agricultural group.

Changes in Tree Species Composition

As referenced from table on page 7, the following tree species were or are a significant component of the forest and their abundance has changed significantly since the original land survey (magnitude of change calculated by comparing FIA data to original bearing trees):

There is currently 10.5 times more Red Oak, 5.0 times more Balsam Fir, 4.9 times more Balm of Gilead, 3.5 times more Ash, 2.6 times more Aspen, 2.3 times more Basswood, 2.1 times more Paper Birch, 2.5 times less Sugar Maple, and 5.0 times less Tamarack in this LTA.

50-year Main Cover Type Goals

See main cover type 50-year goals in table on page 7. This is a priority LTA for Jack Pine and Tamarack cover type increase.

Potential Forest Ecosystem Types and Native Plant Communities

This LTA contains the following forest ecosystem types: Dry Pine, Dry-Mesic Pine, Dry-Mesic Pine/Oak, and Mesic Northern Hardwood. The following Native Plant Communities Classes are known to occur in this LTA **(bold text)** or occur in similar LTAs.

Upland Forests

FDn12, FDn33, MHn35, **MHn46**, MHn47, **FDc12, FDc23, FDc24, FDc34, MHn44,** MHc26, MHc36, MHc37

Wetland Forests

FFn57, FFn67, WFn53, WFn55, **WFn64**, **FPn63, FPn82**, APn80, APn81

Non-Forested Communities

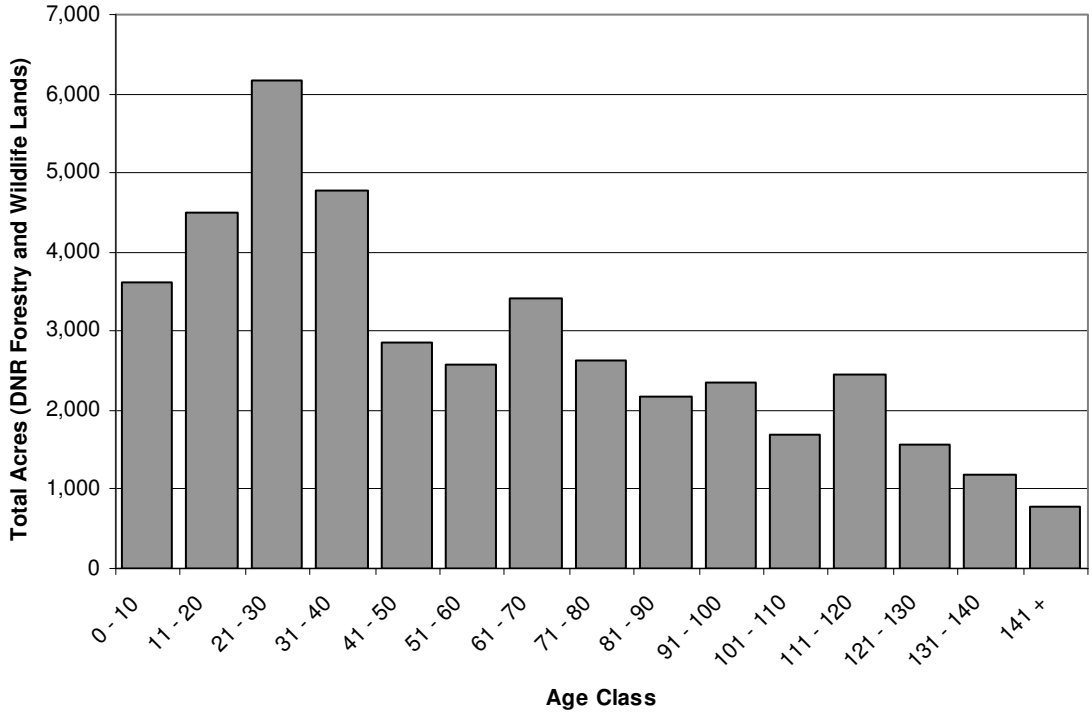
APn91, **OPn81, OPn91**, OPn92, **WMn73, WMn82, FPn73**

Old Growth, Ecologically Important Lowland Conifers, and Extended Rotation Forests

This LTA contains 31 old growth stands with associated OFMCs, 1,310 acres of EILC, and 16,298 acres of ERF on DNR Forestry and Wildlife land.

Age Classes

Figure below shows age-class distribution of all forested cover types in this LTA (42,731 total acres).



Patch Dynamics

This LTA contains 20 designated forest patches on state forestry and wildlife lands. They include 2 lowland conifer patches (Schoolcraft Conifers and Leech Lake Conifers), 9 upland conifer patches (Buzzle Conifers, Eckles Conifers, Northern Conifers, Grant Valley Conifers East, South Lake George Conifers, North Lake George Conifers, Trestle, Clover Conifers, and Turtle River Conifers), and 9 upland hardwood patches (Arrowhead, Rockwood Hardwoods South, Bigfork River, Little Jesse, Island Lake

Hardwoods, Rice Lake, Old Grade, Clover Hardwoods North, and Clover Hardwoods South).

Bemidji Sand Plain (212Na07)										
	Current GAP Land Cover[1] All Ownerships			Current CSA Land Cover[2] DNR Forestry and Wildlife			Comparison of DNR to All Ownerships[3]	Comparison of FIA data to Original Bearing Trees		CP-PMOP Cover Type 50-year Goal
GROUP	Land Cover Class	Acres	%	Main Cover Type	Acres	%		Tree Species	Change[3]	
UPLAND DECIDUOUS	Aspen/White Birch	111,989	20.9	Aspen	12,116	17.8		Aspen	2.58	-7.9%
				Balm of Gilead	244	0.4	-1.1	Balm of Gilead	4.86	
				Birch	828	1.2		Paper Birch	2.11	PMOP -5.2%
				Offsite Aspen	0	0.0				
	Maple/Basswood	4,075	0.8	Northern Hardwoods[4]	773	1.1	1.5	Sugar Maple	-2.50	-10.8%
								Red Maple	0.00	
								Basswood	2.25	
								Yellow Birch	0.00	
	Bur/White Oak	441	0.1	Oak	269	0.4	1.1	Bur Oak	1.73	PMOP -10.9%
	Red Oak	1,422	0.3					Red Oak	10.50	
	Upland Deciduous	24,795	4.6	Offsite Oak	23	0.0				
	Group Sum	142,723	**26.6**	Group Sum	14,253	**21.0**	-1.3			
LOWLAND DECIDUOUS	Black Ash	818	0.2	Ash	1,117	1.6	10.8	Ash	3.50	-10.7%
	Lowland Deciduous	8,630	1.6	Lowland Hardwood	456	0.7	-2.4	Elm	1.64	
	Group Sum	9,448	**1.8**	Group Sum	1,573	**2.3**	1.3			
UPLAND CONIFERS	White Pine mix	59	0.0	White Pine	172	0.3	22.8	White Pine	-1.89	112.4%
	Red Pine	158	0.0	Norway Pine[5]	6,675	9.8	332.5	Red Pine	-1.22	17.1%
	Red/White Pine	30,128	5.6							
	Red/White Pine-Deciduous mix	2,224	0.4							
	Jack Pine	42,176	7.9	Jack Pine	3,166	4.7	-1.7	Jack Pine	-1.34	84.4%
	Jack Pine-Deciduous mix	3,542	0.7							
	White Spruce	268	0.1	White Spruce	1,118	1.6	32.9	White Spruce	-1.64	2.0%
	Balsam Fir mix	5,125	1.0	Balsam Fir	1,631	2.4	2.5	Balsam Fir	5.00	-3.3%
	Spruce/Fir-Deciduous mix	659	0.1							
	Upland Black Spruce	0	0.0	Black Spruce, Upland	0	0.0				0.0%
	Upland Northern White-Cedar	1,510	0.3							
	Upland Conifer	6,024	1.1							
	Group Sum	91,872	**17.1**	Group Sum	12,762	**18.8**	1.1			
LOWLAND CONIFERS	Lowland Black Spruce	12,454	2.3	Black Spruce, Lowland	3,953	5.8	2.5	Black Spruce	1.13	0.0%
	Tamarack	4,760	0.9	Tamarack	5,845	8.6	9.7	Tamarack	-5.03	5.4%
	Lowland Northern White-Cedar	5,092	1.0	Northern White Cedar	2,247	3.3	3.5	Cedar	1.50	5.3%
	Group Sum	22,305	**4.2**	Group Sum	12,046	**17.7**	4.3			
STAGNANT LOWLAND CONIFERS	Stagnant Black Spruce	19	0.0	Stagnant Spruce	353	0.5	145.3			
	Stagnant Tamarack	27	0.0	Stagnant Tamarack	284	0.4	81.7			
	Stagnant Northern White-Cedar	0	0.0	Stagnant Cedar	1,436	2.1				
	Stagnant Conifer	92	0.0							
	Group Sum	139	**0.0**	Group Sum	2,073	**3.0**	117.8			
SHRUBLAND	Upland Shrub	18,911	3.5	Upland Brush	140	0.2	-1.3			
				Cutover Area	1,770	2.6				
	Lowland Deciduous Shrub	47,568	8.9	Lowland Brush	9,345	13.7	1.5			
	Lowland Evergreen Shrub	907	0.2	Muskeg	220	0.3	1.9			
	Group Sum	67,386	**12.6**	Group Sum	11,474	**16.9**	1.3			
AQUATIC	Water	78,780	14.7	Permanent Water	1,039	1.5				
	Floating Aquatic	0	0.0	Non-Permanent Water	1,573	2.3				
	Broadleaf Sedge/Cattail	31,621	5.9	Marsh	8,924	13.1	2.2			
	Sedge Meadow	6,813	1.3	Lowland Grass	1,056	1.6	1.2			
	Group Sum	117,214	**21.9**	Group Sum	12,592	**18.5**	-1.2			
CROP/GRASS	Cropland	68,863	12.9	Agricultural	226	0.3	-38.6			
	Grassland	1,821	0.3	Upland Grass	303	0.4	1.3			
	Prairie	0	0.0							
	Group Sum	70,684	**13.2**	Group Sum	530	**0.8**	-16.9			
DEVELOPED	Low Intensity Urban	3,676	0.7	Development[6]	379	0.6	-2.2			
	High Intensity Urban	2,775	0.5							
	Mixed Developed	59	0.0							
	Transportation	2,488	0.5	Roads	206	0.3	-1.5			
	Group Sum	8,998	**1.7**	Group Sum	584	**0.9**	-2.0			
	Other[7]	5,033	0.9	Other[8]	141	0.2				
	LTA TOTAL	535,802	100.0	LTA TOTAL	68,029	100.0				

Footnotes: 1. MN GAP data on all ownerships, 2. CSA data on DNR Forestry and Wildlife administered lands, 3. Magnitude of change (ex. -2.0 is a 2-fold decline and 4.5 is a 4.5-fold increase), 4. Includes Central Hardwoods, 5. Includes Scotch Pine, 6. Includes Industrial & Urban Development and Recreation Development, 7. Includes Barren and Lowland Conifer-Deciduous mix, 8. Includes Moss and Rock Outcrop

Bena Dunes and Peatlands (212Na08)

OVERVIEW

Information presented in this document is specific to this LTA with some reference to the larger ECS subsection. This summary was written to provide additional forest management information in this landscape and includes the following main sections: overview, description, land management, and vegetation. See the LTA Assessment and Analysis Guide for section explanations, data descriptions, acronyms, and references.

DESCRIPTION

A nearly level outwash plain formed by melt waters from the Des Moines Lobe Glacier that was extensively reshaped by wind action. Uplands occupy 47 percent, wetlands occupy 51 percent, and lakes occupy 2 percent of the LTA (MN DNR, 1998). Extensive swamps and bogs occur, especially in the southern portions of the LTA. Soil parent material is predominantly fine sand. Calcium carbonate has been leached out of the upper six feet or more.

The dominant upland pre-settlement vegetation was dry (jack and red) pine forest and dry mesic (red and white) pine/hardwood. The majority of lowland pre-settlement vegetation was conifer swamp. Historic fire regimes for the dominant upland types were 150- to 350- year forest replacement with five- to 50-year forest maintenance for both communities.

LAND MANAGEMENT

Land Stewardship

Based on GAP stewardship data, the majority of this LTA is state (47.6%), followed by federal (46.7%), and private (3.9%). See table below. This LTA is located in Cass and Itasca counties and is bisected by the Mississippi River. Over 44,604 acres of protected waters exist inside the LTA. Lakes within or adjacent to the LTA include Winnibigoshish, Ball Club, and Six Mile.

The entire LTA is inside Leech Lake Indian Reservation and Chippewa National Forest. Federal, state, county, and private industrial lands are distributed throughout the LTA. The majority of the LTA is in public ownership, with federal and state lands predominating. Municipalities include Bena and Federal Dam.

Agency (%)	Acres	Percent
State (47.6%)		
DNR, Ecological Resources	11	0.0%
DNR, Fish and Wildlife	5,470	6.2%
DNR, Forestry	35,841	40.5%
Other	797	0.9%
County (0.8%)		
Cass	691	0.8%
Federal (46.7%)		
Bureau of Indian Affairs	1,147	1.3%
Leech Lake Reservation	115	0.1%
Other	100	0.1%
U.S. Forest Service	39,916	45.2%
Private (3.9%)		
Private	2,779	3.1%
Private Industrial	675	0.8%
Tribal (1.0%)		
Leech Lake Reservation	853	1.0%
Grand Total	**88,395 acres**	

* note - 2,622 acres of open water are included in the table above

Natural Resource Management Units

Federal

United States Forest Service

- National Forests: Chippewa (east central)

State

Minnesota Department of Natural Resources

- State Forests: Bowstring (south central)
- Wildlife Management Areas: Mud Goose
- Scientific and Natural Areas: Hole-in-the-Bog Peatland

County

None known

Other

Leech Lake Indian Reservation

VEGETATION

Pre-settlement Vegetation and Tree Species

The major Pre-settlement Vegetation types in this LTA include: Aspen-Birch (trending to Conifers) (29%), Conifer Bogs and Swamps (44%), Jack Pine Barrens and Openings (17%), and Wet Prairie (7%).

The following list contains the number of section corner notes from the original Public Land Survey by vegetation/landscape characteristic within this LTA, forest, timber-145, pine openings, pine barrens, scattered pine-13, scattering oak, scattering timber-2, dry land, dry ridge, or island-31, lake, slough, pond-13, river, creek, bottom, or valley, ravine-6, marsh or swamp-207, windthrow, windfall-17, and burned area-4.

Bearing trees include: Ash-8, Black Ash-9, Aspen-109, Balsam Fir-10, Basswood-2, Birch-44, Cedar-63, Elm-5, Oak-4, Bur Oak-3, Red Oak-1, Pine-13, Jack Pine-132, Red Pine-161, White Pine-17, Spruce-29, Tamarack-344, and Willow-1.

Current Land Cover

As referenced from table on page 6:

- Top five GAP land cover classes on all ownerships (93,011 total acres):
  Aspen/White Birch (22.7%), Lowland Deciduous Shrub (15.2%), Red/White Pine (9.5%), Tamarack (5.5%), Lowland Deciduous (5.5%), Broadleaf Sedge/Cattail (5.5%), and Upland Deciduous (4.7%).

- Top five CSA main cover types on DNR Forestry and Wildlife land (39,186 total acres):
  Tamarack (32.2 %), Lowland Brush (13.0%), Marsh (12.4%), Aspen (11.2%), and Norway Pine (5.8%).

- Significant percentage differences in land cover between DNR Forestry and Wildlife land and all ownerships:
  DNR land has 5.8 times more Tamarack, 3.9 times more Ash, 2.3 times more Marsh, 3.0 times less Balsam Fir, 4.8 times less Agricultural, 5.0 times less Jack Pine, and 29.7 times less in the Lowland Hardwood group.

Changes in Tree Species Composition

As referenced from table on page 6, the following tree species were or are a significant component of the forest and their abundance has changed significantly since the original land survey (magnitude of change calculated by comparing FIA data to original bearing trees):

There is currently 8.9 times more Balsam Fir, 2.4 times more Cedar, 2.2 times more Paper Birch, 2.1 times more Black Spruce, 2.0 times more Ash, 2.3 times less Bur Oak, 3.0 times less Jack Pine, and 3.3 times less White Spruce in this LTA.

50-year Main Cover Type Goals

See main cover type 50-year goals in table on page 6. This is a priority LTA for White Spruce cover type increase.

Potential Forest Ecosystem Types and Native Plant Communities

This LTA contains the following forest ecosystem types: Dry Pine and Dry-Mesic Pine/Oak. The following Native Plant Communities Classes are known to occur in this LTA **(bold text)** or occur in similar LTAs.

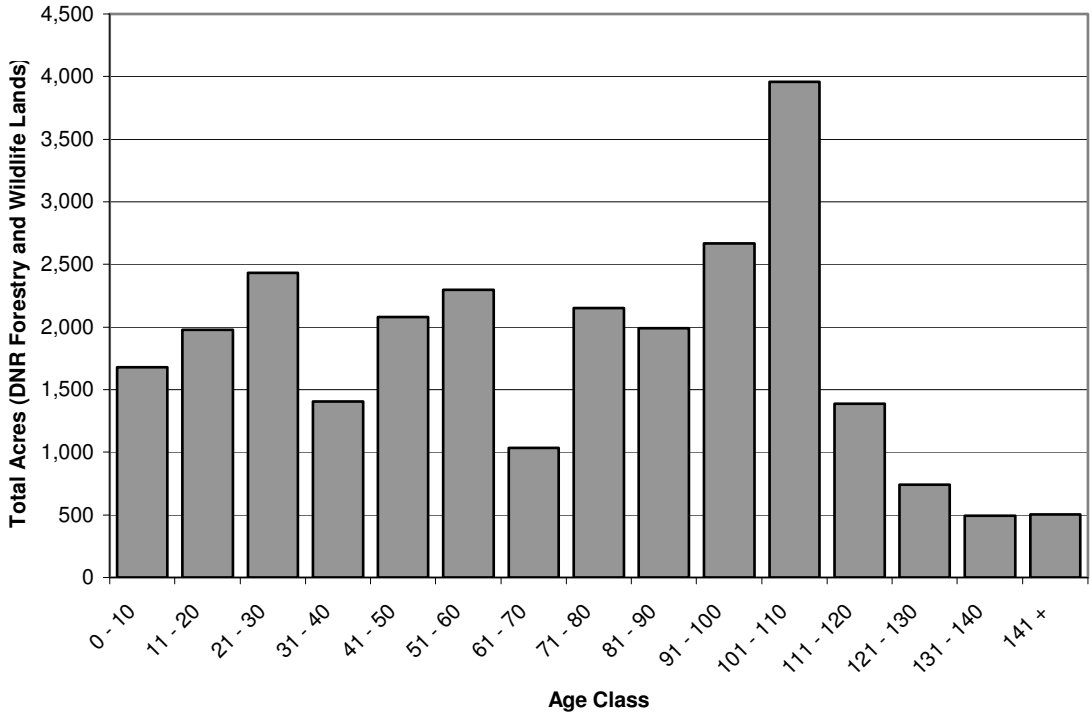
Upland Forests
FDn12, FDn33, FDc12, FDc23, FDc24, FDc34, **MHn35, MHn44, MHn46,** MHn47**, MHc26**, MHc36
Wetland Forests
FFn57, FFn67, **WFn53**, WFn55, **WFn64, FPn63, FPn82, APn80**, APn81
Non-Forested Communities
APn91, OPn81, OPn91, OPn92, WMn73, WMn82, FPn73

Old Growth, Ecologically Important Lowland Conifers, and Extended Rotation Forests

This LTA contains 10 old growth stands with associated OFMCs, 826 acres of EILC, and 11,920 acres of ERF on DNR Forestry and Wildlife land.

Age Classes

Figure below shows age-class distribution of all forested cover types in this LTA (26,815 total acres).



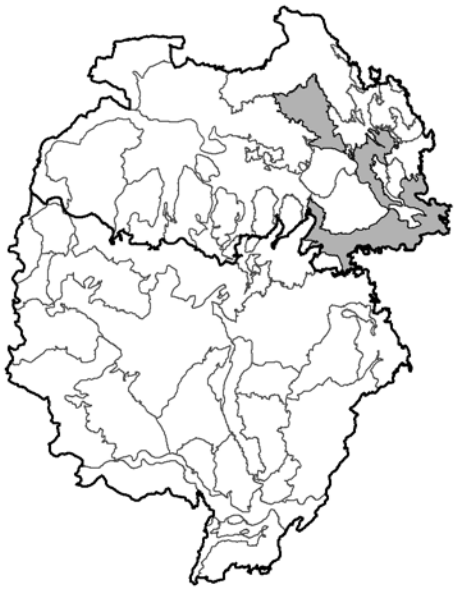
Patch Dynamics

This LTA contains 5 designated forest patches on state forestry and wildlife lands. They include 3 lowland conifer patches (Drumbeater, North Mud, and West Drumbeater Conifers) and 2 upland hardwood patches (Blacksmith Hardwoods and South Sixmile).

Bena Dunes and Peatlands (212Na08)										
	Current GAP Land Cover[1] All Ownerships			Current CSA Land Cover[2] DNR Forestry and Wildlife			Comparison of DNR to All Ownerships[3]	Comparison of FIA data to Original Bearing Trees		CP-PMOP Cover Type 50-year Goal
GROUP	Land Cover Class	Acres	%	Main Cover Type	Acres	%		Tree Species	Change[3]	
UPLAND DECIDUOUS	Aspen/White Birch	21,153	22.7	Aspen	4,372	11.2	-1.7	Aspen	1.04	-7.9%
				Balm of Gilead	13	0.0		Balm of Gilead	0.00	
				Birch	894	2.3		Paper Birch	2.16	PMOP -5.2%
				Offsite Aspen	0	0.0				
	Maple/Basswood	166	0.2	Northern Hardwoods[4]	100	0.3	1.4	Sugar Maple	0.00	-10.8%
								Red Maple	0.00	
								Basswood	1.50	
								Yellow Birch	0.00	
	Bur/White Oak	0	0.0	Oak	58	0.1	38.5	Bur Oak	-2.25	PMOP -10.9%
	Red Oak	4	0.0					Red Oak	0.00	
	Upland Deciduous	4,372	4.7	Offsite Oak	10	0.0				
	Group Sum	25,695	**27.6**	Group Sum	5,447	**13.9**	-2.0			
LOWLAND DECIDUOUS	Black Ash	146	0.2	Ash	238	0.6	3.9	Ash	2.00	-10.7%
	Lowland Deciduous	5,079	5.5	Lowland Hardwood	72	0.2	-29.7	Elm	1.40	
	Group Sum	5,224	**5.6**	Group Sum	310	**0.8**	-7.1			
UPLAND CONIFERS	White Pine mix	0	0.0	White Pine	80	0.2		White Pine	1.94	112.4%
	Red Pine	0	0.0	Norway Pine[5]	2,286	5.8		Red Pine	-1.03	17.1%
	Red/White Pine	8,878	9.5							
	Red/White Pine-Deciduous mix	208	0.2							
	Jack Pine	1,246	1.3	Jack Pine	106	0.3	-5.0	Jack Pine	-2.95	84.4%
	Jack Pine-Deciduous mix	77	0.1							
	White Spruce	18	0.0	White Spruce	135	0.3	18.2	White Spruce	-3.33	2.0%
	Balsam Fir mix	3,007	3.2	Balsam Fir	428	1.1	-3.0	Balsam Fir	8.91	-3.3%
	Spruce/Fir-Deciduous mix	27	0.0							
	Upland Black Spruce	0	0.0	Black Spruce, Upland	12	0.0				0.0%
	Upland Northern White-Cedar	1,336	1.4							
	Upland Conifer	528	0.6							
	Group Sum	15,325	**16.5**	Group Sum	3,047	**7.8**	-2.1			
LOWLAND CONIFERS	Lowland Black Spruce	3,869	4.2	Black Spruce, Lowland	1,398	3.6	-1.2	Black Spruce	2.11	0.0%
	Tamarack	5,154	5.5	Tamarack	12,637	32.2	5.8	Tamarack	-1.90	5.4%
	Lowland Northern White-Cedar	3,170	3.4	Northern White Cedar	925	2.4	-1.4	Cedar	2.38	5.3%
	Group Sum	12,193	**13.1**	Group Sum	14,960	**38.2**	2.9			
STAGNANT LOWLAND CONIFERS	Stagnant Black Spruce	0	0.0	Stagnant Spruce	1,035	2.6				
	Stagnant Tamarack	0	0.0	Stagnant Tamarack	1,400	3.6				
	Stagnant Northern White-Cedar	0	0.0	Stagnant Cedar	602	1.5				
	Stagnant Conifer	0	0.0							
	Group Sum	0	**0.0**	Group Sum	3,037	**7.8**				
SHRUBLAND	Upland Shrub	748	0.8	Upland Brush	18	0.0	-17.6			
				Cutover Area	0	0.0				
	Lowland Deciduous Shrub	14,114	15.2	Lowland Brush	5,091	13.0	-1.2			
	Lowland Evergreen Shrub	1,741	1.9	Muskeg	760	1.9	1.0			
	Group Sum	16,603	**17.9**	Group Sum	5,869	**15.0**	-1.2			
AQUATIC	Water	2,321	2.5	Permanent Water	201	0.5				
	Floating Aquatic	0	0.0	Non-Permanent Water	207	0.5				
	Broadleaf Sedge/Cattail	5,078	5.5	Marsh	4,845	12.4	2.3			
	Sedge Meadow	1,190	1.3	Lowland Grass	586	1.5	1.2			
	Group Sum	8,589	**9.2**	Group Sum	5,839	**14.9**	1.6			
CROP/GRASS	Cropland	807	0.9	Agricultural	71	0.2	-4.8			
	Grassland	91	0.1	Upland Grass	0	0.0				
	Prairie	0	0.0							
	Group Sum	898	**1.0**	Group Sum	71	**0.2**	-5.4			
DEVELOPED	Low Intensity Urban	101	0.1	Development[6]	83	0.2	1.9			
	High Intensity Urban	3	0.0							
	Mixed Developed	0	0.0							
	Transportation	29	0.0	Roads	189	0.5	15.4			
	Group Sum	133	**0.1**	Group Sum	272	**0.7**	4.9			
	Other[7]	8,352	9.0	Other[8]	334	0.9				
	LTA TOTAL	93,011	100.0	LTA TOTAL	39,186	100.0				

Footnotes: 1. MN GAP data on all ownerships, 2. CSA data on DNR Forestry and Wildlife administered lands, 3. Magnitude of change (ex. -2.0 is a 2-fold decline and 4.5 is a 4.5-fold increase), 4. Includes Central Hardwoods, 5. Includes Scotch Pine, 6. Includes Industrial & Urban Development and Recreation Development, 7. Includes Barren and Lowland Conifer-Deciduous mix, 8. Includes Moss and Rock Outcrop

Rosey Lake Plain (212Na09)



OVERVIEW

Information presented in this document is specific to this LTA with some reference to the larger ECS subsection. This summary was written to provide additional forest management information in this landscape and includes the following main sections: overview, description, land management, and vegetation. See the LTA Assessment and Analysis Guide for section explanations, data descriptions, acronyms, and references.

DESCRIPTION

A nearly level glacial lake basin (Aitkin) formed by melt waters of the Des Moines Lobe Glacier. Uplands occupy 51 percent, wetlands occupy 41 percent, and lakes occupy 8 percent of the LTA (MN DNR, 1998). There are 0.5 miles of streams per square mile. Mineral soils with silt and clay textures occupy 36 percent and fine sand textures occupy 25 percent of the LTA.

The pre-settlement vegetation was wet-mesic hardwood-conifer (pine) with minor amounts of dry pine and mesic northern hardwoods in the northern two polygons and wet-mesic hardwood-conifer (spruce-fir) in the southern polygon (Marschner, 1974). Lowland presettlement vegetation was wet sedge meadows and conifer bog and swamp (Marschner, 1974). Historic fire regimes for the dominant upland types were a) 150- to 350-year forest replacement, b) 150- to 350-year forest replacement with five- to 50-year forest maintenance, c) 250- to 1,000-year forest replacement, and d) 70- to 150-year forest replacement.

LAND MANAGEMENT

Land Stewardship

Based on GAP stewardship data, the majority of this LTA is private (35.1%), followed by federal (33.7%), state (24.0%), and county (6.4%). See table below. Water bodies segregate the essentially contiguous four units of this LTA. The LTA is located in Beltrami, Cass, and Itasca counties. Over 124,144 acres of protected waters exist inside the LTA. Lakes within or adjacent to the LTA include Winnibigoshish, Leech, Bowstring, and Round. The Mississippi River flows through the LTA.

Nearly all of the LTA is inside Leech Lake Indian Reservation and Chippewa National Forest. Federal, state, county, and private industrial lands are dispersed throughout the LTA. Most USFS land is located in the LTA's north unit. Significant blocks of state forestlands are located in three of the LTA's four units. Abundant parcels owned by Potlatch Corporation and Blandin Paper Company exists in the LTA, as well as a large tract of Minnesota Power and Light Company land in the south unit of the LTA. Municipalities include Federal Dam, Boy River, Zemple, Deer River, and Cohasset.

Agency (%)	Acres	Percent
State (24.0%)		
DNR, Ecological Resources	2,461	1.0%
DNR, Fish and Wildlife	11,774	5.0%
DNR, Forestry	41,536	17.5%
DNR, Parks	406	0.2%
Other	670	0.3%
State (Undifferentiated)	83	0.0%
County (6.4%)		
Beltrami	128	0.1%
Cass	9,782	4.1%
Itasca	5,271	2.2%
Federal (33.7%)		
Bureau of Indian Affairs	1,089	0.5%
Bureau of Land Management	164	0.1%
Leech Lake Reservation	132	0.1%
Other	1,354	0.6%
U.S. Forest Service	77,151	32.6%
Other Public (0.3%)		
City of Deer River	683	0.3%
Private (35.1%)		
Private	72,593	30.6%
Private Industrial	9,905	4.2%
Private Other	673	0.3%
Tribal (0.5%)		
Leech Lake Reservation	1,094	0.5%
Grand Total	**236,949 acres**	

* note - 24,613 acres of open water are included in the table above

Natural Resource Management Units

Federal

United States Forest Service

- National Forests: Chippewa (east central)

State

Minnesota Department of Natural Resources

- State Forests: Blackduck (east half), Bowstring (north central, east central, and southwest), Battleground (east half)

- Wildlife Management Areas: Bowstring Deer Yard, Bass Brook, Mud Goose
- Aquatic Management Areas: Crawford Island, Five Mile Point
- Fish Management Areas: Mostoller, Steven's Lake
- Scientific and Natural Areas: Hole-in-the-Bog Peatland
- State Parks: Schoolcraft

County

None known

Other

Leech Lake Indian Reservation

VEGETATION

Pre-settlement Vegetation and Tree Species

The major Pre-settlement Vegetation types in this LTA include: Aspen-Birch (trending to Conifers) (34%), Conifer Bogs and Swamps (38%), Lakes (open water) (8%), and Wet Prairie (8%).

The following list contains the number of section corner notes from the original Public Land Survey by vegetation/landscape characteristic within this LTA, forest, timber-605, pine openings, pine barrens, scattered pine-4, scattering oak, scattering timber-10, thicket, brush, underbrush or only tree around-13, dry land, dry ridge, or island-8, lake, slough, pond-32, river, creek, bottom, or valley, ravine-24, marsh or swamp-505, meadow-3, windthrow, windfall-40, and burned area-7.

Bearing trees include: Ash-8, Aspen-28, Balm-of-Gilead-7, Balsam Fir-13, Basswood-2, Birch-15, Cedar-65, Elm-8, Oak-1, Pine-7, Jack Pine-3, Red Pine-3, White Pine-8, Spruce-117, Tamarack-322, and Willow-1.

Current Land Cover

As referenced from table on page 6:

- Top five GAP land cover classes on all ownerships (283,826 total acres):
  Aspen/White Birch (25.9%), Lowland Deciduous Shrub (11.8%), Water (8.8%), Cropland (7.5%), and Upland Deciduous (6.7%).

- Top five CSA main cover types on DNR Forestry and Wildlife land (56,565 total acres):
  Aspen (15.4%), Lowland Black Spruce (14.7%), Lowland Brush (10.7%), Tamarack (9.1%), and Marsh (8.8%).

- Significant percentage differences in land cover between DNR Forestry and Wildlife land and all ownerships:

DNR land has 4.7 times more Tamarack, 4.3 times more Muskeg, 4.1 times more Ash, 2.6 times more Lowland Black Spruce, 2.3 times more Jack Pine, 5.8 times less Agricultural, and 6.7 times less in the Lowland Hardwood group.

Changes in Tree Species Composition

As referenced from table on page 6, the following tree species were or are a significant component of the forest and their abundance has changed significantly since the original land survey (magnitude of change calculated by comparing FIA data to original bearing trees):

There is currently 8.6 times more Balm of Gilead, 5.7 times more Ash, 2.5 times more Ash, 2.4 times more Basswood, 2.5 times less White Pine, 5.4 times less Tamarack, and 6.6 times less White Spruce in this LTA.

50-year Main Cover Type Goals

See main cover type 50-year goals in table on page 6. This is a priority LTA for White Pine, White Spruce, Tamarack, and Northern White Cedar cover type increase.

Potential Forest Ecosystem Types and Native Plant Communities

This LTA contains the following forest ecosystem types: Dry Pine, Dry-Mesic Pine/Oak, Mesic Northern Hardwood, Boreal Hardwood Conifer, White Cedar Swamp, and Open Meadows. The following Native Plant Communities Classes are known to occur in this LTA **(bold text)** or occur in similar LTAs.

Upland Forests

FDn12, FDn33, FDn43, **FDc34, MHn35, MHn44, MHn46, MHn47, MHc26, MHc36**

Wetland Forests

FFn57, FFn67, **WFn53, WFn55, WFn64,** FPn63, **FPn82, APn80, APn81**

Non-Forested Communities

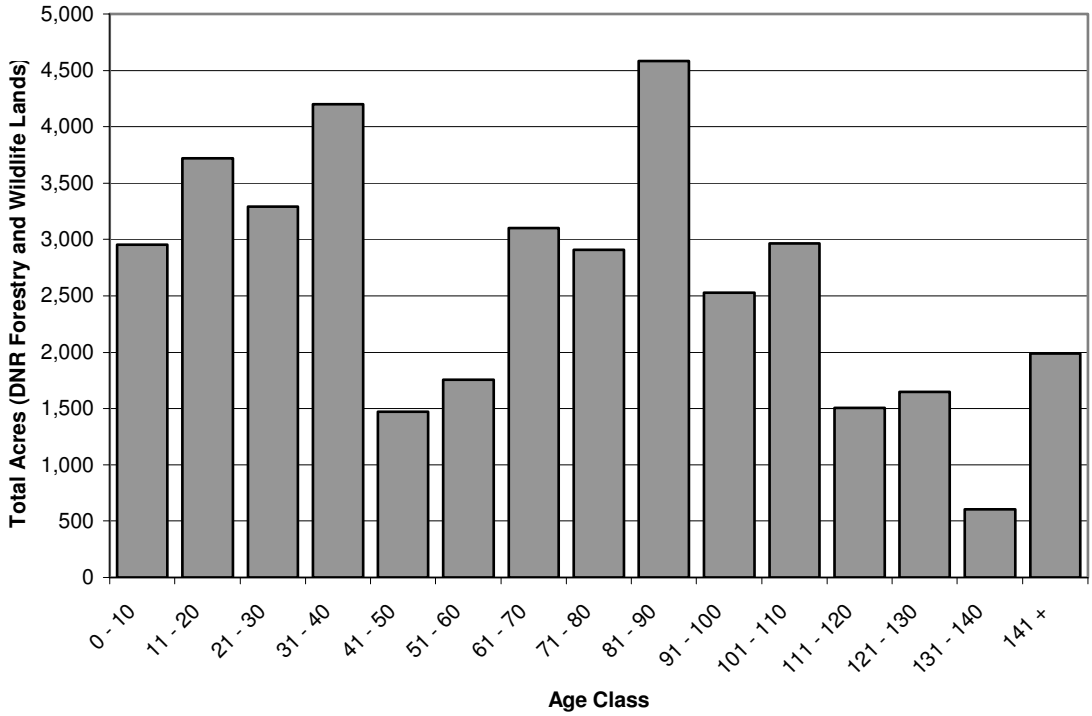
APn90, APn91, MRn83, **OPn81,** OPn91, OPn92, **WMn73, WMn82, FPn73**

Old Growth, Ecologically Important Lowland Conifers, and Extended Rotation Forests

This LTA contains 6 old growth stands with associated OFMCs, 1,752 acres of EILC, and 10,602 acres of ERF on DNR Forestry and Wildlife land.

Age Classes

Figure below shows age-class distribution of all forested cover types in this LTA (39,239 total acres).



Patch Dynamics

This LTA contains 9 designated forest patches on state forestry and wildlife lands. They include 2 upland conifer patches (Skimmerhorn Creek and Decker Lake), 2 upland hardwood patches (South Goose and Olivet), 4 lowland conifer patches (South Gould Conifers, North Gould Conifers, Skimmerhorn Lake, and Little Cut Foot), and a lowland hardwoods patch (Shallow Pond).

Rosey Lake Plain (212Na09)

	Current GAP Land Cover[1] All Ownerships			Current CSA Land Cover[2] DNR Forestry and Wildlife			Comparison of DNR to All Ownerships[3]	Comparison of FIA data to Original Bearing Trees		CP-PMOP Cover Type 50-year Goal
GROUP	Land Cover Class	Acres	%	Main Cover Type	Acres	%		Tree Species	Change[3]	
UPLAND DECIDUOUS	Aspen/White Birch	73,490	25.9	Aspen	8,738	15.4	-1.5	Aspen	1.77	-7.9%
				Balm of Gilead	843	1.5		Balm of Gilead	8.56	
				Birch	336	0.6		Paper Birch	1.06	PMOP -5.2%
				Offsite Aspen	0	0.0				
	Maple/Basswood	1,990	0.7	Northern Hardwoods[4]	619	1.1	1.6	Sugar Maple	-1.30	-10.8%
								Red Maple	0.00	
								Basswood	2.40	
								Yellow Birch	0.00	
	Bur/White Oak	5	0.0	Oak	75	0.1	2.0	Bur Oak	1.00	PMOP -10.9%
	Red Oak	188	0.1					Red Oak	1.50	
	Upland Deciduous	19,118	6.7	Offsite Oak	5	0.0				
	Group Sum	94,791	**33.4**	Group Sum	10,616	**18.8**	-1.8			
LOWLAND DECIDUOUS	Black Ash	3,269	1.2	Ash	2,645	4.7	4.1	Ash	5.65	-10.7%
	Lowland Deciduous	13,236	4.7	Lowland Hardwood	395	0.7	-6.7	Elm	2.50	
	Group Sum	16,506	**5.8**	Group Sum	3,040	**5.4**	-1.1			
UPLAND CONIFERS	White Pine mix	21	0.0	White Pine	76	0.1	17.9	White Pine	-2.47	112.4%
	Red Pine	34	0.0	Norway Pine[5]	1,243	2.2	182.1	Red Pine	1.53	17.1%
	Red/White Pine	8,413	3.0							
	Red/White Pine-Deciduous mix	406	0.1							
	Jack Pine	2,165	0.8	Jack Pine	1,010	1.8	2.3	Jack Pine	-1.18	84.4%
	Jack Pine-Deciduous mix	330	0.1							
	White Spruce	124	0.0	White Spruce	298	0.5	12.1	White Spruce	-6.56	2.0%
	Balsam Fir mix	5,655	2.0	Balsam Fir	709	1.3	-1.6	Balsam Fir	1.78	-3.3%
	Spruce/Fir-Deciduous mix	29	0.0							
	Upland Black Spruce	0	0.0	Black Spruce, Upland	0	0.0				0.0%
	Upland Northern White-Cedar	3,089	1.1							
	Upland Conifer	873	0.3							
	Group Sum	21,139	**7.4**	Group Sum	3,335	**5.9**	-1.3			
LOWLAND CONIFERS	Lowland Black Spruce	16,096	5.7	Black Spruce, Lowland	8,338	14.7	2.6	Black Spruce	-1.40	0.0%
	Tamarack	5,531	1.9	Tamarack	5,130	9.1	4.7	Tamarack	-5.36	5.4%
	Lowland Northern White-Cedar	7,737	2.7	Northern White Cedar	911	1.6	-1.7	Cedar	-1.35	5.3%
	Group Sum	29,364	**10.3**	Group Sum	14,380	**25.4**	2.5			
STAGNANT LOWLAND CONIFERS	Stagnant Black Spruce	0	0.0	Stagnant Spruce	4,202	7.4				
	Stagnant Tamarack	1	0.0	Stagnant Tamarack	1,204	2.1	5441.4			
	Stagnant Northern White-Cedar	0	0.0	Stagnant Cedar	2,462	4.4				
	Stagnant Conifer	10	0.0							
	Group Sum	12	**0.0**	Group Sum	7,868	**13.9**	3415.0			
SHRUBLAND	Upland Shrub	5,657	2.0	Upland Brush	18	0.0	-9.8			
				Cutover Area	96	0.2				
	Lowland Deciduous Shrub	33,385	11.8	Lowland Brush	6,071	10.7	-1.1			
	Lowland Evergreen Shrub	2,034	0.7	Muskeg	1,743	3.1	4.3			
	Group Sum	41,076	**14.5**	Group Sum	7,928	**14.0**	-1.0			
AQUATIC	Water	25,002	8.8	Permanent Water	630	1.1				
	Floating Aquatic	177	0.1	Non-Permanent Water	585	1.0				
	Broadleaf Sedge/Cattail	17,875	6.3	Marsh	4,984	8.8	1.4			
	Sedge Meadow	5,496	1.9	Lowland Grass	2,122	3.8	1.9			
	Group Sum	48,550	**17.1**	Group Sum	8,320	**14.7**	-1.2			
CROP/GRASS	Cropland	21,183	7.5	Agricultural	733	1.3	-5.8			
	Grassland	1,009	0.4	Upland Grass	155	0.3	-1.3			
	Prairie	0	0.0							
	Group Sum	22,192	**7.8**	Group Sum	888	**1.6**	-5.0			
DEVELOPED	Low Intensity Urban	463	0.2	Development[6]	96	0.2	-1.7			
	High Intensity Urban	358	0.1							
	Mixed Developed	0	0.0							
	Transportation	375	0.1	Roads	84	0.1	1.1			
	Group Sum	1,196	**0.4**	Group Sum	180	**0.3**	-1.3			
	Other[7]	9,001	3.2	Other[8]	12	0.0				
	LTA TOTAL	283,826	100.0	LTA TOTAL	56,565	100.0				

Footnotes: 1. MN GAP data on all ownerships, 2. CSA data on DNR Forestry and Wildlife administered lands, 3. Magnitude of change (ex. -2.0 is a 2-fold decline and 4.5 is a 4.5-fold increase), 4. Includes Central Hardwoods, 5. Includes Scotch Pine, 6. Includes Industrial & Urban Development and Recreation Development, 7. Includes Barren and Lowland Conifer-Deciduous mix, 8. Includes Moss and Rock Outcrop

Deer River Peatlands (212Na10)

OVERVIEW

Information presented in this document is specific to this LTA with some reference to the larger ECS subsection. This summary was written to provide additional forest management information in this landscape and includes the following main sections: overview, description, land management, and vegetation. See the LTA Assessment and Analysis Guide for section explanations, data descriptions, acronyms, and references.

DESCRIPTION

A level glacial lake basin that was formed by melt waters from the Des Moines Lobe Glacier. Uplands occupy 20 percent, wetlands occupy 77 percent, and lakes occupy 3 percent of the LTA (MN DNR, 1998). The mineral soils have fine sand (25 percent), clay (16 percent), and silt (6 percent) textures.

The upland pre-settlement vegetation was wet-mesic hardwood-conifer (spruce-fir) with minor amounts of dry pine (Marschner, 1974). Lowland pre-settlement vegetation was wet sedge meadows and conifer bog and swamp (Marschner, 1974). Historic fire regimes for the dominant upland type were 70- to 150-year forest replacement.

LAND MANAGEMENT

Land Stewardship

Based on GAP stewardship data, the majority of this LTA is state (60.9%), followed by federal (20.0%), private (17.7%), and county (1.1%). See table below. This LTA exists as two separate units within Cass and Itasca counties. The Mississippi River meanders through the LTA. Over 48,809 acres of protected waters exist inside the LTA. Lakes within or adjacent to the LTA include Bowstring, White Oak, and Little White Oak lakes.

Most of the LTA is inside Leech Lake Indian Reservation and Chippewa National Forest. The majority of forestland in the LTA is state owned. Federal, county, and private industrial lands are spread throughout. The largest block of USFS land is located in the LTA's north unit. Several tracts of Potlatch Corporation and Blandin Paper Company lands exist in the north unit of the LTA. Over 23,000 contiguous acres of Leech Lake

Indian Reservation tribal land is within the LTA's south unit. Municipalities include the town of Deer River.

Agency (%)	Acres	Percent
State (60.9%)		
DNR, Fish and Wildlife	141	0.3%
DNR, Forestry	32,353	60.4%
Other	92	0.2%
County (1.1%)		
Cass	191	0.4%
Itasca	402	0.8%
Federal (20.0%)		
Bureau of Indian Affairs	94	0.2%
Leech Lake Reservation	568	1.1%
Other	78	0.1%
U.S. Forest Service	9,956	18.6%
Private (17.7%)		
Private	7,024	13.1%
Private Industrial	2,445	4.6%
Tribal (0.4%)		
Leech Lake Reservation	205	0.4%
Grand Total	**53,549 acres**	

* note - 2,690 acres of open water are included in the table above

Natural Resource Management Units

Federal

United States Forest Service

- National Forests: Chippewa (east central)

State

Minnesota Department of Natural Resources

- State Forests: Bowstring (northeast corner)
- Wildlife Management Areas: Bowstring Deer Yard

County

None known

Other

Leech Lake Indian Reservation

VEGETATION

Pre-settlement Vegetation and Tree Species

The major Pre-settlement Vegetation types in this LTA include: Aspen-Birch (trending to Conifers) (9%), Conifer Bogs and Swamps (67%), and Wet Prairie (14%).

The following list contains the number of section corner notes from the original Public Land Survey by vegetation/landscape characteristic within this LTA, forest, timber-19, pine openings, pine barrens, scattered pine-1, thicket, brush, underbrush or only tree around-6, dry land, dry ridge, or island-1, lake, slough, pond-5, river, creek, bottom, or valley, ravine-12, marsh or swamp-200, windthrow, windfall-35, and burned area-3.

Bearing trees include: Ash-8, Aspen-28, Balm-of-Gilead-7, Balsam Fir-13, Basswood-2, Birch-15, Cedar-65, Elm-8, Oak-1, Pine-7, Jack Pine-3, Red Pine-3, White Pine-8, Spruce-117, Tamarack-322, and Willow-1.

Current Land Cover

As referenced from table on page 6:

- Top five GAP land cover classes on all ownerships (62,268 total acres):
  Lowland Black Spruce (21.1%), Lowland Deciduous Shrub (16.4%), Broadleaf Sedge/Cattail (11.2%), Aspen/White Birch (10.6%), Lowland Northern White Cedar (8.3%).

- Top five CSA main cover types on DNR Forestry and Wildlife land (35,572 total acres):
  Stagnant Spruce (23.2%), Lowland Black Spruce (14.5%), Lowland Brush (13.4%), Tamarack (13.0%), and Marsh (7.9%).

- Significant percentage differences in land cover between DNR Forestry and Wildlife land and all ownerships:
  DNR land has 3.8 times more Tamarack and 95.1 times less in the Lowland Hardwood group.

Changes in Tree Species Composition

As referenced from table on page 6, the following tree species were or are a significant component of the forest and their abundance has changed significantly since the original land survey (magnitude of change calculated by comparing FIA data to original bearing trees):

There is currently 7.8 times more Ash, 7.3 times more Balsam Fir, 4.4 times more Aspen, 3.7 times more Balm of Gilead, 2.2 times more Cedar, and 3.9 times less Tamarack in this LTA.

50-year Main Cover Type Goals

See main cover type 50-year goals in table on page 6. This LTA was not identified as a priority LTA for cover type increase.

Potential Forest Ecosystem Types and Native Plant Communities

This LTA contains the following forest ecosystem types: Forested Bog and Open Meadows. The following Native Plant Communities Classes are known to occur in this LTA **(bold text)** or occur in similar LTAs.

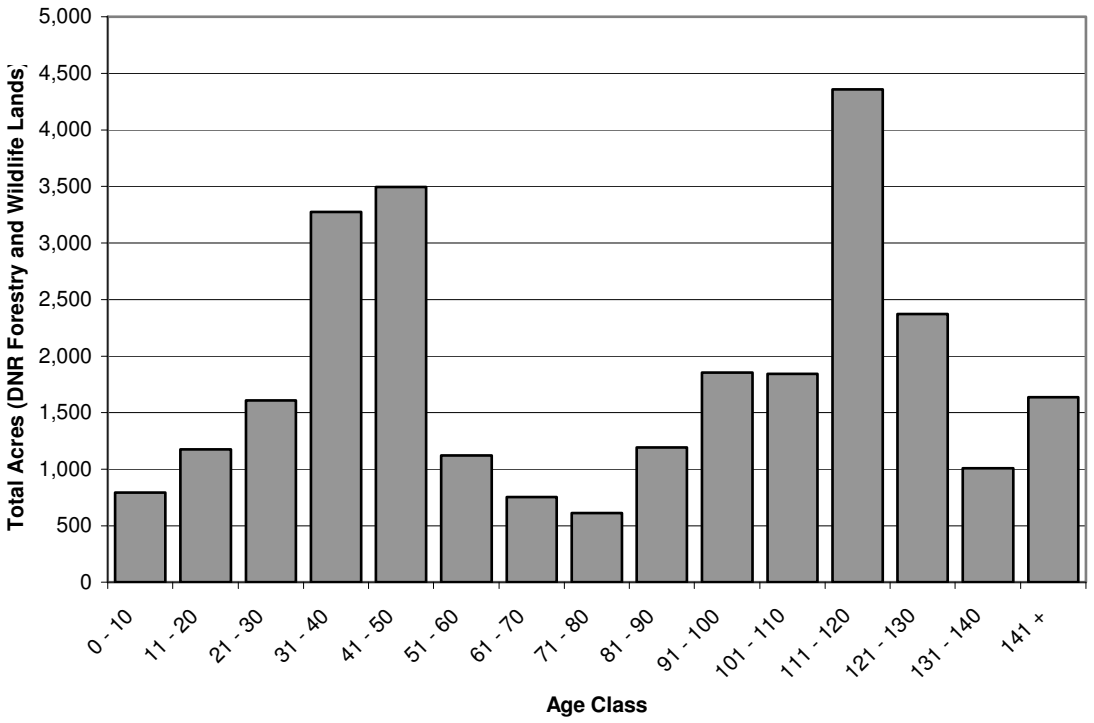
Upland Forests
MHn35
Wetland Forests
FFn57, FFn67, **WFn53, WFn55**, WFn64, FPn63, FPn82, APn80, APn81
Non-Forested Communities
APn91, OPn92, WMn82

Old Growth, Ecologically Important Lowland Conifers, and Extended Rotation Forests

This LTA contains 3 old growth stands with associated OFMCs, 2,873 acres of EILC, and 6,831 acres of ERF on DNR Forestry and Wildlife land.

Age Classes

Figure below shows age-class distribution of all forested cover types in this LTA (27,103 total acres).



Patch Dynamics

This LTA contains 8 designated forest patches on state forestry and wildlife lands. They include 7 lowland conifer patches (Little Ball Club, North Grouse Creek, Section 29,

South Bowstring, South Grouse Creek, West Rice, and White Oak) and a lowland hardwoods patch (South Chapel).

Deer River Peatlands (212Na10)

	Current GAP Land Cover[1] All Ownerships			Current CSA Land Cover[2] DNR Forestry and Wildlife			Comparison of DNR to All Ownerships[3]	Comparison of FIA data to Original Bearing Trees		CP-PMOP Cover Type 50-year Goal
GROUP	Land Cover Class	Acres	%	Main Cover Type	Acres	%		Tree Species	Change[3]	
UPLAND DECIDUOUS	Aspen/White Birch	6,579	10.6	Aspen	2,248	6.0	-1.6	Aspen	4.44	-7.9%
				Balm of Gilead	121	0.3		Balm of Gilead	3.73	
				Birch	123	0.3		Paper Birch	1.35	PMOP -5.2%
				Offsite Aspen	20	0.1				
	Maple/Basswood	83	0.1	Northern Hardwoods[4]	33	0.1	-1.5	Sugar Maple	0.00	-10.8%
								Red Maple	0.00	
								Basswood	0.00	
								Yellow Birch	0.00	
	Bur/White Oak	0	0.0	Oak	9	0.0	8.5	Bur Oak	0.00	PMOP -10.9%
	Red Oak	2	0.0					Red Oak	0.00	
	Upland Deciduous	970	1.6	Offsite Oak	0	0.0				
	Group Sum	7,634	**12.3**	Group Sum	2,554	**6.8**	-1.8			
LOWLAND DECIDUOUS	Black Ash	1,195	1.9	Ash	900	2.4	1.2	Ash	7.80	-10.7%
	Lowland Deciduous	3,712	6.0	Lowland Hardwood	24	0.1	-95.1	Elm	0.00	
	Group Sum	4,908	**7.9**	Group Sum	924	**2.5**	-3.2			
UPLAND CONIFERS	White Pine mix	0	0.0	White Pine	0	0.0		White Pine	0.00	112.4%
	Red Pine	0	0.0	Norway Pine[5]	20	0.1		Red Pine	0.00	17.1%
	Red/White Pine	270	0.4							
	Red/White Pine-Deciduous mix	22	0.0							
	Jack Pine	73	0.1	Jack Pine	0	0.0		Jack Pine	0.00	84.4%
	Jack Pine-Deciduous mix	35	0.1							
	White Spruce	6	0.0	White Spruce	22	0.1	6.4	White Spruce	0.00	2.0%
	Balsam Fir mix	711	1.1	Balsam Fir	47	0.1	-9.0	Balsam Fir	7.33	-3.3%
	Spruce/Fir-Deciduous mix	16	0.0							
	Upland Black Spruce	0	0.0	Black Spruce, Upland	0	0.0				0.0%
	Upland Northern White-Cedar	689	1.1							
	Upland Conifer	134	0.2							
	Group Sum	1,955	**3.1**	Group Sum	90	**0.2**	-13.1			
LOWLAND CONIFERS	Lowland Black Spruce	13,141	21.1	Black Spruce, Lowland	5,449	14.5	-1.5	Black Spruce	1.37	0.0%
	Tamarack	2,117	3.4	Tamarack	4,895	13.0	3.8	Tamarack	-3.87	5.4%
	Lowland Northern White-Cedar	5,159	8.3	Northern White Cedar	1,908	5.1	-1.6	Cedar	2.16	5.3%
	Group Sum	20,417	**32.8**	Group Sum	12,252	**32.6**	-1.0			
STAGNANT LOWLAND CONIFERS	Stagnant Black Spruce	0	0.0	Stagnant Spruce	8,716	23.2				
	Stagnant Tamarack	0	0.0	Stagnant Tamarack	349	0.9				
	Stagnant Northern White-Cedar	0	0.0	Stagnant Cedar	2,219	5.9				
	Stagnant Conifer	0	0.0							
	Group Sum	0	**0.0**	Group Sum	11,284	**30.0**				
SHRUBLAND	Upland Shrub	384	0.6	Upland Brush	17	0.0	-1.8			
				Cutover Area	109	0.3				
	Lowland Deciduous Shrub	10,204	16.4	Lowland Brush	5,039	13.4	-1.2			
	Lowland Evergreen Shrub	382	0.6	Muskeg	278	0.7	1.2			
	Group Sum	10,970	**17.6**	Group Sum	5,443	**14.5**	-1.2			
AQUATIC	Water	2,085	3.3	Permanent Water	419	1.1				
	Floating Aquatic	5	0.0	Non-Permanent Water	143	0.4				
	Broadleaf Sedge/Cattail	6,948	11.2	Marsh	2,975	7.9	-1.4			
	Sedge Meadow	1,440	2.3	Lowland Grass	1,363	3.6	1.6			
	Group Sum	10,477	**16.8**	Group Sum	4,900	**13.0**	-1.3			
CROP/GRASS	Cropland	919	1.5	Agricultural	0	0.0				
	Grassland	114	0.2	Upland Grass	12	0.0	-5.6			
	Prairie	0	0.0							
	Group Sum	1,033	**1.7**	Group Sum	12	**0.0**	-50.6			
DEVELOPED	Low Intensity Urban	0	0.0	Development[6]	17	0.0				
	High Intensity Urban	0	0.0							
	Mixed Developed	0	0.0							
	Transportation	9	0.0	Roads	66	0.2	12.3			
	Group Sum	9	**0.0**	Group Sum	83	**0.2**	15.4			
	Other[7]	4,866	7.8	Other[8]	31	0.1				
	LTA TOTAL	62,268	100.0	LTA TOTAL	37,572	100.0				

Footnotes: 1. MN GAP data on all ownerships, 2. CSA data on DNR Forestry and Wildlife administered lands, 3. Magnitude of change (ex. -2.0 is a 2-fold decline and 4.5 is a 4.5-fold increase), 4. Includes Central Hardwoods, 5. Includes Scotch Pine, 6. Includes Industrial & Urban Development and Recreation Development, 7. Includes Barren and Lowland Conifer-Deciduous mix, 8. Includes Moss and Rock Outcrop

Bowstring Till Plain (212Na11)

OVERVIEW

Information presented in this document is specific to this LTA with some reference to the larger ECS subsection. This summary was written to provide additional forest management information in this landscape and includes the following main sections: overview, description, land management, and vegetation. See the LTA Assessment and Analysis Guide for section explanations, data descriptions, acronyms, and references.

DESCRIPTION

A nearly level to rolling landscape formed in till and sand-capped till. Uplands occupy 90 percent, wetlands occupy 10 percent, and lakes occupy less than 1 percent of the LTA (MN DNR, 1998). Soil parent materials have loam and clay loam textures in the northwestern half and along the lake. The southeast half has 20 to 40 inches of sand over the loamy till (Itasca County Soil Survey).

The majority of the upland pre-settlement vegetation was wet-mesic hardwood-conifer (pine) and mesic northern hardwoods (Shadis, 1999 and Marschner, 1974). The dominant lowland pre-settlement vegetation was wet meadows or conifer bog and swamp (Marschner, 1974). Historic fire regimes for the dominant upland types were a) 150- to 350-year forest replacement and b) 250- to 1,000-year forest replacement, respectively.

The majority of the upland pre-settlement vegetation was aspen-birch (trending to conifers) and Big Woods—Hardwoods (Marschner, 1974). The dominant lowland pre-settlement vegetation was wet meadows or conifer bog and swamp (Marschner, 1974).

LAND MANAGEMENT

Land Stewardship

Based on GAP stewardship data, the majority of this LTA is federal (45.3%), followed by private (41.8%), state (10.7%), and county (2.2%). See table below. This LTA is located in west central Itasca County. Over 57 acres of protected waters exist within the LTA. Bowstring Lake borders the LTA's southeast and southwest side.

Parts of the LTA are inside Leech Lake Indian Reservation and Chippewa National Forest. Federal, state, and county lands are spread throughout the LTA. Large tracts of contiguous USFS land are present from end to end. The majority of state lands are located in the LTA's southeast portion. No municipalities are located within the LTA.

Agency (%)	Acres	Percent
State (10.7%)		
DNR, Forestry	198	10.7%
County (2.2%)		
Itasca	41	2.2%
Federal (45.3%)		
Bureau of Indian Affairs	52	2.8%
Other	42	2.2%
U.S. Forest Service	744	40.2%
Private (41.8%)		
Private	738	39.9%
Private Industrial	36	2.0%
Grand Total	**1,851 acres**	

* note – 5 acres of open water are included in the table above

Natural Resource Management Units

Federal

United States Forest Service

- National Forests: Chippewa (northeast corner)

State

Minnesota Department of Natural Resources

- State Forests: Bowstring (northeast corner)

County

None known

Other

Leech Lake Indian Reservation

VEGETATION

Pre-settlement Vegetation and Tree Species

The major Pre-settlement Vegetation types in this LTA include: Aspen-Birch (trending to Conifers) (44%), Big Woods - Hardwoods (oak, maple, basswood, hickory) (31%), and Wet Prairie (25%).

The following list contains the number of section corner notes from the original Public Land Survey by vegetation/landscape characteristic within this LTA, forest, timber-3, scattering oak, scattering timber-1, and marsh or swamp-2.

Bearing trees include: Balsam Fir-1, Birch-3, Cedar-1, Sugar Maple-4, White Pine-1, Spruce-1, and Tamarack-3.

Current Land Cover

As referenced from table on page 5:

- Top five GAP land cover classes on all ownerships (1,854 total acres):
  Aspen/White Birch (69.9%), Upland Deciduous (8.3%), Cropland (5.2%), Lowland Deciduous (3.3%), and Upland Shrub (3.2%).

- Top five CSA main cover types on DNR Forestry and Wildlife land (210 total acres):
  Aspen (69.6%), Northern Hardwoods (9.7%), Lowland Brush (7.5%), Stagnant Cedar (5.0%), and Lowland Black Spruce (5.0%).

- Significant percentage differences in land cover between DNR Forestry and Wildlife land and all ownerships:
  DNR land has 12.3 times more Lowland Black Spruce, 6.7 times more Northern Hardwoods, and 2.4 times more in the Lowland Brush group.

Changes in Tree Species Composition

As referenced from table on page 5, the following tree species were or are a significant component of the forest and their abundance has changed significantly since the original land survey (magnitude of change calculated by comparing FIA data to original bearing trees):

There is currently 2.8 times less Paper Birch in this LTA.

50-year Main Cover Type Goals

See main cover type 50-year goals in table on page 5. This LTA was not identified as a priority LTA for cover type increase.

Potential Forest Ecosystem Types and Native Plant Communities

This LTA contains the following forest ecosystem types: Dry-Mesic Pine/Oak. The following Native Plant Communities Classes are known to occur in this LTA **(bold text)** or occur in similar LTAs.

Upland Forests

FDn12, FDn33, FDn43, FDc34**, MHn35, MHn44, MHn46, MHn47,** MHc26

Wetland Forests

FFn57, FFn67, WFn53**, WFn55,WFn64, FPn63,** FPn82, **APn80,** APn81

Non-Forested Communities

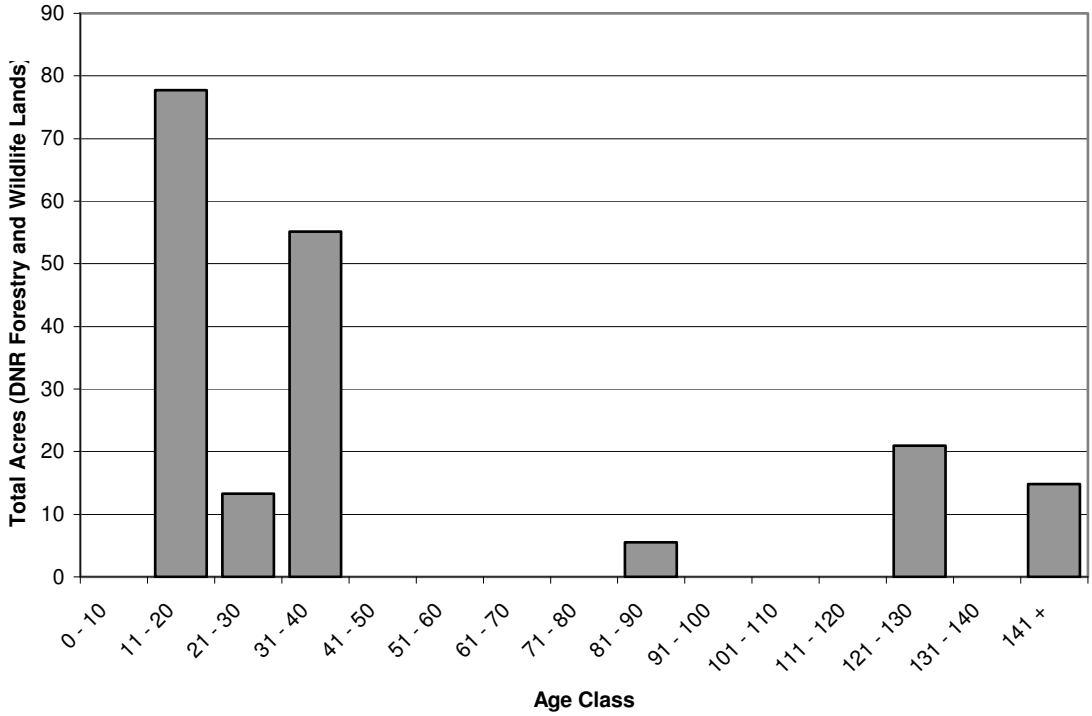
APn90, APn91, MRn83, OPn81, OPn91, OPn92, WMn73, WMn82, FPn73

Old Growth, Ecologically Important Lowland Conifers, and Extended Rotation Forests

This LTA contains no old growth stands or associated OFMCs, 11 acres of EILC, and 11 acres of ERF on DNR Forestry and Wildlife land.

Age Classes

Figure below shows age-class distribution of all forested cover types in this LTA (188 total acres).



Patch Dynamics

This LTA contains no designated forest patches on state forestry and wildlife lands.

Bowstring Till Plain (212Na11)										
	Current GAP Land Cover[1] All Ownerships			Current CSA Land Cover[2] DNR Forestry and Wildlife			Comparison of DNR to All Ownerships[3]	Comparison of FIA data to Original Bearing Trees		CP-PMOP Cover Type 50-year Goal
GROUP	Land Cover Class	Acres	%	Main Cover Type	Acres	%		Tree Species	Change[3]	
UPLAND DECIDUOUS	Aspen/White Birch	1,296	69.9	Aspen	146	69.6	-1.0	Aspen	0.00	-7.9%
				Balm of Gilead	0	0.0		Balm of Gilead	0.00	
				Birch	0	0.0		Paper Birch	-2.78	PMOP -5.2%
				Offsite Aspen	0	0.0				
	Maple/Basswood	27	1.4	Northern Hardwoods[4]	20	9.7	6.7	Sugar Maple	1.08	-10.8%
								Red Maple	0.00	
								Basswood	0.00	
								Yellow Birch	0.00	
	Bur/White Oak	0	0.0	Oak	0	0.0		Bur Oak	0.00	PMOP -10.9%
	Red Oak	0	0.0					Red Oak	0.00	
	Upland Deciduous	153	8.3	Offsite Oak	0	0.0				
	Group Sum	1,476	**79.6**	Group Sum	167	**79.3**	-1.0			
LOWLAND DECIDUOUS	Black Ash	3	0.2	Ash	0	0.0		Ash	0.00	-10.7%
	Lowland Deciduous	62	3.3	Lowland Hardwood	0	0.0		Elm	0.00	
	Group Sum	65	**3.5**	Group Sum	0	**0.0**				
UPLAND CONIFERS	White Pine mix	0	0.0	White Pine	0	0.0		White Pine	0.00	112.4%
	Red Pine	0	0.0	Norway Pine[5]	0	0.0		Red Pine	0.00	17.1%
	Red/White Pine	23	1.2							
	Red/White Pine-Deciduous mix	4	0.2							
	Jack Pine	0	0.0	Jack Pine	0	0.0		Jack Pine	0.00	84.4%
	Jack Pine-Deciduous mix	1	0.0							
	White Spruce	0	0.0	White Spruce	0	0.0		White Spruce	0.00	2.0%
	Balsam Fir mix	24	1.3	Balsam Fir	0	0.0		Balsam Fir	0.00	-3.3%
	Spruce/Fir-Deciduous mix	0	0.0							
	Upland Black Spruce	0	0.0	Black Spruce, Upland	0	0.0				0.0%
	Upland Northern White-Cedar	13	0.7							
	Upland Conifer	2	0.1							
	Group Sum	66	**3.6**	Group Sum	0	**0.0**				
LOWLAND CONIFERS	Lowland Black Spruce	8	0.4	Black Spruce, Lowland	11	5.0	12.3	Black Spruce	0.00	0.0%
	Tamarack	0	0.0	Tamarack	0	0.0		Tamarack	0.00	5.4%
	Lowland Northern White-Cedar	4	0.2	Northern White Cedar	0	0.0		Cedar	0.00	5.3%
	Group Sum	11	**0.6**	Group Sum	11	**5.0**	8.2			
STAGNANT LOWLAND CONIFERS	Stagnant Black Spruce	0	0.0	Stagnant Spruce	0	0.0				
	Stagnant Tamarack	0	0.0	Stagnant Tamarack	0	0.0				
	Stagnant Northern White-Cedar	0	0.0	Stagnant Cedar	10	5.0				
	Stagnant Conifer	0	0.0							
	Group Sum	0	**0.0**	Group Sum	10	**5.0**				
SHRUBLAND	Upland Shrub	59	3.2	Upland Brush	0	0.0				
				Cutover Area	0	0.0				
	Lowland Deciduous Shrub	57	3.1	Lowland Brush	16	7.5	2.4			
	Lowland Evergreen Shrub	4	0.2	Muskeg	0	0.0				
	Group Sum	120	**6.5**	Group Sum	16	**7.5**	1.2			
AQUATIC	Water	5	0.3	Permanent Water	0	0.0				
	Floating Aquatic	0	0.0	Non-Permanent Water	4	1.9				
	Broadleaf Sedge/Cattail	6	0.3	Marsh	0	0.0				
	Sedge Meadow	0	0.0	Lowland Grass	0	0.0				
	Group Sum	11	**0.6**	Group Sum	4	**1.9**	3.2			
CROP/GRASS	Cropland	96	5.2	Agricultural	0	0.0				
	Grassland	3	0.1	Upland Grass	0	0.0				
	Prairie	0	0.0							
	Group Sum	99	**5.3**	Group Sum	0	**0.0**				
DEVELOPED	Low Intensity Urban	0	0.0	Development[6]	0	0.0				
	High Intensity Urban	0	0.0							
	Mixed Developed	0	0.0							
	Transportation	1	0.1	Roads	3	1.3	22.3			
	Group Sum	1	**0.1**	Group Sum	3	**1.3**	22.3			
	Other[7]	4	0.2	Other[8]	0	0.0				
	LTA TOTAL	1,854	100.0	LTA TOTAL	210	100.0				

Footnotes: 1. MN GAP data on all ownerships, 2. CSA data on DNR Forestry and Wildlife administered lands, 3. Magnitude of change (ex. -2.0 is a 2-fold decline and 4.5 is a 4.5-fold increase), 4. Includes Central Hardwoods, 5. Includes Scotch Pine, 6. Includes Industrial & Urban Development and Recreation Development, 7. Includes Barren and Lowland Conifer-Deciduous mix, 8. Includes Moss and Rock Outcrop

Blackduck Till Plain (212Na16)

OVERVIEW

Information presented in this document is specific to this LTA with some reference to the larger ECS subsection. This summary was written to provide additional forest management information in this landscape and includes the following main sections: overview, description, land management, and vegetation. See the LTA Assessment and Analysis Guide for section explanations, data descriptions, acronyms, and references.

DESCRIPTION

A nearly level to rolling till plain formed by the Koochiching Lobe Glacier. Uplands occupy 66 percent, wetlands occupy 30 percent, and lakes occupy 4 percent of the LTA (MN DNR, 1998). Small wet depressions that are dry in the summer are common. Intermittent streams are commonly present in areas where the loamy till is near or at the surface. There are 0.5 miles of streams per square mile. The majority of upland soils have loam to clay loam textures. A cap of sandy material is commonly found on the surface.

The dominant upland pre-settlement vegetation was wet-mesic hardwood-conifer (spruce-fir) (Shadis, 1999 and Marschner, 1974). Lowland pre-settlement vegetation was conifer bog and swamp (Marschner, 1974). Historic fire regime for the dominant upland type was 70- to 150-year forest replacement (Shadis, 1999).

LAND MANAGEMENT

Land Stewardship

Based on GAP stewardship data, the majority of this LTA is private (51.5%), followed by federal (25.8%), state (12.6%), and county (10.0%). See table below. This LTA exists as four separate units within Beltrami, Itasca, and Koochiching counties. Over 72,353 acres of protected waters are present inside the LTA. Lakes within or adjacent to the LTA include Blackduck, Island, Sand, and Jessie.

Parts of the LTA are in Leech Lake Indian Reservation and Chippewa National Forest. Federal, state, county, and private industrial lands are scattered throughout the LTA. Large contiguous tracts of USFS lands are evident in all four LTA units. The majority of

private industrial forestlands, which includes Boise Cascade Corporation, Potlatch Corporation, Blandin Paper Company, and Boundary Company, Inc. parcels, are located in the LTA's north unit. Municipalities include Blackduck, Kelliher, Tenstrike, Funkley, Squaw Lake, Northome, and Mizpah.

Agency (%)	Acres	Percent
State (12.6%)		
DNR, Ecological Resources	224	0.1%
DNR, Fish and Wildlife	1,432	0.5%
DNR, Forestry	32,531	12.0%
Other	66	0.0%
State (Undifferentiated)	25	0.0%
County (10.0%)		
Beltrami	13,103	4.8%
Itasca	825	0.3%
Koochiching	13,072	4.8%
Federal (25.8%)		
Bureau of Indian Affairs	496	0.2%
Farmers Home Administration	1,142	0.4%
Leech Lake Reservation	68	0.0%
Other	443	0.2%
U.S. Forest Service	67,644	25.0%
Other Public (0.0%)		
School District	79	0.0%
Private (51.5%)		
Private	112,328	41.4%
Private Industrial	23,238	8.6%
Private Other	3,949	1.5%
Tribal (0.1%)		
Leech Lake Reservation	346	0.1%
Grand Total	**271,011 acres**	

* note - 12,966 acres of open water are included in the table above

Natural Resource Management Units

Federal

United States Forest Service

- National Forests: Chippewa (northwest, north central, northeast, east central)

State

Minnesota Department of Natural Resources

- State Forests: Blackduck (west/northwest, north/north central, east/northeast), Bowstring (north/northeast), Big Fork (west/southwest, south/southeast), Buena Vista (north/northeast), Red Lake (southeast corner), Pine Island (southwest corner)
- Wildlife Management Areas: Carmen Borgerding, Dishpan, Bowstring Deer Yard, Squaw Lake Deer Yard
- Aquatic Management Areas: Blackduck Lake

- Fish Management Areas: Island Lake, Bender
- Scientific and Natural Areas: Lost Forty

County

None known

Other

Leech Lake Indian Reservation

VEGETATION

Pre-settlement Vegetation and Tree Species

The major Pre-settlement Vegetation types in this LTA include: Aspen-Birch (trending to Conifers) (70%), and Conifer Bogs and Swamps (19%).

The following list contains the number of section corner notes from the original Public Land Survey by vegetation/landscape characteristic within this LTA, forest, timber-875, scattering oak, scattering timber-3, thicket, brush, underbrush or only tree around-6, dry land, dry ridge, or island-5, lake, slough, pond-34, river, creek, bottom, or valley, ravine-9, marsh or swamp-375, meadow-3, wet prairie or prairie-1, windthrow, windfall-18, and burned area-8.

Bearing trees include: Ash-51, Black Ash-15, Aspen-392, Balm-of-Gilead-30, Balsam Fir-361, Basswood-57, Birch-448, Yellow Birch-1, Cedar-360, Cottonwood-4, Elm-69, Ironwood-6, Maple-38, Sugar Maple-27, Oak-8, Bur Oak-1, Northern Pin Oak-3, Pine-6, Jack Pine-25, Red Pine-67, White Pine-172, Spruce-523, Black Spruce –5, Tamarack-647, and Willow-7.

Current Land Cover

As referenced from table on page 6:

- Top five GAP land cover classes on all ownerships (290,519 total acres):
  Aspen/White Birch (33.3%), Cropland (12.8%), Lowland Deciduous Shrub (12.4%), Upland Deciduous (11.7%), and Lowland Deciduous (6.0%).

- Top five CSA main cover types on DNR Forestry and Wildlife land (9,748 total acres):
  Aspen (34.0%), Lowland Brush (14.3%), Lowland Black Spruce (7.7%), Ash (5.7%), and Tamarack (5.3%).

- Significant percentage differences in land cover between DNR Forestry and Wildlife land and all ownerships:
  DNR land has 10.6 times more Ash, 5.3 times more Tamarack, 4.4 times more Northern White Cedar, 3.5 times more Lowland Black Spruce, and 51.7 times less in the Lowland Hardwood group.

Changes in Tree Species Composition

As referenced from table on page 6, the following tree species were or are a significant component of the forest and their abundance has changed significantly since the original land survey (magnitude of change calculated by comparing FIA data to original bearing trees):

There is currently 10.5 times more Balm of Gilead, 3.4 times more Ash, 2.8 times more Aspen, 2.5 times more Bur Oak, 2.1 times more Elm, 2.0 times more Sugar Maple, 2.0 times more Basswood, 2.2 times less Black Spruce, 2.4 times less Red Pine, 5.9 times less Tamarack, and 6.3 times less White Spruce in this LTA.

50-year Main Cover Type Goals

See main cover type 50-year goals in table on page 6. This is a priority LTA for White Spruce, Tamarack, and Northern White Cedar cover type increase.

Potential Forest Ecosystem Types and Native Plant Communities

This LTA contains the following forest ecosystem types: Dry-Mesic Pine/Oak, Mesic Northern Hardwood, Boreal Hardwood Conifer, and White Cedar Swamp. The following Native Plant Communities Classes are known to occur in this LTA **(bold text)** or occur in similar LTAs.

Upland Forests
FDn12, FDn33, FDn43, **MHn35, MHn44, MHn46, MHn47**

Wetland Forests
FFn57, FFn67, WFn53, **WFn55, WFn64, FPn63**, FPn82, **APn80**

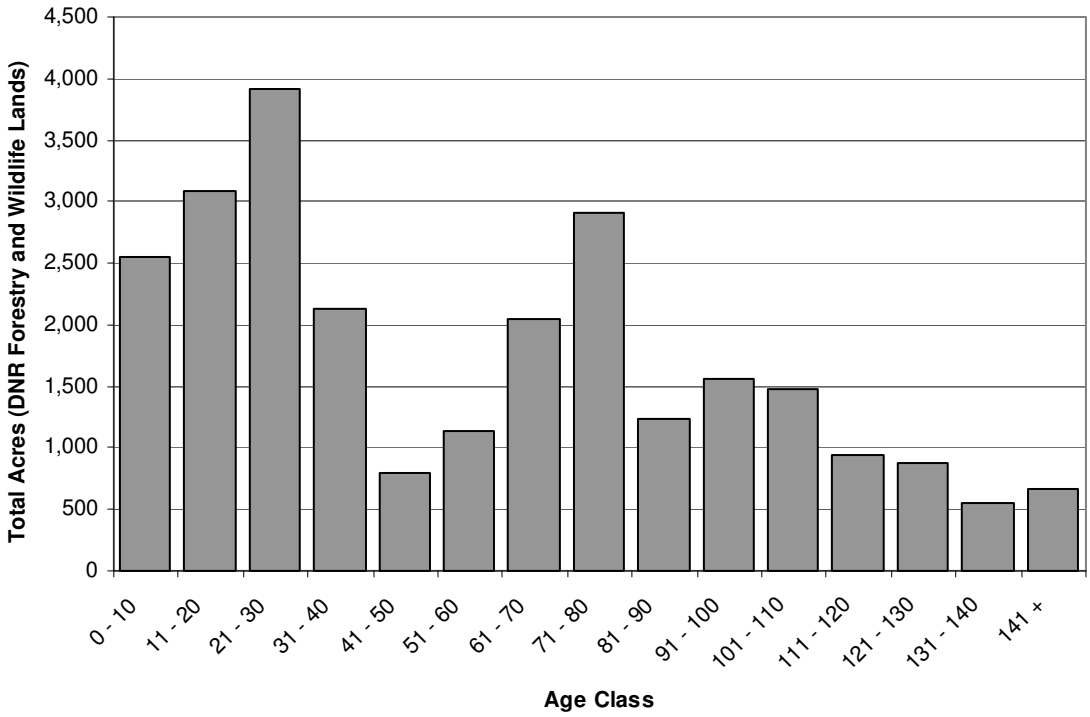
Non-Forested Communities
APn90, APn91, MRn83, OPn81, OPn91, **OPn92, WMn73, WMn82, FPn73**

Old Growth, Ecologically Important Lowland Conifers, and Extended Rotation Forests

This LTA contains 4 old growth stands with associated OFMCs, 552 acres of EILC, and 8,130 acres of ERF on DNR Forestry and Wildlife land.

Age Classes

Figure below shows age-class distribution of all forested cover types in this LTA (25,881 total acres).



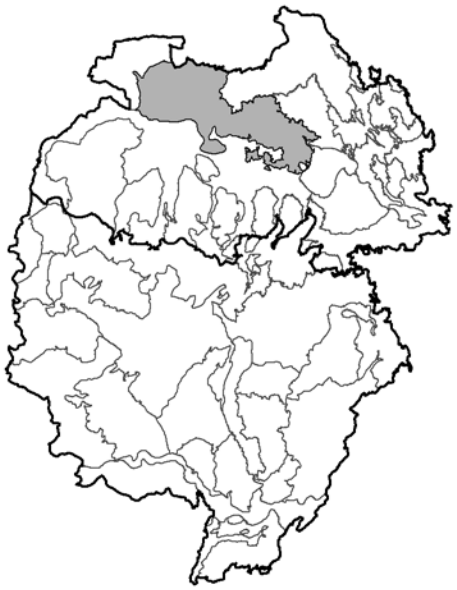
Patch Dynamics

This LTA contains 10 designated forest patches on state forestry and wildlife lands. They include 5 upland hardwood patches (Little Constance, Squaw Lake, County 29, Blue Ox, and Cloverleaf), a lowland conifers patch (County 36), and 4 lowland hardwood patches (South Chapel, Cormant River Headwaters, Popple River, and West Six).

Blackduck Till Plain (212Na16)										
	Current GAP Land Cover[1] All Ownerships			Current CSA Land Cover[2] DNR Forestry and Wildlife			Comparison of DNR to All Ownerships[3]	Comparison of FIA data to Original Bearing Trees		CP-PMOP Cover Type 50-year Goal
GROUP	Land Cover Class	Acres	%	Main Cover Type	Acres	%		Tree Species	Change[3]	
UPLAND DECIDUOUS	Aspen/White Birch	96,783	33.3	Aspen	12,086	34.0	1.1	Aspen	2.79	-7.9%
				Balm of Gilead	642	1.8		Balm of Gilead	10.50	
				Birch	500	1.4		Paper Birch	-1.60	PMOP -5.2%
				Offsite Aspen	0	0.0				
	Maple/Basswood	8,290	2.9	Northern Hardwoods[4]	1,567	4.4	1.5	Sugar Maple	2.00	-10.8%
								Red Maple	0.00	
								Basswood	2.00	
								Yellow Birch	0.00	
	Bur/White Oak	0	0.0	Oak	24	0.1	-2.4	Bur Oak	2.50	PMOP -10.9%
	Red Oak	483	0.2					Red Oak	0.00	
	Upland Deciduous	33,864	11.7	Offsite Oak	0	0.0				
	Group Sum	139,421	**48.0**	Group Sum	14,819	**41.7**	-1.1			
LOWLAND DECIDUOUS	Black Ash	1,558	0.5	Ash	2,012	5.7	10.6	Ash	3.42	-10.7%
	Lowland Deciduous	17,491	6.0	Lowland Hardwood	41	0.1	-51.7	Elm	2.10	
	Group Sum	19,050	**6.6**	Group Sum	2,053	**5.8**	-1.1			
UPLAND CONIFERS	White Pine mix	6	0.0	White Pine	12	0.0	17.7	White Pine	0.00	112.4%
	Red Pine	0	0.0	Norway Pine[5]	152	0.4		Red Pine	-2.38	17.1%
	Red/White Pine	3,878	1.3							
	Red/White Pine-Deciduous mix	400	0.1							
	Jack Pine	1,092	0.4	Jack Pine	4	0.0	-36.9	Jack Pine	0.00	84.4%
	Jack Pine-Deciduous mix	282	0.1							
	White Spruce	124	0.0	White Spruce	224	0.6	14.8	White Spruce	-6.25	2.0%
	Balsam Fir mix	3,605	1.2	Balsam Fir	621	1.7	1.4	Balsam Fir	1.33	-3.3%
	Spruce/Fir-Deciduous mix	31	0.0							
	Upland Black Spruce	0	0.0	Black Spruce, Upland	0	0.0				0.0%
	Upland Northern White-Cedar	1,992	0.7							
	Upland Conifer	414	0.1							
	Group Sum	11,825	**4.1**	Group Sum	1,014	**2.9**	-1.4			
LOWLAND CONIFERS	Lowland Black Spruce	6,437	2.2	Black Spruce, Lowland	2,719	7.7	3.5	Black Spruce	-2.19	0.0%
	Tamarack	2,873	1.0	Tamarack	1,867	5.3	5.3	Tamarack	-5.88	5.4%
	Lowland Northern White-Cedar	2,583	0.9	Northern White Cedar	1,392	3.9	4.4	Cedar	-1.96	5.3%
	Group Sum	11,892	**4.1**	Group Sum	5,978	**16.8**	4.1			
STAGNANT LOWLAND CONIFERS	Stagnant Black Spruce	0	0.0	Stagnant Spruce	1,088	3.1				
	Stagnant Tamarack	0	0.0	Stagnant Tamarack	252	0.7				
	Stagnant Northern White-Cedar	0	0.0	Stagnant Cedar	677	1.9				
	Stagnant Conifer	0	0.0							
	Group Sum	0	**0.0**	Group Sum	2,017	**5.7**				
SHRUBLAND	Upland Shrub	4,383	1.5	Upland Brush	11	0.0	-2.8			
				Cutover Area	182	0.5				
	Lowland Deciduous Shrub	36,166	12.4	Lowland Brush	5,078	14.3	1.1			
	Lowland Evergreen Shrub	433	0.1	Muskeg	401	1.1	7.6			
	Group Sum	40,981	**14.1**	Group Sum	5,672	**16.0**	1.1			
AQUATIC	Water	13,850	4.8	Permanent Water	581	1.6				
	Floating Aquatic	13	0.0	Non-Permanent Water	1,601	4.5				
	Broadleaf Sedge/Cattail	6,681	2.3	Marsh	1,135	3.2	1.4			
	Sedge Meadow	2,514	0.9	Lowland Grass	438	1.2	1.4			
	Group Sum	23,059	**7.9**	Group Sum	3,755	**10.6**	1.3			
CROP/GRASS	Cropland	37,077	12.8	Agricultural	43	0.1	-105.9			
	Grassland	665	0.2	Upland Grass	53	0.2	-1.5			
	Prairie	0	0.0							
	Group Sum	37,742	**13.0**	Group Sum	96	**0.3**	-48.0			
DEVELOPED	Low Intensity Urban	408	0.1	Development[6]	34	0.1	-2.8			
	High Intensity Urban	371	0.1							
	Mixed Developed	0	0.0							
	Transportation	1,113	0.4	Roads	48	0.1	-2.8			
	Group Sum	1,891	**0.7**	Group Sum	82	**0.2**	-2.8			
	Other[7]	4,659	1.6	Other[8]	14	0.0				
	LTA TOTAL	290,519	100.0	LTA TOTAL	35,500	100.0				

Footnotes: 1. MN GAP data on all ownerships, 2. CSA data on DNR Forestry and Wildlife administered lands, 3. Magnitude of change (ex. -2.0 is a 2-fold decline and 4.5 is a 4.5-fold increase), 4. Includes Central Hardwoods, 5. Includes Scotch Pine, 6. Includes Industrial & Urban Development and Recreation Development, 7. Includes Barren and Lowland Conifer-Deciduous mix, 8. Includes Moss and Rock Outcrop

Blackduck Moraine (212Na18)



OVERVIEW

Information presented in this document is specific to this LTA with some reference to the larger ECS subsection. This summary was written to provide additional forest management information in this landscape and includes the following main sections: overview, description, land management, and vegetation. See the LTA Assessment and Analysis Guide for section explanations, data descriptions, acronyms, and references.

DESCRIPTION

A rolling to steep end moraine formed by the Koochiching Lobe Glacier. Uplands occupy 63 percent, wetlands occupy 28 percent, and lakes occupy 9 percent of the LTA (MN DNR, 1998). Soil parent material is loam to clay loam till.

The dominant upland pre-settlement vegetation was dry-mesic (red and white) pine forest, wet-mesic hardwood-conifer (spruce-fir) forest, and wet-mesic hardwood/conifer (white pine) forest, (Shadis, 1999 and Marschner, 1974). The majority of lowland pre-settlement vegetation was conifer bog and swamp (Marschner, 1974). Historic fire regimes for the dominant upland types were a) 150- to 350-year forest replacement with five- to 50-year forest maintenance, b) 70- to 150-year forest replacement, and c) 250- to 1,000-year forest replacement, respectively (Shadis, 1999).

LAND MANAGEMENT

Land Stewardship

Based on GAP stewardship data, the majority of this LTA is private (42.3%), followed by federal (22.4%), county (21.5%), and state (13.7%). See table below. This LTA exists as six separate units within Beltrami and Itasca counties. Three of the LTA's six units are less than 25 acres each in size. The Mississippi River flows through the LTA. Over 88,763 acres of protected waters exist inside the LTA. Lakes within or adjacent to the LTA include Puposky, Big, Cass, and Winnibigoshish.

Parts of the LTA are inside Leech Lake and Chippewa National Forest. Federal, state, county, and private industrial lands are distributed throughout the LTA. Large tracts of

contiguous USFS lands occur primarily in the LTA's central and east portions. The majority of state lands are located in the LTA's east half, while most county lands occur in the west half. Very little private industrial forestlands exist. Municipalities include Tenstrike and Turtle River.

Agency (%)	Acres	Percent
State (13.7%)		
DNR, Fish and Wildlife	3,018	1.2%
DNR, Forestry	32,567	12.5%
DNR, Parks	198	0.1%
County (21.5%)		
Beltrami	55,129	21.1%
Itasca	795	0.3%
Lakes and Rivers	261	0.1%
Federal (22.4%)		
Bureau of Indian Affairs	820	0.3%
Bureau of Land Management	16	0.0%
Leech Lake Reservation	85	0.0%
Other	1,173	0.4%
U.S. Forest Service	56,320	21.6%
Private (42.3%)		
Private	110,237	42.3%
Private Industrial	211	0.1%
Tribal (0.0%)		
Leech Lake Reservation	43	0.0%
Grand Total	**260,873 acres**	

* note - 27,084 acres of open water are included in the table above

Natural Resource Management Units

Federal

United States Forest Service

- National Forests: Chippewa (northwest corner)

State

Minnesota Department of Natural Resources

- State Forests: Blackduck (west half), Bowstring (northwest corner), Mississippi Headwaters (extreme north portion), Buena Vista (nearly all)
- Wildlife Management Areas: James B. Fern, Sugar Lake, Long Lake, Morph Meadows
- Scientific and Natural Areas: Pennington Bog
- State Parks: Lake Bemidji

County

None known

Other

Leech Lake Indian Reservation

VEGETATION

Pre-settlement Vegetation and Tree Species

The major Pre-settlement Vegetation types in this LTA include: Aspen-Birch (trending to Conifers) (21%), Conifer Bogs and Swamps (25%), Lakes (open water) (6%), Mixed Hardwood and Pine (Maple, White Pine, Basswood, etc) (10%), and Mixed White Pine and Red Pine (26%).

The following list contains the number of section corner notes from the original Public Land Survey by vegetation/landscape characteristic within this LTA, forest, timber-749, pine openings, pine barrens, scattered pine-12, scattering oak, scattering timber-19, thicket, brush, underbrush or only tree around-21, dry land, dry ridge, or island-16, lake, slough, pond-132, river, creek, bottom, or valley, ravine-8, marsh or swamp-358, meadow-2, windthrow, windfall-48, and burned area-74.

Bearing trees include: Ash-45, Black Ash-4, Aspen-418, Balm-of-Gilead-23, Balsam Fir-157, Basswood-52, Birch-378, Cedar-229, Elm-95, Ironwood-13, Maple-69, Sugar Maple-22, Oak-61, Bur Oak-17, Red Oak-6, Pine-51, Jack Pine-120, Red Pine-259, White Pine-309, Spruce-163, Black Spruce –4, Tamarack-729, and Willow-2.

Current Land Cover

As referenced from table on page 6:

- Top five GAP land cover classes on all ownerships (304,462 total acres):
  Aspen/White Birch (25.4%), Upland Deciduous (12.8%), Cropland (12.5%), Lowland Deciduous Shrub (10.3%), and Water (8.1%).

- Top five CSA main cover types on DNR Forestry and Wildlife land (44,610 total acres):
  Aspen (29.8 %), Marsh (13.5%), Lowland Brush (10.1%), Tamarack (8.9%), and Northern Hardwoods (5.5%).

- Significant percentage differences in land cover between DNR Forestry and Wildlife land and all ownerships:
  DNR land has 12.6 times more Tamarack, 3.9 times more Northern White Cedar, 2.9 times more Marsh, 1.4 times more Lowland Black Spruce, and 1.0 times less in the Lowland Brush group.

Changes in Tree Species Composition

As referenced from table on page 6, the following tree species were or are a significant component of the forest and their abundance has changed significantly since the original land survey (magnitude of change calculated by comparing FIA data to original bearing trees):

There is currently 6.5 times more Basswood, 6.3 times more Balm of Gilead, 4.2 times more Ash, 2.5 times more Black Spruce, 2.4 times more Sugar Maple, 2.2 times more Red Oak, 2.1 times more Aspen, 2.0 times more Elm, 2.4 times less White Spruce, 5.9 times less Tamarack, 6.3 times less Red Pine, 10.7 times less White Pine, and 20.0 times less Jack Pine in this LTA.

50-year Main Cover Type Goals

See main cover type 50-year goals in table on page 6. This is a priority LTA for White Pine, White Spruce, and Tamarack cover type increase.

Potential Forest Ecosystem Types and Native Plant Communities

This LTA contains the following forest ecosystem types: Dry Pine, Dry-Mesic Pine, Dry-Mesic Pine/Oak, Mesic Northern Hardwood, and Boreal Hardwood Conifer. The following Native Plant Communities Classes are known to occur in this LTA **(bold text)** or occur in similar LTAs.

Upland Forests

FDn12, FDn33, FDc12**, FDc34, MHn35, MHn44**, MHn46, **MHn47, MHc26,** MHc37

Wetland Forests

FFn57, FFn67, **WFn53,** WFn55**, WFn64, FPn63, FPn82, APn80,** APn81

Non-Forested Communities

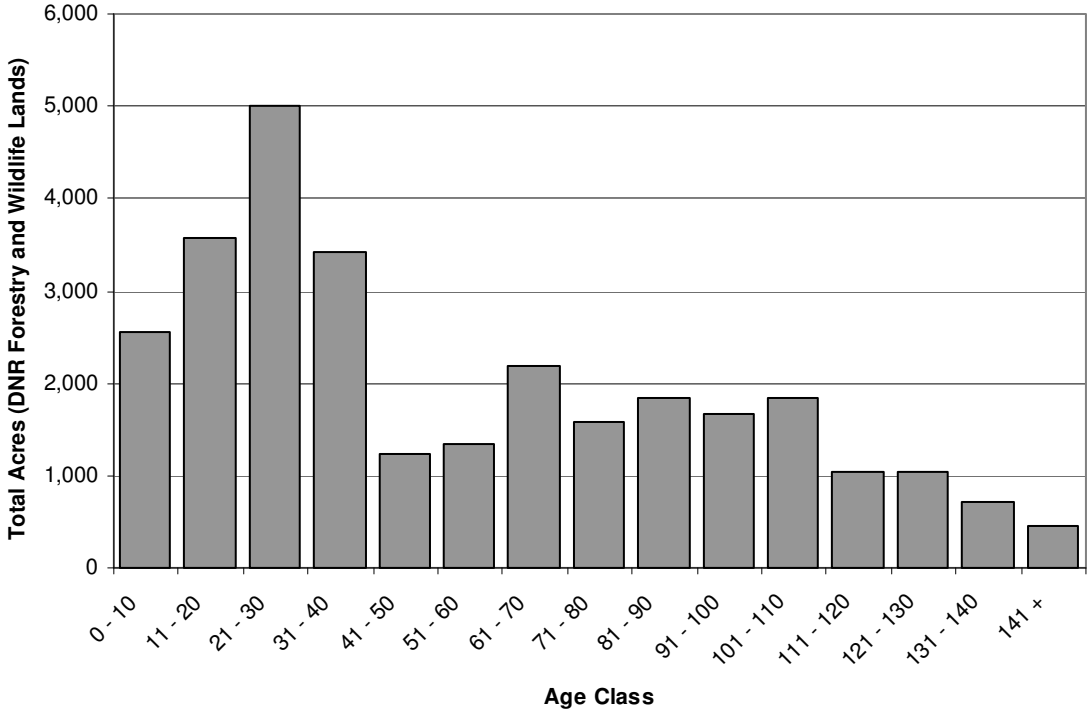
APn91, OPn92, WMn73, WMn82, FPn73

Old Growth, Ecologically Important Lowland Conifers, and Extended Rotation Forests

This LTA contains 30 old growth stands with associated OFMCs, 972 acres of EILC, and 8,181 acres of ERF on DNR Forestry and Wildlife land.

Age Classes

Figure below shows age-class distribution of all forested cover types in this LTA (29,518 total acres).



Patch Dynamics

This LTA contains 12 designated forest patches on state forestry and wildlife lands. They include 10 upland hardwood patches (Little Moose Lake, No Name Lake, Medicine Lake, Durand Hardwoods North, Rabideau, Durand Hardwoods South, Range Line Lake, Moose Lake Hardwoods, Castle Creek, and Morff) and 2 lowland conifer patches (Third River and Bog Lake).

Blackduck Moraine (212Na18)

	Current GAP Land Cover[1] All Ownerships			Current CSA Land Cover[2] DNR Forestry and Wildlife			Comparison of DNR to All Ownerships[3]	Comparison of FIA data to Original Bearing Trees		CP-PMOP Cover Type 50-year Goal
GROUP	Land Cover Class	Acres	%	Main Cover Type	Acres	%		Tree Species	Change[3]	
UPLAND DECIDUOUS	Aspen/White Birch	77,183	25.4	Aspen	13,282	29.8	1.2	Aspen	2.06	-7.9%
				Balm of Gilead	151	0.3		Balm of Gilead	6.29	
				Birch	662	1.5		Paper Birch	-1.15	PMOP -5.2%
				Offsite Aspen	0	0.0				
	Maple/Basswood	15,309	5.0	Northern Hardwoods[4]	2,473	5.5	1.1	Sugar Maple	2.41	-10.8%
								Red Maple	0.00	
								Basswood	6.53	
								Yellow Birch	0.00	
	Bur/White Oak	0	0.0	Oak	20	0.0	-13.1	Bur Oak	1.85	PMOP -10.9%
	Red Oak	1,774	0.6					Red Oak	2.20	
	Upland Deciduous	39,078	12.8	Offsite Oak	0	0.0				
	Group Sum	133,343	**43.8**	Group Sum	16,588	**37.2**	-1.2			
LOWLAND DECIDUOUS	Black Ash	270	0.1	Ash	707	1.6	17.9	Ash	4.21	-10.7%
	Lowland Deciduous	8,886	2.9	Lowland Hardwood	323	0.7	-4.0	Elm	2.04	
	Group Sum	9,157	**3.0**	Group Sum	1,030	**2.3**	-1.3			
UPLAND CONIFERS	White Pine mix	0	0.0	White Pine	141	0.3		White Pine	-10.67	112.4%
	Red Pine	0	0.0	Norway Pine[5]	402	0.9		Red Pine	-6.31	17.1%
	Red/White Pine	6,450	2.1							
	Red/White Pine-Deciduous mix	137	0.0							
	Jack Pine	2,453	0.8	Jack Pine	80	0.2	-4.5	Jack Pine	-20.00	84.4%
	Jack Pine-Deciduous mix	780	0.3							
	White Spruce	240	0.1	White Spruce	494	1.1	14.0	White Spruce	-2.38	2.0%
	Balsam Fir mix	3,424	1.1	Balsam Fir	452	1.0	-1.1	Balsam Fir	1.60	-3.3%
	Spruce/Fir-Deciduous mix	14	0.0							
	Upland Black Spruce	0	0.0	Black Spruce, Upland	0	0.0				0.0%
	Upland Northern White-Cedar	2,376	0.8							
	Upland Conifer	863	0.3							
	Group Sum	16,737	**5.5**	Group Sum	1,569	**3.5**	-1.6			
LOWLAND CONIFERS	Lowland Black Spruce	11,077	3.6	Black Spruce, Lowland	2,194	4.9	1.4	Black Spruce	2.50	0.0%
	Tamarack	2,141	0.7	Tamarack	3,963	8.9	12.6	Tamarack	-5.86	5.4%
	Lowland Northern White-Cedar	4,229	1.4	Northern White Cedar	2,410	5.4	3.9	Cedar	-1.03	5.3%
	Group Sum	17,446	**5.7**	Group Sum	8,567	**19.2**	3.4			
STAGNANT LOWLAND CONIFERS	Stagnant Black Spruce	0	0.0	Stagnant Spruce	1,187	2.7				
	Stagnant Tamarack	0	0.0	Stagnant Tamarack	355	0.8				
	Stagnant Northern White-Cedar	0	0.0	Stagnant Cedar	222	0.5				
	Stagnant Conifer	0	0.0							
	Group Sum	0	**0.0**	Group Sum	1,764	**4.0**				
SHRUBLAND	Upland Shrub	6,810	2.2	Upland Brush	34	0.1	-7.0			
				Cutover Area	109	0.2				
	Lowland Deciduous Shrub	31,228	10.3	Lowland Brush	4,506	10.1	-1.0			
	Lowland Evergreen Shrub	1,100	0.4	Muskeg	318	0.7	2.0			
	Group Sum	39,138	**12.9**	Group Sum	4,968	**11.1**	-1.2			
AQUATIC	Water	24,638	8.1	Permanent Water	958	2.1				
	Floating Aquatic	4	0.0	Non-Permanent Water	2,176	4.9				
	Broadleaf Sedge/Cattail	14,212	4.7	Marsh	6,016	13.5	2.9			
	Sedge Meadow	4,060	1.3	Lowland Grass	818	1.8	1.4			
	Group Sum	42,914	**14.1**	Group Sum	9,969	**22.3**	1.6			
CROP/GRASS	Cropland	37,993	12.5	Agricultural	20	0.0	-279.6			
	Grassland	694	0.2	Upland Grass	75	0.2	-1.4			
	Prairie	0	0.0							
	Group Sum	38,687	**12.7**	Group Sum	95	**0.2**	-59.7			
DEVELOPED	Low Intensity Urban	25	0.0	Development[6]	2	0.0	-8.0			
	High Intensity Urban	78	0.0							
	Mixed Developed	0	0.0							
	Transportation	988	0.3	Roads	59	0.1	-2.5			
	Group Sum	1,091	**0.4**	Group Sum	61	**0.1**	-2.6			
	Other[7]	5,948	2.0	Other[8]	0	0.0				
	LTA TOTAL	304,462	100.0	LTA TOTAL	44,610	100.0				

Footnotes: 1. MN GAP data on all ownerships, 2. CSA data on DNR Forestry and Wildlife administered lands, 3. Magnitude of change (ex. -2.0 is a 2-fold decline and 4.5 is a 4.5-fold increase), 4. Includes Central Hardwoods, 5. Includes Scotch Pine, 6. Includes Industrial & Urban Development and Recreation Development, 7. Includes Barren and Lowland Conifer-Deciduous mix, 8. Includes Moss and Rock Outcrop

Alida Till Plain (212Na21)

OVERVIEW

Information presented in this document is specific to this LTA with some reference to the larger ECS subsection. This summary was written to provide additional forest management information in this landscape and includes the following main sections: overview, description, land management, and vegetation. See the LTA Assessment and Analysis Guide for section explanations, data descriptions, acronyms, and references.

DESCRIPTION

A complex of rolling till plains and moraines separated by outwash channels all formed by the Koochiching Lobe Glacier. Uplands occupy 83 percent, wetlands occupy 15 percent, and lakes occupy 2 percent of the LTA (MN DNR, 1998). The most mineral soils in the till plains and moraines have loam to clay loam textures. Sandy loam or sand textures are also present primarily in the outwash channels.

The majority of the upland pre-settlement vegetation was aspen-birch (trending to conifers), mixed white pine and red pine, Big Woods—hardwoods, and jack pine barrens and openings (Marschner, 1974). The dominant lowland pre-settlement vegetation was wet meadows or conifer bog and swamp (Marschner, 1974).

LAND MANAGEMENT

Land Stewardship

Based on GAP stewardship data, the majority of this LTA is private (76.9%), followed by county (13.4%), and state (8.8%). See table below. This LTA is located in Mahnomen, Clearwater, Beltrami, and Hubbard counties. The Mississippi River meanders through the southeastern portion of the LTA. Over 26,363 acres of protected waters exist inside the LTA. Lakes within or adjacent to the LTA include Upper Rice, Minerva, and Itasca.

Parts of the LTA's west side are inside White Earth Indian Reservation. State and county lands are scattered throughout the LTA. The largest block of contiguous state forestland occurs in the central portion of the LTA. Most county lands are concentrated in the

southeast and east segments. No USFS and very little private industrial lands are found in the LTA. Municipalities include Bagley, Shevlin, and Solway.

Agency (%)	Acres	Percent
State (8.8%)		
DNR, Ecological Resources	210	0.1%
DNR, Fish and Wildlife	1,191	0.6%
DNR, Forestry	14,643	7.7%
DNR, Parks	843	0.4%
County (13.4%)		
Beltrami	883	0.5%
Clearwater	22,790	11.9%
Hubbard	1,929	1.0%
Mahnomen	37	0.0%
Federal (0.4%)		
Bureau of Indian Affairs	721	0.4%
Other Public (0.2%)		
City of Bagley	368	0.2%
Private (76.9%)		
Private	145,913	76.4%
Private Industrial	962	0.5%
Tribal (0.3%)		
White Earth Reservation	570	0.3%
Grand Total	**191,060 acres**	

* note - 3,753 acres of open water are included in the table above

Natural Resource Management Units

Federal

None known

State

Minnesota Department of Natural Resources

- State Forests: Mississippi Headwaters (central and south portions), White Earth (north portions)
- Wildlife Management Areas: Mud Lake, Sucker Lake, Mallard Lake, Gill Lake, Robinson Lake, Upper Rice Lake, Daniel Lake, Island Lake Fmha, Lower Rice, Mosquito Creek
- Scientific and Natural Areas: Iron Springs Bog, Itasca Wilderness Sanctuary
- State Parks: Itasca

County

None known

Other

White Earth Indian Reservation

VEGETATION

Pre-settlement Vegetation and Tree Species

The major Pre-settlement Vegetation types in this LTA include: Aspen-Birch (trending to Conifers) (45%), Big Woods - Hardwoods (oak, maple, basswood, hickory) (6%), Conifer Bogs and Swamps (17%), Jack Pine Barrens and Openings (5%), and Mixed White Pine and Red Pine (21%).

The following list contains the number of section corner notes from the original Public Land Survey by vegetation/landscape characteristic within this LTA, forest, timber-449, pine openings, pine barrens, scattered pine-39, scattering oak, scattering timber-32, thicket, brush, underbrush or only tree around-64, lake, slough, pond-8, river, creek, bottom, or valley, ravine-3, marsh or swamp-183, windthrow, windfall-10, and burned area-159.

Bearing trees include: Ash-21, Aspen-556, Balm-of-Gilead-65, Balsam Fir-56, Basswood-21, Birch-112, Cedar-1, Cottonwood-12, Elm-101, Ironwood-12, Maple-42, Sugar Maple-16, Oak-36, Bur Oak-21, Red Oak-6, Pine-37, Jack Pine-107, Red Pine-199, White Pine-437, Spruce-98, Tamarack-335, and Willow-2.

Current Land Cover

As referenced from table on page 6:

- Top five GAP land cover classes on all ownerships (196,599 total acres):
  Cropland (36.8%), Aspen/White Birch (20.7%), Upland Deciduous (14.1%), Lowland Deciduous Shrub (6.0%), and Upland Shrub (3.7%).

- Top five CSA main cover types on DNR Forestry and Wildlife land (16,279 total acres):
  Aspen (26.4 %), Tamarack (19.1%), Lowland Brush (17.8%), Lowland Grass (4.3%), and Marsh (3.6%).

- Significant percentage differences in land cover between DNR Forestry and Wildlife land and all ownerships:
  DNR land has 18.1 times more Tamarack, 7.6 times more Balsam Fir, 6.8 times more Upland Grass, 3.0 times more Lowland Brush, 2.4 times more Lowland Black Spruce, 2.0 times more Lowland Grass, and 2.1 times less in the Upland Grass group.

Changes in Tree Species Composition

As referenced from table on page 6, the following tree species were or are a significant component of the forest and their abundance has changed significantly since the original land survey (magnitude of change calculated by comparing FIA data to original bearing trees):

There is currently 8.2 times more Basswood, 3.0 times more Bur Oak, 3.0 times more Ash, 2.8 times more Balsam Fir, 2.4 times more Red Oak, 2.3 times more Elm, 2.1 times more Balm of Gilead, 2.0 times less Red Pine, 2.9 times less Tamarack, and 24.8 times less White Pine in this LTA.

50-year Main Cover Type Goals

See main cover type 50-year goals in table on page 6. This is a priority LTA for White Pine cover type increase.

Potential Forest Ecosystem Types and Native Plant Communities

This LTA contains the following forest ecosystem types: Dry-Mesic Pine and Dry-Mesic Pine/Oak. The following Native Plant Communities Classes are known to occur in this LTA **(bold text)** or occur in similar LTAs.

Upland Forests

FDn12, **FDn33, FDc12, FDc34, MHn35, MHn44, MHn46,** MHn47**, MHc26, MHc37**

Wetland Forests

FFn57, FFn67, WFn53, WFn55, WFn64, FPn63, FPn82, APn80, APn81

Non-Forested Communities

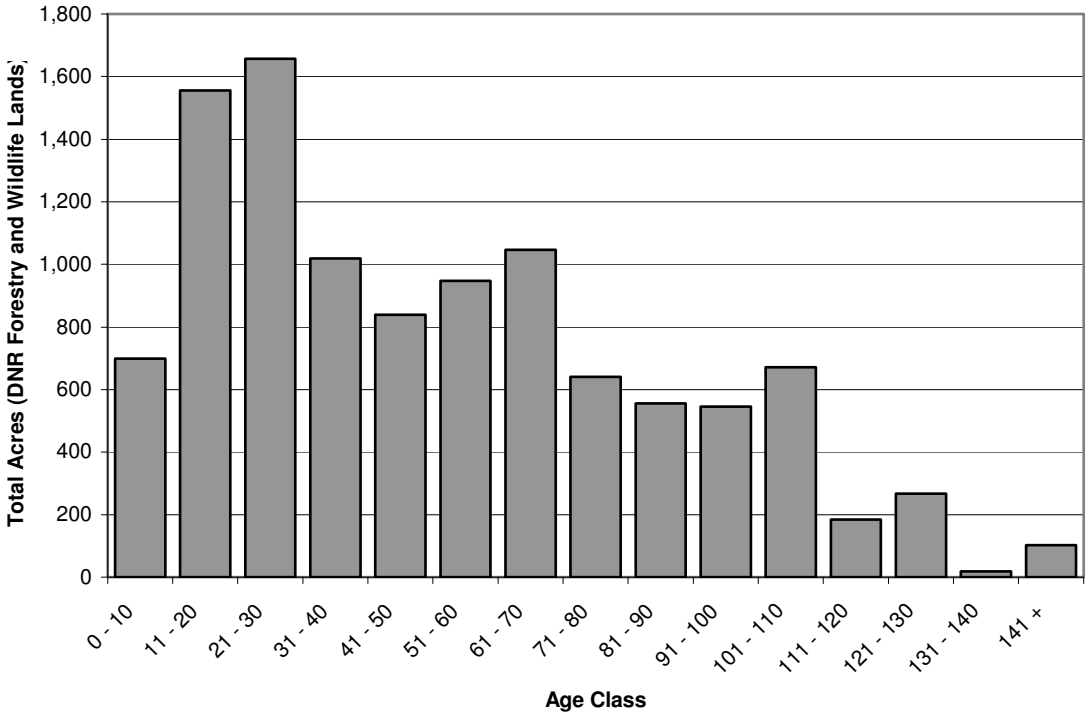
APn91, OPn92, WMn73, **WMn82**, FPn73

Old Growth, Ecologically Important Lowland Conifers, and Extended Rotation Forests

This LTA contains 4 old growth stands with associated OFMCs, 401 acres of EILC, and 4,900 acres of ERF on DNR Forestry and Wildlife land.

Age Classes

Figure below shows age-class distribution of all forested cover types in this LTA (10,748 total acres).



Patch Dynamics

This LTA contains 8 designated forest patches on state forestry and wildlife lands. They include an upland conifers patch (Itasca Conifers), 6 upland hardwood patches (Bear Moose Creek Hardwoods, Rice Hardwoods, Minerva Hardwoods North, Shevlin Hardwoods, Minerva Hardwoods South, and Itasca Hardwoods), and a lowland conifers patch (Nora/Minerva Conifers).

Alida Till Plain (212Na21)

	Current GAP Land Cover[1] All Ownerships			Current CSA Land Cover[2] DNR Forestry and Wildlife			Comparison of DNR to All Ownerships[3]	Comparison of FIA data to Original Bearing Trees		CP-PMOP Cover Type 50-year Goal
GROUP	Land Cover Class	Acres	%	Main Cover Type	Acres	%		Tree Species	Change[3]	
UPLAND DECIDUOUS	Aspen/White Birch	40,704	20.7	Aspen	4,296	26.4	1.4	Aspen	1.28	-7.9%
				Balm of Gilead	232	1.4		Balm of Gilead	2.11	
				Birch	44	0.3		Paper Birch	1.38	PMOP -5.2%
				Offsite Aspen	0	0.0				
	Maple/Basswood	5,413	2.8	Northern Hardwoods[4]	503	3.1	1.1	Sugar Maple	-1.62	-10.8%
								Red Maple	-1.67	
								Basswood	8.22	
								Yellow Birch	0.00	
	Bur/White Oak	3	0.0	Oak	208	1.3	5.8	Bur Oak	2.95	PMOP -10.9%
	Red Oak	426	0.2					Red Oak	2.43	
	Upland Deciduous	27,672	14.1	Offsite Oak	0	0.0				
	Group Sum	74,218	**37.8**	Group Sum	5,282	**32.4**	-1.2			
LOWLAND DECIDUOUS	Black Ash	41	0.0	Ash	402	2.5	119.3	Ash	3.00	-10.7%
	Lowland Deciduous	1,138	0.6	Lowland Hardwood	306	1.9	3.2	Elm	2.30	
	Group Sum	1,179	**0.6**	Group Sum	708	**4.3**	7.3			
UPLAND CONIFERS	White Pine mix	0	0.0	White Pine	84	0.5		White Pine	-24.75	112.4%
	Red Pine	0	0.0	Norway Pine[5]	410	2.5		Red Pine	-1.98	17.1%
	Red/White Pine	2,167	1.1							
	Red/White Pine-Deciduous mix	1,327	0.7							
	Jack Pine	2,015	1.0	Jack Pine	79	0.5	-2.1	Jack Pine	1.22	84.4%
	Jack Pine-Deciduous mix	955	0.5							
	White Spruce	185	0.1	White Spruce	90	0.6	5.9	White Spruce	-1.71	2.0%
	Balsam Fir mix	754	0.4	Balsam Fir	476	2.9	7.6	Balsam Fir	2.83	-3.3%
	Spruce/Fir-Deciduous mix	202	0.1							
	Upland Black Spruce	0	0.0	Black Spruce, Upland	12	0.1				0.0%
	Upland Northern White-Cedar	51	0.0							
	Upland Conifer	1,571	0.8							
	Group Sum	9,227	**4.7**	Group Sum	1,151	**7.1**	1.5			
LOWLAND CONIFERS	Lowland Black Spruce	1,984	1.0	Black Spruce, Lowland	397	2.4	2.4	Black Spruce	1.36	0.0%
	Tamarack	2,083	1.1	Tamarack	3,113	19.1	18.1	Tamarack	-2.94	5.4%
	Lowland Northern White-Cedar	27	0.0	Northern White Cedar	11	0.1	4.9	Cedar	0.00	5.3%
	Group Sum	4,094	**2.1**	Group Sum	3,521	**21.6**	10.4			
STAGNANT LOWLAND CONIFERS	Stagnant Black Spruce	0	0.0	Stagnant Spruce	21	0.1				
	Stagnant Tamarack	0	0.0	Stagnant Tamarack	65	0.4				
	Stagnant Northern White-Cedar	0	0.0	Stagnant Cedar	0	0.0				
	Stagnant Conifer	8	0.0							
	Group Sum	8	**0.0**	Group Sum	86	**0.5**	129.5			
SHRUBLAND	Upland Shrub	7,344	3.7	Upland Brush	35	0.2	-2.1			
				Cutover Area	252	1.5				
	Lowland Deciduous Shrub	11,806	6.0	Lowland Brush	2,890	17.8	3.0			
	Lowland Evergreen Shrub	294	0.1	Muskeg	23	0.1	-1.0			
	Group Sum	19,443	**9.9**	Group Sum	3,200	**19.7**	2.0			
AQUATIC	Water	3,525	1.8	Permanent Water	328	2.0				
	Floating Aquatic	0	0.0	Non-Permanent Water	37	0.2				
	Broadleaf Sedge/Cattail	5,746	2.9	Marsh	588	3.6	1.2			
	Sedge Meadow	4,161	2.1	Lowland Grass	692	4.3	2.0			
	Group Sum	13,432	**6.8**	Group Sum	1,645	**10.1**	1.5			
CROP/GRASS	Cropland	72,294	36.8	Agricultural	48	0.3	-125.6			
	Grassland	1,023	0.5	Upland Grass	572	3.5	6.8			
	Prairie	0	0.0							
	Group Sum	73,317	**37.3**	Group Sum	620	**3.8**	-9.8			
DEVELOPED	Low Intensity Urban	2	0.0	Development[6]	62	0.4	4.4			
	High Intensity Urban	159	0.1							
	Mixed Developed	11	0.0							
	Transportation	1,134	0.6	Roads	4	0.0	-21.9			
	Group Sum	1,306	**0.7**	Group Sum	67	**0.4**	-1.6			
	Other[7]	375	0.2	Other[8]	0	0.0				
	LTA TOTAL	196,599	100.0	LTA TOTAL	16,279	100.0				

Footnotes: 1. MN GAP data on all ownerships, 2. CSA data on DNR Forestry and Wildlife administered lands, 3. Magnitude of change (ex. -2.0 is a 2-fold decline and 4.5 is a 4.5-fold increase), 4. Includes Central Hardwoods, 5. Includes Scotch Pine, 6. Includes Industrial & Urban Development and Recreation Development, 7. Includes Barren and Lowland Conifer-Deciduous mix, 8. Includes Moss and Rock Outcrop

Becida Till Plain (212Na22)

OVERVIEW

Information presented in this document is specific to this LTA with some reference to the larger ECS subsection. This summary was written to provide additional forest management information in this landscape and includes the following main sections: overview, description, land management, and vegetation. See the LTA Assessment and Analysis Guide for section explanations, data descriptions, acronyms, and references.

DESCRIPTION

A complex of Koochiching and Wadena Lobe glacier till plains separated by Koochiching Lobe glacier outwash channels. Topography is level (outwash channels) to rolling (till plains). Uplands occupy 87 percent, wetlands occupy 8 percent, and lakes occupy 5 percent of the LTA (MN DNR, 1998). The majority of the mineral soils have loam to clay loam textures. Small areas with sandy loam or sand textures are also present.

The majority of the upland pre-settlement vegetation was jack pine barrens and openings, mixed white pine and red pine, aspen-birch (trending to conifers), and Big Woods—hardwoods (Marschner, 1974). The dominant lowland pre-settlement vegetation was wet meadows or conifer bog and swamp (Marschner, 1974).

LAND MANAGEMENT

Land Stewardship

Based on GAP stewardship data, the majority of this LTA is private (51.2%), followed by county (38.4%), and state (10.4%). See table below. This LTA is located in Clearwater, Beltrami, and Hubbard counties. The Headwaters of the Mississippi River is located in the LTA's southwest portion. Over 6,569 acres of protected waters exist inside the LTA. Lakes within or adjacent to the LTA include Itasca, Big LaSalle, LaSalle, Hennepin, Evergreen, and Lake Hattie.

State, county, and private industrial lands are spread throughout the LTA. An island on Hennepin Lake is federally owned. Large tracts of contiguous county lands are located in

LTA's east, west, and central portions. Potlatch Corporation forestlands are located in the LTA's north half. Communities include Lake Itasca and Becida.

Agency (%)	Acres	Percent
State (10.4%)		
DNR, Forestry	4,150	6.8%
DNR, Parks	2,207	3.6%
County (38.4%)		
Beltrami	35	0.1%
Clearwater	1,654	2.7%
Hubbard	21,772	35.6%
Private (51.2%)		
Private	30,954	50.7%
Private Industrial	296	0.5%
Grand Total	**61,068 acres**	

* note - 3,175 acres of open water are included in the table above

Natural Resource Management Units

Federal

None known

State

Minnesota Department of Natural Resources

- State Forests: Paul Bunyan (northwest and west), Mississippi Headwaters (eastern portions)
- Scientific and Natural Areas: Itasca Wilderness Sanctuary
- State Parks: Itasca

County

None known

Other

None known

VEGETATION

Pre-settlement Vegetation and Tree Species

The major Pre-settlement Vegetation types in this LTA include: Conifer Bogs and Swamps (10%), Jack Pine Barrens and Openings (30%), and Mixed White Pine and Red Pine (26%),

The following list contains the number of section corner notes from the original Public Land Survey by vegetation/landscape characteristic within this LTA, forest, timber-249, pine openings, pine barrens, scattered pine-2, scattering oak, scattering timber-5, thicket, brush, underbrush or only tree around-19, lake, slough, pond-12, river, creek, bottom, or

valley, ravine-3, marsh or swamp-30, meadow-1, windthrow, windfall-4, and burned area-8.

Bearing trees include: Ash-8, Black Ash-4, Aspen-195, Balm-of-Gilead-4, Balsam Fir-8, Basswood-3, Birch-34, Elm-6, Ironwood-4, Maple-7, Sugar Maple-7, Oak-27, Bur Oak-4, Red Oak-5, Pine-1, Jack Pine-198, Red Pine-117, White Pine-59, Spruce-30, and Tamarack-54.

Current Land Cover

As referenced from table on page 6:

- Top five GAP land cover classes on all ownerships (304,462 total acres):
  Aspen/White Birch (25.4%), Upland Deciduous (12.8%), Cropland (12.5%), Lowland Deciduous Shrub (10.3%), and Water (8.1%).

- Top five CSA main cover types on DNR Forestry and Wildlife land (4,151 total acres):
  Aspen (54.8 %), White Spruce (6.7%), Balsam Fir (5.5%), Lowland Brush (5.1%), and Oak (4.1%).

- Significant percentage differences in land cover between DNR Forestry and Wildlife land and all ownerships:
  DNR land has 10.2 times more Balsam Fir, 1.3 times more Lowland Black Spruce, 1.6 times less Jack Pine, and 3.3 times less in the Northern Hardwoods group.

Changes in Tree Species Composition

As referenced from table on page 6, the following tree species were or are a significant component of the forest and their abundance has changed significantly since the original land survey (magnitude of change calculated by comparing FIA data to original bearing trees):

There is currently 10.4 times more Balm of Gilead, 6.6 times more Balsam Fir, 4.5 times more Basswood, 3.4 times more Paper Birch, 3.2 times more Red Oak, 3.1 times more Bur Oak, 2.3 times more Elm, 3.0 times less Black Spruce, 3.4 times less Sugar Maple, 10.0 times less Red Pine, 20.3 times less Tamarack, and 25.3 times less White Pine in this LTA.

50-year Main Cover Type Goals

See main cover type 50-year goals in table on page 6. This is a priority LTA for White Pine cover type increase.

Potential Forest Ecosystem Types and Native Plant Communities

This LTA contains the following forest ecosystem types: Dry-Mesic Pine/Oak. The following Native Plant Communities Classes are known to occur in this LTA **(bold text)** or occur in similar LTAs.

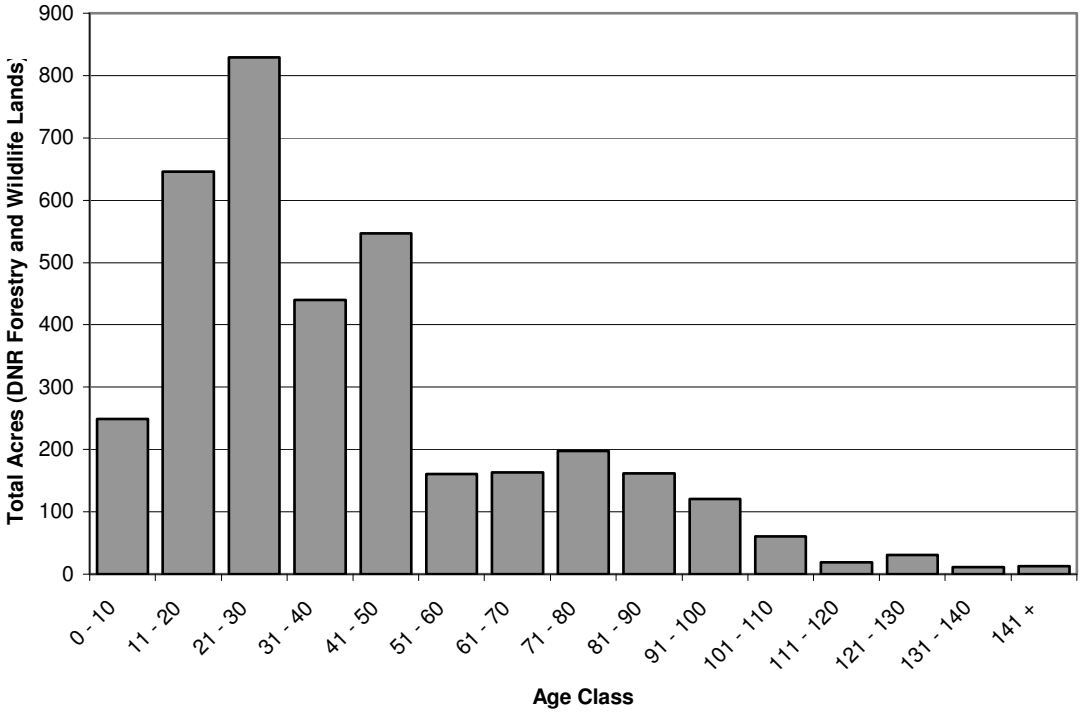
Upland Forests
FDn33, **FDc12,** FDc23, FDc24**, FDc34**, FDs37, MHn35, MHn44, MHn46, **MHc26, MHc37**
Wetland Forests
FFn57, FFn67, WFn53, WFn55, WFn64, WFs57, **FPn63**, FPn72, FPn82, APn80, APn81
Non-Forested Communities
APn90, APn91, **MRn83**, OPn81, **OPn92**, WMn73, **WMn82**, FPn73

Old Growth, Ecologically Important Lowland Conifers, and Extended Rotation Forests

This LTA contains 38 old growth stands with associated OFMCs, 47 acres of EILC, and 1,538 acres of ERF on DNR Forestry and Wildlife land.

Age Classes

Figure below shows age-class distribution of all forested cover types in this LTA (3,648 total acres).



Patch Dynamics

This LTA contains 3 designated forest patches on state forestry and wildlife lands. They include an upland conifers patch (Grant Valley Conifers West) and 2 upland hardwood patches (Lake Hattie Hardwoods and Rockwood Hardwoods North).

Becida Till Plain (212Na22)

	Current GAP Land Cover[1] All Ownerships			Current CSA Land Cover[2] DNR Forestry and Wildlife			Comparison of DNR to All Ownerships[3]	Comparison of FIA data to Original Bearing Trees		CP-PMOP Cover Type 50-year Goal
GROUP	Land Cover Class	Acres	%	Main Cover Type	Acres	%		Tree Species	Change[3]	
UPLAND DECIDUOUS	Aspen/White Birch	25,126	36.7	Aspen	2,275	54.8	1.6	Aspen	1.44	-7.9%
				Balm of Gilead	15	0.4		Balm of Gilead	10.40	
				Birch	81	1.9		Paper Birch	3.38	PMOP -5.2%
				Offsite Aspen	0	0.0				
	Maple/Basswood	3,409	5.0	Northern Hardwoods[4]	62	1.5	-3.3	Sugar Maple	-3.50	-10.8%
								Red Maple	1.00	
								Basswood	4.50	
								Yellow Birch	0.00	
	Bur/White Oak	23	0.0	Oak	172	4.1	1.6	Bur Oak	3.14	PMOP -10.9%
	Red Oak	1,762	2.6					Red Oak	3.17	
	Upland Deciduous	8,592	12.6	Offsite Oak	0	0.0				
	Group Sum	38,911	**56.9**	Group Sum	2,605	**62.8**	1.1			
LOWLAND DECIDUOUS	Black Ash	10	0.0	Ash	68	1.6	117.1	Ash	1.00	-10.7%
	Lowland Deciduous	120	0.2	Lowland Hardwood	9	0.2	1.2	Elm	2.25	
	Group Sum	129	**0.2**	Group Sum	77	**1.9**	9.8			
UPLAND CONIFERS	White Pine mix	8	0.0	White Pine	0	0.0		White Pine	-25.33	112.4%
	Red Pine	18	0.0	Norway Pine[5]	132	3.2	122.4	Red Pine	-10.00	17.1%
	Red/White Pine	860	1.3							
	Red/White Pine-Deciduous mix	148	0.2							
	Jack Pine	2,645	3.9	Jack Pine	98	2.4	-1.6	Jack Pine	-1.88	84.4%
	Jack Pine-Deciduous mix	501	0.7							
	White Spruce	49	0.1	White Spruce	277	6.7	93.4	White Spruce	-1.33	2.0%
	Balsam Fir mix	372	0.5	Balsam Fir	230	5.5	10.2	Balsam Fir	6.60	-3.3%
	Spruce/Fir-Deciduous mix	57	0.1							
	Upland Black Spruce	0	0.0	Black Spruce, Upland	0	0.0				0.0%
	Upland Northern White-Cedar	18	0.0							
	Upland Conifer	484	0.7							
	Group Sum	5,160	**7.5**	Group Sum	737	**17.8**	2.4			
LOWLAND CONIFERS	Lowland Black Spruce	1,911	2.8	Black Spruce, Lowland	148	3.6	1.3	Black Spruce	-3.00	0.0%
	Tamarack	469	0.7	Tamarack	51	1.2	1.8	Tamarack	-20.33	5.4%
	Lowland Northern White-Cedar	1,831	2.7	Northern White Cedar	17	0.4	-6.6	Cedar	0.00	5.3%
	Group Sum	4,211	**6.2**	Group Sum	216	**5.2**	-1.2			
STAGNANT LOWLAND CONIFERS	Stagnant Black Spruce	0	0.0	Stagnant Spruce	0	0.0				
	Stagnant Tamarack	3	0.0	Stagnant Tamarack	0	0.0				
	Stagnant Northern White-Cedar	0	0.0	Stagnant Cedar	13	0.3				
	Stagnant Conifer	0	0.0							
	Group Sum	3	**0.0**	Group Sum	13	**0.3**	77.9			
SHRUBLAND	Upland Shrub	2,734	4.0	Upland Brush	3	0.1	-1.7			
				Cutover Area	97	2.3				
	Lowland Deciduous Shrub	2,368	3.5	Lowland Brush	212	5.1	1.5			
	Lowland Evergreen Shrub	49	0.1	Muskeg	0	0.0				
	Group Sum	5,151	**7.5**	Group Sum	312	**7.5**	-1.0			
AQUATIC	Water	2,908	4.2	Permanent Water	31	0.7				
	Floating Aquatic	0	0.0	Non-Permanent Water	3	0.1				
	Broadleaf Sedge/Cattail	1,449	2.1	Marsh	126	3.0	1.4			
	Sedge Meadow	412	0.6	Lowland Grass	0	0.0				
	Group Sum	4,769	**7.0**	Group Sum	159	**3.8**	-1.8			
CROP/GRASS	Cropland	9,677	14.1	Agricultural	0	0.0				
	Grassland	201	0.3	Upland Grass	19	0.5	1.5			
	Prairie	0	0.0							
	Group Sum	9,878	**14.4**	Group Sum	19	**0.5**	-31.9			
DEVELOPED	Low Intensity Urban	0	0.0	Development[6]	4	0.1				
	High Intensity Urban	0	0.0							
	Mixed Developed	0	0.0							
	Transportation	149	0.2	Roads	0	0.0				
	Group Sum	149	**0.2**	Group Sum	4	**0.1**	-2.6			
	Other[7]	60	0.1	Other[8]	10	0.2				
	LTA TOTAL	68,421	100.0	LTA TOTAL	4,151	100.0				

Footnotes: 1. MN GAP data on all ownerships, 2. CSA data on DNR Forestry and Wildlife administered lands, 3. Magnitude of change (ex. -2.0 is a 2-fold decline and 4.5 is a 4.5-fold increase), 4. Includes Central Hardwoods, 5. Includes Scotch Pine, 6. Includes Industrial & Urban Development and Recreation Development, 7. Includes Barren and Lowland Conifer-Deciduous mix, 8. Includes Moss and Rock Outcrop

Crow Wing Sand Plain (212Nc01)

OVERVIEW

Information presented in this document is specific to this LTA with some reference to the larger ECS subsection. This summary was written to provide additional forest management information in this landscape and includes the following main sections: overview, description, land management, and vegetation. See the LTA Assessment and Analysis Guide for section explanations, data descriptions, acronyms, and references.

DESCRIPTION

A gently rolling pitted outwash plain with islands of till, all formed by the Rainy Lobe Glacier. Uplands occupy 64 percent, wetlands occupy 10 percent, and lakes occupy 26 percent of the LTA (MN DNR, 1998). Soil parent material is sandy loam or sand. Soils were formed under forest vegetation.

The dominant upland pre-settlement vegetation was dry pine-oak woodlands, dry-mesic (jack, red, and white) pine-hardwood forest, and dry-mesic (white and red) pine forest (Shadis, 1999 and Marschner, 1974). Lowland pre-settlement vegetation was commonly conifer bog and swamp (Marschner, 1974).

LAND MANAGEMENT

Land Stewardship

Based on GAP stewardship data, the majority of this LTA is private (88.9%), followed by county (5.6%), and state (5.1%). See table below. This LTA is located in Cass and Crow Wing counties. The Mississippi River flows through the LTA's east and southeast portions. Over 73,766 acres of protected waters exist inside the LTA. Lakes within or adjacent to the LTA include Whitefish, Gull, Pelican, North Long, and Edward.

Federal, state, county, and private industrial lands are scattered throughout the LTA. The largest contiguous tracts of state, county, and Potlatch Corporation lands occur in the LTA's northeast and east central portions. Municipalities include Crosslake, East Gull Lake, Emily, Fifty Lakes, Manhattan Beach, Baxter, Lake Shore, Nisswa, Breezy Point, Pequot Lake, Jenkins, and Brainerd.

Agency (%)	Acres	Percent
State (5.1%)		
DNR, Fish and Wildlife	1,355	0.9%
DNR, Forestry	6,352	4.0%
DNR, Trails and Waterways	23	0.0%
Other	239	0.2%
State (Undifferentiated)	34	0.0%
County (5.6%)		
Cass	1,486	0.9%
Crow Wing	7,371	4.7%
Federal (0.1%)		
Army Corps of Engineers	177	0.1%
Other	28	0.0%
Other Public (0.2%)		
City of Breezy Point	224	0.1%
City of Cross Lake	41	0.0%
City of Nisswa	82	0.1%
Private (88.9%)		
Private	129,596	82.1%
Private Conservancy	94	0.1%
Private Industrial	10,621	6.7%
Tribal (0.1%)		
Mille Lacs Reservation	106	0.1%
Grand Total	**157,829 acres**	

* note - 58,078 acres of open water are included in the table above

Natural Resource Management Units

Federal

None known

State

Minnesota Department of Natural Resources

- State Forests: Land O'Lakes (south central), Crow Wing (southwest and north central)
- Wildlife Management Areas: Upgaard, Twin Heron, Lowell, Mission Lake
- Aquatic Management Areas: Grassy Point, Upper Whitefish Lake, Dassett Island, Ivy Island, Pleasant Lake, Big Pine Lake, Bertha Moody, North Long Lake, Love Lake, Gilbert Lake
- Fish Management Areas: Stony Brook, Arrowhead Lake, Pine River, West Lower Hay Lake, Nelson Lake, Lower Hay Lake, Hay Creek, East Twin Lake, Loungee/Markee Lake, Hubert Lake, Whiskey Creek, White Sand Lake
- State Recreation Areas: Cuyuna Country

County

None known

Other

The Nature Conservancy
- Paul Bunyan Savanna

VEGETATION

Pre-settlement Vegetation and Tree Species

The major Pre-settlement Vegetation types in this LTA include: Aspen-Birch (trending to Conifers) (20%), Jack Pine Barrens and Openings (35%), Lakes (open water) (23%), Mixed White Pine and Red Pine (8%), and Wet Prairie (5%).

The following list contains the number of section corner notes from the original Public Land Survey by vegetation/landscape characteristic within this LTA, forest, timber-544, pine openings, pine barrens, scattered pine-19, scattering oak, scattering timber-58, thicket, brush, underbrush or only tree around-44, dry land, dry ridge, or island-1, lake, slough, pond-145, river, creek, bottom, or valley, ravine-17, marsh or swamp-84, meadow-8, and burned area-10.

Bearing trees include: Ash-9, Black Ash-2, Aspen-87, Balm-of-Gilead-1, Balsam Fir-4, Basswood-7, Birch-29, Elm-17, Ironwood-1, Maple-1, Sugar Maple-7, Oak-42, Bur Oak-3, Red Oak-11, Pine-237, Jack Pine-685, Red Pine-540, White Pine-123, Spruce-13, Tamarack-69, and Willow-1.

Current Land Cover

As referenced from table on page 6:

- Top five GAP land cover classes on all ownerships (219,914 total acres):
  Aspen/White Birch (28.5%), Water (25.3%), Red Oak (9.9%), Grassland (7.3%), and Jack Pine (5.7%).

- Top five CSA main cover types on DNR Forestry and Wildlife land (7,741 total acres):
  Norway Pine (19.7 %), Aspen (16.7%), Oak (12.5%), Marsh (10.6%), and Permanent Water (8.7%).

- Significant percentage differences in land cover between DNR Forestry and Wildlife land and all ownerships:
  DNR land has 6.8 times more Norway Pine, 5.0 times more Ash, 4.4 times more Marsh, 3.9 times more Lowland Brush, 2.8 times more Tamarack, 2.5 times more Lowland Brush, and 8.9 times less in the Upland Brush group.

Changes in Tree Species Composition

As referenced from table on page 6, the following tree species were or are a significant component of the forest and their abundance has changed significantly since the original

land survey (magnitude of change calculated by comparing FIA data to original bearing trees):

There is currently 9.7 times more Red Oak, 9.4 times more Paper Birch, 7.2 times more Aspen, 5.3 times more Bur Oak, 2.7 times more Basswood, 2.5 times more Ash, 3.0 times less Elm, 5.3 times less White Pine, 5.3 times less Tamarack, and 6.0 times less Red Pine in this LTA.

50-year Main Cover Type Goals

See main cover type 50-year goals in table on page 6. This is a priority LTA for Jack Pine, Norway Pine, and White Pine cover type increase.

Potential Forest Ecosystem Types and Native Plant Communities

This LTA contains the following forest ecosystem types: Dry-Mesic Pine/Oak. The following Native Plant Communities Classes are known to occur in this LTA **(bold text)** or occur in similar LTAs.

Upland Forests

FDn33, FDc12, **FDc23, FDc24, FDc25, FDc34,** FDs37, **MHc26, MHc36**

Wetland Forests

FFn57, FFn67, WFn53, WFn55, WFn64, WFs57, FPn72, FPn82, APn81

Non-Forested Communities

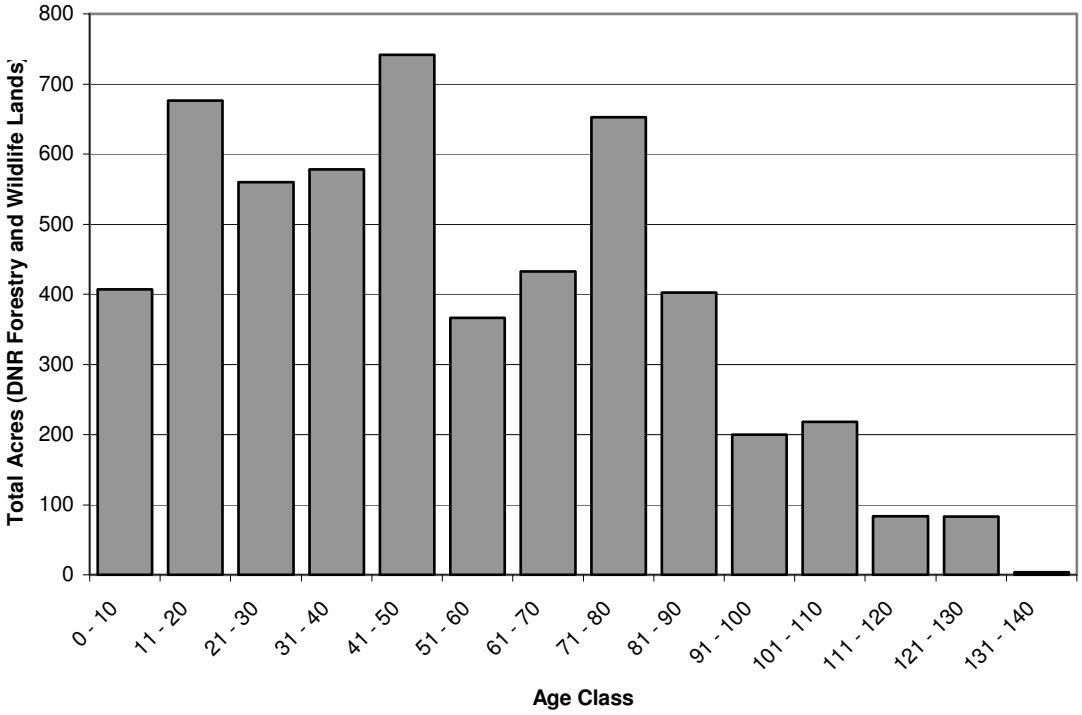
APn90, **APn91**, MRn83, **OPn81**, OPn92, WMn73, **WMn82,** FPn73

Old Growth, Ecologically Important Lowland Conifers, and Extended Rotation Forests

This LTA contains 7 old growth stands with associated OFMCs, 25 acres of EILC, and 2,743 acres of ERF on DNR Forestry and Wildlife land.

Age Classes

Figure below shows age-class distribution of all forested cover types in this LTA (5,404 total acres).



Patch Dynamics

This LTA contains 2 designated forest patches on state forestry and wildlife lands. They are upland conifer patches (Ideal and Mission).

Crow Wing Sand Plain (212Nc01)										
	Current GAP Land Cover[1] All Ownerships			Current CSA Land Cover[2] DNR Forestry and Wildlife			Comparison of DNR to All Ownerships[3]	Comparison of FIA data to Original Bearing Trees		CP-PMOP Cover Type 50-year Goal
GROUP	Land Cover Class	Acres	%	Main Cover Type	Acres	%		Tree Species	Change[3]	
UPLAND DECIDUOUS	Aspen/White Birch	62,606	28.5	Aspen	1,289	16.7	-1.4	Aspen	7.23	-7.9%
				Balm of Gilead	0	0.0		Balm of Gilead	0.00	
				Birch	264	3.4		Paper Birch	9.36	PMOP -5.2%
				Offsite Aspen	0	0.0				
	Maple/Basswood	135	0.1	Northern Hardwoods[4]	131	1.7	27.5	Sugar Maple	-1.33	-10.8%
								Red Maple	0.00	
								Basswood	2.67	
								Yellow Birch	0.00	
	Bur/White Oak	1,760	0.8	Oak	967	12.5	1.2	Bur Oak	5.33	PMOP -10.9%
	Red Oak	21,760	9.9					Red Oak	9.73	
	Upland Deciduous	0	0.0	Offsite Oak	41	0.5				
	Group Sum	86,261	**39.2**	Group Sum	2,692	**34.8**	-1.1			
LOWLAND DECIDUOUS	Black Ash	1,323	0.6	Ash	232	3.0	5.0	Ash	2.50	-10.7%
	Lowland Deciduous	0	0.0	Lowland Hardwood	80	1.0		Elm	-3.00	
	Group Sum	1,323	**0.6**	Group Sum	312	**4.0**	6.7			
UPLAND CONIFERS	White Pine mix	903	0.4	White Pine	55	0.7	1.7	White Pine	-5.31	112.4%
	Red Pine	6,396	2.9	Norway Pine[5]	1,522	19.7	6.8	Red Pine	-5.98	17.1%
	Red/White Pine	0	0.0							
	Red/White Pine-Deciduous mix	0	0.0							
	Jack Pine	12,573	5.7	Jack Pine	327	4.2	-1.4	Jack Pine	-2.28	84.4%
	Jack Pine-Deciduous mix	0	0.0							
	White Spruce	111	0.1	White Spruce	249	3.2	63.8	White Spruce	0.00	2.0%
	Balsam Fir mix	114	0.1	Balsam Fir	0	0.0		Balsam Fir	0.00	-3.3%
	Spruce/Fir-Deciduous mix	0	0.0							
	Upland Black Spruce	0	0.0	Black Spruce, Upland	3	0.0				0.0%
	Upland Northern White-Cedar	0	0.0							
	Upland Conifer	0	0.0							
	Group Sum	20,096	**9.1**	Group Sum	2,156	**27.8**	3.0			
LOWLAND CONIFERS	Lowland Black Spruce	1,081	0.5	Black Spruce, Lowland	94	1.2	2.5	Black Spruce	0.00	0.0%
	Tamarack	1,138	0.5	Tamarack	111	1.4	2.8	Tamarack	-5.33	5.4%
	Lowland Northern White-Cedar	63	0.0	Northern White Cedar	0	0.0		Cedar	0.00	5.3%
	Group Sum	2,282	**1.0**	Group Sum	205	**2.6**	2.5			
STAGNANT LOWLAND CONIFERS	Stagnant Black Spruce	0	0.0	Stagnant Spruce	40	0.5				
	Stagnant Tamarack	189	0.1	Stagnant Tamarack	0	0.0				
	Stagnant Northern White-Cedar	0	0.0	Stagnant Cedar	0	0.0				
	Stagnant Conifer	0	0.0							
	Group Sum	189	**0.1**	Group Sum	40	**0.5**	6.0			
SHRUBLAND	Upland Shrub	6,805	3.1	Upland Brush	12	0.1	-8.9			
				Cutover Area	15	0.2				
	Lowland Deciduous Shrub	3,435	1.6	Lowland Brush	477	6.2	3.9			
	Lowland Evergreen Shrub	0	0.0	Muskeg	0	0.0				
	Group Sum	10,240	**4.7**	Group Sum	504	**6.5**	1.4			
AQUATIC	Water	55,703	25.3	Permanent Water	676	8.7				
	Floating Aquatic	3,110	1.4	Non-Permanent Water	88	1.1				
	Broadleaf Sedge/Cattail	5,246	2.4	Marsh	820	10.6	4.4			
	Sedge Meadow	7,031	3.2	Lowland Grass	149	1.9	-1.7			
	Group Sum	71,088	**32.3**	Group Sum	1,734	**22.4**	-1.4			
CROP/GRASS	Cropland	10,496	4.8	Agricultural	0	0.0				
	Grassland	16,043	7.3	Upland Grass	5	0.1	-118.4			
	Prairie	0	0.0							
	Group Sum	26,539	**12.1**	Group Sum	5	**0.1**	-195.8			
DEVELOPED	Low Intensity Urban	1,067	0.5	Development[6]	59	0.8	-1.1			
	High Intensity Urban	828	0.4							
	Mixed Developed	0	0.0							
	Transportation	0	0.0	Roads	34	0.4				
	Group Sum	1,895	**0.9**	Group Sum	93	**1.2**	1.4			
	Other[7]	0	0.0	Other[8]	1	0.0				
	LTA TOTAL	219,914	100.0	LTA TOTAL	7,741	100.0				

Footnotes: 1. MN GAP data on all ownerships, 2. CSA data on DNR Forestry and Wildlife administered lands, 3. Magnitude of change (ex. -2.0 is a 2-fold decline and 4.5 is a 4.5-fold increase), 4. Includes Central Hardwoods, 5. Includes Scotch Pine, 6. Includes Industrial & Urban Development and Recreation Development, 7. Includes Barren and Lowland Conifer-Deciduous mix, 8. Includes Moss and Rock Outcrop

St. Croix Moraine (212Nc02)

OVERVIEW

Information presented in this document is specific to this LTA with some reference to the larger ECS subsection. This summary was written to provide additional forest management information in this landscape and includes the following main sections: overview, description, land management, and vegetation. See the LTA Assessment and Analysis Guide for section explanations, data descriptions, acronyms, and references.

DESCRIPTION

A steep end moraine formed by the Rainy Lobe Glacier. Uplands occupy 76 percent, wetlands occupy 11 percent, and lakes occupy 13 percent of the LTA (MN DNR, 1998). Soil parent material is coarse loamy (sandy loam) and sandy till. Soils formed under forest vegetation.

The dominant upland pre-settlement vegetation was dry-mesic (white and red) pine, dry-mesic (white) pine/hardwood, wet-mesic hardwood-conifer, (Marschner, 1974). Lowland pre-settlement vegetation was conifer bog and swamp (Marschner, 1974).

LAND MANAGEMENT

Land Stewardship

Based on GAP stewardship data, the majority of this LTA is private (45.7%), followed by state (34.4%), and county (19.9%). See table below. This LTA exists as two separate units within Cass, Crow Wing, Todd, and Morrison counties. The Crow Wing River bisects the LTA's north and south units and flows into the Mississippi River, which meanders south along the east side of the LTA's south unit. Over 41,400 acres of protected waters exist inside the LTA. Lakes within or adjacent to the LTA include Pine Mountain, Spider, Gull, Alexander, and Shamineau.

Federal, state, county, and private industrial lands are distributed throughout the LTA. The largest contiguous tracts of state and county lands occur in the LTA's north unit. Potlatch Corporation holdings are located in both the north and south units of the LTA. Municipalities include East Gull Lake, Lake Shore, and Nisswa.

Agency (%)	Acres	Percent
State (34.4%)		
Department of Military Affairs	31,623	17.7%
DNR, Ecological Resources	1,898	1.1%
DNR, Fish and Wildlife	4,579	2.6%
DNR, Forestry	22,635	12.7%
Other	258	0.1%
State (Undifferentiated)	498	0.3%
County (19.9%)		
Cass	35,463	19.8%
Todd	35	0.0%
Federal (0.0%)		
Other	44	0.0%
Private (45.7%)		
Private	75,965	42.5%
Private Conservancy	1,831	1.0%
Private Industrial	2,552	1.4%
Private Other	1,356	0.8%
Grand Total	**178,737 acres**	

* note - 28,291 acres of open water are included in the table above

Natural Resource Management Units

Federal

None known

State

Minnesota Department of Natural Resources

- State Forests: Pillsbury (nearly all), Foothills (south half)
- Wildlife Management Areas: Stanchfield Lake, Phillbrook, Meadow Brook, Kobliska, Ruff-Nik
- Aquatic Management Areas: Grassy Point
- Fish Management Areas: Pine Mountain Lake, Agate Lake, Stump Lake, Shamineau Lake
- Scientific and Natural Areas: Lake Alexander Woods
- State Parks: Crow Wing

County

None known

Other

The Nature Conservancy

- Lake Alexander Preserve

Minnesota National Guard

- Camp Ripley

VEGETATION

Pre-settlement Vegetation and Tree Species

The major Pre-settlement Vegetation types in this LTA include: Aspen-Birch (trending to Conifers) (31%), Conifer Bogs and Swamps (5%), Lakes (open water) (8%), Mixed Hardwood and Pine (Maple, White Pine, Basswood, etc) (15%), Mixed White Pine and Red Pine (24%), and Oak openings and barrens (5%).

The following list contains the number of section corner notes from the original Public Land Survey by vegetation/landscape characteristic within this LTA, forest, timber-555, pine openings, pine barrens, scattered pine-16, scattering oak, scattering timber-32, oak barrens or oak openings-4, thicket, brush, underbrush or only tree around-92, lake, slough, pond-115, river, creek, bottom, or valley, ravine-5, marsh or swamp-105, meadow-2, wet prairie or prairie-3, and burned area-24.

Bearing trees include: Ash-19, Black Ash-8, Aspen-301, Balsam Fir-23, Basswood-20, Birch-276, Yellow Birch-4, Elm-24, Ironwood-19, Maple-83, Sugar Maple-26, Oak-127, Bur Oak-10, Northern Pin Oak-4, Red Oak-155, Pine-278, Jack Pine-48, Red Pine-233, White Pine-228, Spruce-33, Tamarack-207, and Willow-2.

Current Land Cover

As referenced from table on page 6:

- Top five GAP land cover classes on all ownerships (209,260 total acres):
  Aspen/White Birch (49.1%), Water (11.1%), Red Oak (9.3%), Grassland (6.7%), and Upland Shrub (6.6%).

- Top five CSA main cover types on DNR Forestry and Wildlife land (29,112 total acres):
  Aspen (40.6 %), Oak (21.5%), Marsh (6.6%), Norway Pine (6.1%), and Birch (4.9%).

- Significant percentage differences in land cover between DNR Forestry and Wildlife land and all ownerships:
  DNR land has 5.3 times more Norway Pine, 3.0 times more Marsh, 2.2 times more Oak, 2.6 times less Lowland Grass, and 10.7 times less in the Upland Grass group.

Changes in Tree Species Composition

As referenced from table on page 6, the following tree species were or are a significant component of the forest and their abundance has changed significantly since the original land survey (magnitude of change calculated by comparing FIA data to original bearing trees):

There is currently 15.7 times more Red Maple, 2.6 times more Aspen, 2.5 times more Bur Oak, 2.0 times more Red Oak, 2.0 times more Basswood, 2.5 times less Balsam Fir, 4.1 times less Red Pine, 7.7 times less Sugar Maple, 10.7 times less White Pine, and 10.8 times less Tamarack in this LTA.

50-year Main Cover Type Goals

See main cover type 50-year goals in table on page 6. This is a priority LTA for Norway Pine and White Pine cover type increase.

Potential Forest Ecosystem Types and Native Plant Communities

This LTA contains the following forest ecosystem types: Dry-Mesic Pine and Dry-Mesic Pine/Oak. The following Native Plant Communities Classes are known to occur in this LTA **(bold text)** or occur in similar LTAs.

Upland Forests

FDn33, FDc12, FDc23, FDc24, FDc25, **FDc34, FDs37, MHn35,** MHn44, **MHc26, MHc36**

Wetland Forests

FFn57, FFn67, WFn53, **WFn55, WFn64**, WFs57, FPn72, **FPn82**, FPs63, **APn81**

Non-Forested Communities

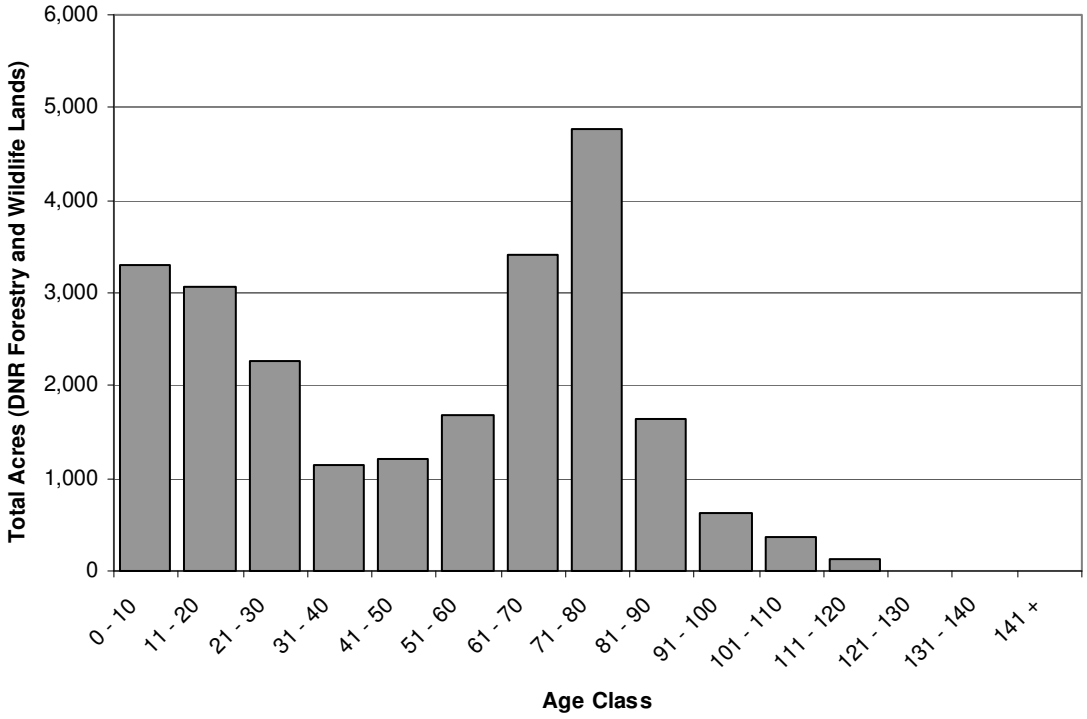
APn90, **APn91**, MRn83, **OPn81**, OPn92, WMn73, **WMn82**, FPn73

Old Growth, Ecologically Important Lowland Conifers, and Extended Rotation Forests

This LTA contains 6 old growth stands with associated OFMCs, 17 acres of EILC, and 9,907 acres of ERF on DNR Forestry and Wildlife land.

Age Classes

Figure below shows age-class distribution of all forested cover types in this LTA (23,619 total acres).



Patch Dynamics

This LTA contains 5 designated forest patches on state forestry and wildlife lands. They include 3 upland conifer patches (Rode, Hunter Lake, and Fairview), an upland hardwoods patch (Pillsbury), and a lowland hardwoods patch (Bull Moose Ash).

St. Croix Moraine (212Nc02)

	Current GAP Land Cover[1] All Ownerships			Current CSA Land Cover[2] DNR Forestry and Wildlife			Comparison of DNR to All Ownerships[3]	Comparison of FIA data to Original Bearing Trees		CP-PMOP Cover Type 50-year Goal
GROUP	Land Cover Class	Acres	%	Main Cover Type	Acres	%		Tree Species	Change[3]	
UPLAND DECIDUOUS	Aspen/White Birch	102,676	49.1	Aspen	11,815	40.6	-1.1	Aspen	2.58	-7.9%
				Balm of Gilead	0	0.0		Balm of Gilead	0.00	
				Birch	1,441	4.9		Paper Birch	1.38	PMOP -5.2%
				Offsite Aspen	0	0.0				
	Maple/Basswood	262	0.1	Northern Hardwoods[4]	628	2.2	17.2	Sugar Maple	-7.67	-10.8%
								Red Maple	15.67	
								Basswood	2.00	
								Yellow Birch	0.00	
	Bur/White Oak	655	0.3	Oak	6,256	21.5	2.2	Bur Oak	2.50	PMOP -10.9%
	Red Oak	19,507	9.3					Red Oak	2.04	
	Upland Deciduous	0	0.0	Offsite Oak	136	0.5				
	Group Sum	123,099	**58.8**	Group Sum	20,275	**69.6**	1.2			
LOWLAND DECIDUOUS	Black Ash	1,999	1.0	Ash	406	1.4	1.5	Ash	1.08	-10.7%
	Lowland Deciduous	0	0.0	Lowland Hardwood	111	0.4		Elm	1.90	
	Group Sum	1,999	**1.0**	Group Sum	517	**1.8**	1.9			
UPLAND CONIFERS	White Pine mix	547	0.3	White Pine	324	1.1	4.3	White Pine	-10.67	112.4%
	Red Pine	2,387	1.1	Norway Pine[5]	1,764	6.1	5.3	Red Pine	-4.05	17.1%
	Red/White Pine	0	0.0							
	Red/White Pine-Deciduous mix	0	0.0							
	Jack Pine	1,724	0.8	Jack Pine	196	0.7	-1.2	Jack Pine	-1.35	84.4%
	Jack Pine-Deciduous mix	0	0.0							
	White Spruce	24	0.0	White Spruce	427	1.5	125.4	White Spruce	0.00	2.0%
	Balsam Fir mix	161	0.1	Balsam Fir	68	0.2	3.0	Balsam Fir	-2.50	-3.3%
	Spruce/Fir-Deciduous mix	0	0.0							
	Upland Black Spruce	0	0.0	Black Spruce, Upland	0	0.0				0.0%
	Upland Northern White-Cedar	0	0.0							
	Upland Conifer	0	0.0							
	Group Sum	4,844	**2.3**	Group Sum	2,778	**9.5**	4.1			
LOWLAND CONIFERS	Lowland Black Spruce	461	0.2	Black Spruce, Lowland	6	0.0	-10.0	Black Spruce	0.00	0.0%
	Tamarack	711	0.3	Tamarack	37	0.1	-2.7	Tamarack	-10.75	5.4%
	Lowland Northern White-Cedar	95	0.0	Northern White Cedar	6	0.0	-2.2	Cedar	0.00	5.3%
	Group Sum	1,266	**0.6**	Group Sum	50	**0.2**	-3.6			
STAGNANT LOWLAND CONIFERS	Stagnant Black Spruce	0	0.0	Stagnant Spruce	0	0.0				
	Stagnant Tamarack	66	0.0	Stagnant Tamarack	0	0.0				
	Stagnant Northern White-Cedar	0	0.0	Stagnant Cedar	0	0.0				
	Stagnant Conifer	0	0.0							
	Group Sum	66	**0.0**	Group Sum	0	**0.0**				
SHRUBLAND	Upland Shrub	13,742	6.6	Upland Brush	14	0.0	-17.9			
				Cutover Area	93	0.3				
	Lowland Deciduous Shrub	4,279	2.0	Lowland Brush	591	2.0	-1.0			
	Lowland Evergreen Shrub	0	0.0	Muskeg	52	0.2				
	Group Sum	18,020	**8.6**	Group Sum	750	**2.6**	-3.3			
AQUATIC	Water	23,263	11.1	Permanent Water	1,089	3.7				
	Floating Aquatic	2,965	1.4	Non-Permanent Water	1,005	3.5				
	Broadleaf Sedge/Cattail	4,610	2.2	Marsh	1,921	6.6	3.0			
	Sedge Meadow	6,666	3.2	Lowland Grass	360	1.2	-2.6			
	Group Sum	37,503	**17.9**	Group Sum	4,375	**15.0**	-1.2			
CROP/GRASS	Cropland	8,366	4.0	Agricultural	36	0.1	-32.0			
	Grassland	13,967	6.7	Upland Grass	181	0.6	-10.7			
	Prairie	0	0.0							
	Group Sum	22,333	**10.7**	Group Sum	217	**0.7**	-14.3			
DEVELOPED	Low Intensity Urban	105	0.1	Development[6]	67	0.2	3.7			
	High Intensity Urban	24	0.0							
	Mixed Developed	0	0.0							
	Transportation	0	0.0	Roads	26	0.1				
	Group Sum	129	**0.1**	Group Sum	93	**0.3**	5.2			
	Other[7]	0	0.0	Other[8]	58	0.2				
	LTA TOTAL	209,260	100.0	LTA TOTAL	29,112	100.0				

Footnotes: 1. MN GAP data on all ownerships, 2. CSA data on DNR Forestry and Wildlife administered lands, 3. Magnitude of change (ex. -2.0 is a 2-fold decline and 4.5 is a 4.5-fold increase), 4. Includes Central Hardwoods, 5. Includes Scotch Pine, 6. Includes Industrial & Urban Development and Recreation Development, 7. Includes Barren and Lowland Conifer-Deciduous mix, 8. Includes Moss and Rock Outcrop

Swan Creek Sand Plain (212Nc08)

OVERVIEW

Information presented in this document is specific to this LTA with some reference to the larger ECS subsection. This summary was written to provide additional forest management information in this landscape and includes the following main sections: overview, description, land management, and vegetation. See the LTA Assessment and Analysis Guide for section explanations, data descriptions, acronyms, and references.

DESCRIPTION

A landscape dominated by level Rainy and Wadena Lobe outwash plains. Soil parent material is sand. The sand has been reworked by wind; dune features are common. Uplands occupy 64 percent, wetlands occupy 35 percent, and lakes occupy 1 percent of the LTA (MN DNR, 1998).

LAND MANAGEMENT

Land Stewardship

Based on GAP stewardship data, the majority of this LTA is private (68.5%), followed by county (19.5%), and state (12.1%). See table below. This LTA is located in Cass and Wadena counties. The Crow Wing River courses through the LTA. Over 12,927 acres of protected waters exist inside the LTA. Lakes within or adjacent to the LTA include Dry, Sand, Farnham, and Radabaugh.

Federal, state, county, and private industrial lands are dispersed throughout the LTA. The majority of these forestlands occur in the LTA's northern two-thirds, including a large contiguous block of Potlatch Corporation land holdings. No municipalities occur inside the LTA, but the cities of Staples and Motley are the nearest communities.

Agency (%)	Acres	Percent
State (12.1%)		
DNR, Fish and Wildlife	449	1.2%
DNR, Forestry	4,210	10.9%
State (Undifferentiated)	19	0.0%
County (19.5%)		

Cass	6,347	16.4%
Wadena	1,209	3.1%
Private (68.5%)		
Private	20,813	53.7%
Private Industrial	5,738	14.8%
Grand Total	**38,785 acres**	

* note - 620 acres of open water are included in the table above

Natural Resource Management Units

Federal
None known

State
Minnesota Department of Natural Resources
- State Forests: Lyons (southeast/east portions)
- Wildlife Management Areas: Dry Sand

County
None known

Other
None known

VEGETATION

Pre-settlement Vegetation and Tree Species

The major Pre-settlement Vegetation types in this LTA include: Aspen-Birch (trending to Conifers) (14%), Conifer Bogs and Swamps (14%), Jack Pine Barrens and Openings (53%), River Bottom Forest (5%), Wet Prairie (15%).

The following list contains the number of section corner notes from the original Public Land Survey by vegetation/landscape characteristic within this LTA, forest, timber-71, scattering oak, scattering timber-7, thicket, brush, underbrush or only tree around-10, dry land, dry ridge, or island-1, lake, slough, pond-7, river, creek, bottom, or valley, ravine-13, marsh or swamp-70, meadow-5, and burned area-5.

Bearing trees include: Ash-3, Black Ash-1, Aspen-13, Basswood-1, Birch-2, Cottonwood-1, Elm-5, Maple-1, Oak-4, Red Oak-1, Pine-9, Jack Pine-208, Red Pine-55, White Pine-3, Spruce-5, Tamarack-77.

Current Land Cover

As referenced from table on page 5:

- Top five GAP land cover classes on all ownerships (39,929 total acres):
  Jack Pine (20.6%), Aspen/White Birch (16.5%), Grassland (12.5%), Lowland Deciduous Shrub (10.1%), and Sedge Meadow (9.7%).

- Top five CSA main cover types on DNR Forestry and Wildlife land (4,854 total acres):
  Lowland Brush (30.7%), Aspen (18.3%), Jack Pine (15.8 %), Norway Pine (10.2%), and Lowland Grass (7.0%).

- Significant percentage differences in land cover between DNR Forestry and Wildlife land and all ownerships:
  DNR land has 6.8 times more Norway Pine, 3.0 times more Upland Brush, 2.6 times more Ash, 1.3 times less Jack Pine, and 15.0 times less in the Upland Grass group.

Changes in Tree Species Composition

As referenced from table on page 5, the following tree species were or are a significant component of the forest and their abundance has changed significantly since the original land survey (magnitude of change calculated by comparing FIA data to original bearing trees):

There is currently 7.0 times more Bur Oak, 6.0 times more Red Oak, 5.7 times more Aspen, 4.8 times more Paper Birch, and 2.4 times more Ash in this LTA.

50-year Main Cover Type Goals

See main cover type 50-year goals in table on page 5. This LTA was not identified as a priority LTA for cover type increase.

Potential Forest Ecosystem Types and Native Plant Communities

This LTA contains the following forest ecosystem types: Dry Pine. The following Native Plant Communities Classes are known to occur in this LTA **(bold text)** or occur in similar LTAs.

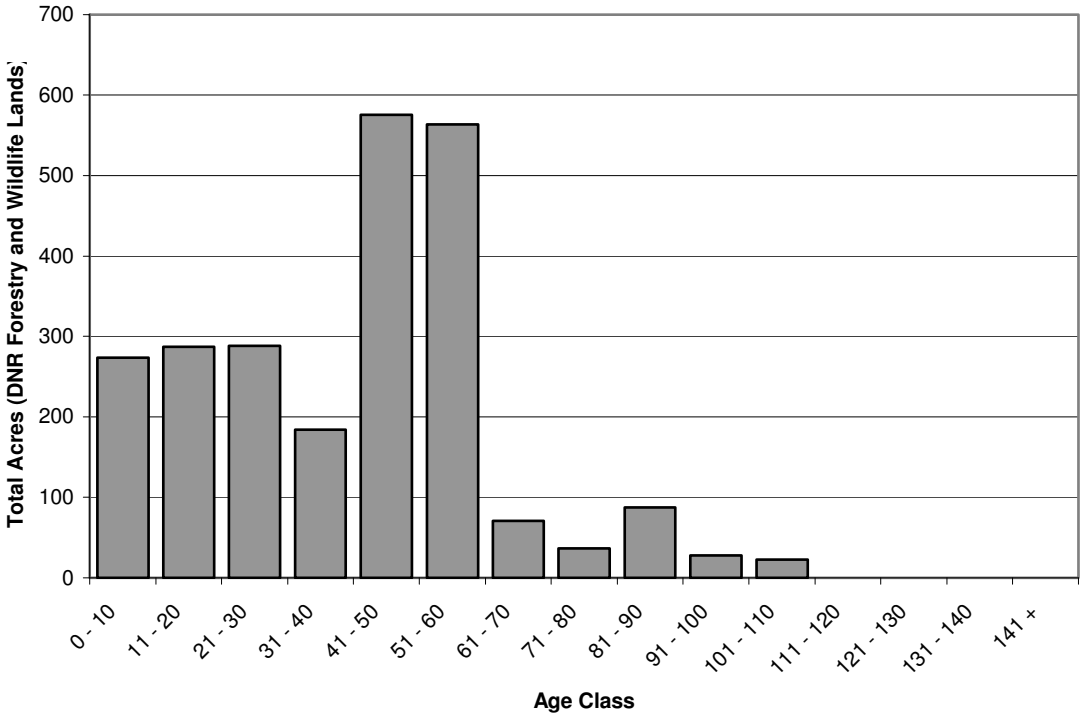
Upland Forests
FDc23, FDc24, FDc25, FDs37, MHc26
Wetland Forests
FFn57, FFn67, WFn55, FPn82, APn81
Non-Forested Communities
OPn81, WMn82

Old Growth, Ecologically Important Lowland Conifers, and Extended Rotation Forests

This LTA contains no old growth stands or associated OFMCs, 5 acres of EILC, and 557 acres of ERF on DNR Forestry and Wildlife land.

Age Classes

Figure below shows age-class distribution of all forested cover types in this LTA (2,417 total acres).



Patch Dynamics

This LTA contains 1 designated forest patches on state forestry and wildlife lands. It is an upland conifers patch (Cottrell).

Swan Creek Sand Plain (212Nc08)

	Current GAP Land Cover[1] All Ownerships			Current CSA Land Cover[2] DNR Forestry and Wildlife			Comparison of DNR to All Ownerships[3]	Comparison of FIA data to Original Bearing Trees		CP-PMOP Cover Type 50-year Goal
GROUP	Land Cover Class	Acres	%	Main Cover Type	Acres	%		Tree Species	Change[3]	
UPLAND DECIDUOUS	Aspen/White Birch	6,580	16.5	Aspen	887	18.3	1.1	Aspen	5.73	-7.9%
				Balm of Gilead	0	0.0		Balm of Gilead	0.00	
				Birch	0	0.0		Paper Birch	4.80	PMOP -5.2%
				Offsite Aspen	0	0.0				
	Maple/Basswood	0	0.0	Northern Hardwoods[4]	0	0.0		Sugar Maple	0.00	-10.8%
								Red Maple	0.00	
								Basswood	0.00	
								Yellow Birch	0.00	
	Bur/White Oak	224	0.6	Oak	8	0.2	-11.3	Bur Oak	7.09	PMOP -10.9%
	Red Oak	542	1.4					Red Oak	6.00	
	Upland Deciduous	0	0.0	Offsite Oak	44	0.9				
	Group Sum	7,345	**18.4**	Group Sum	939	**19.4**	1.1			
LOWLAND DECIDUOUS	Black Ash	345	0.9	Ash	109	2.2	2.6	Ash	2.40	-10.7%
	Lowland Deciduous	0	0.0	Lowland Hardwood	33	0.7		Elm	1.46	
	Group Sum	345	**0.9**	Group Sum	142	**2.9**	3.4			
UPLAND CONIFERS	White Pine mix	83	0.2	White Pine	0	0.0		White Pine	0.00	112.4%
	Red Pine	593	1.5	Norway Pine[5]	493	10.2	6.8	Red Pine	1.16	17.1%
	Red/White Pine	0	0.0							
	Red/White Pine-Deciduous mix	0	0.0							
	Jack Pine	8,214	20.6	Jack Pine	765	15.8	-1.3	Jack Pine	-1.11	84.4%
	Jack Pine-Deciduous mix	0	0.0							
	White Spruce	6	0.0	White Spruce	0	0.0		White Spruce	0.00	2.0%
	Balsam Fir mix	101	0.3	Balsam Fir	0	0.0		Balsam Fir	0.00	-3.3%
	Spruce/Fir-Deciduous mix	0	0.0							
	Upland Black Spruce	0	0.0	Black Spruce, Upland	0	0.0				0.0%
	Upland Northern White-Cedar	0	0.0							
	Upland Conifer	0	0.0							
	Group Sum	8,997	**22.5**	Group Sum	1,258	**25.9**	1.2			
LOWLAND CONIFERS	Lowland Black Spruce	217	0.5	Black Spruce, Lowland	9	0.2	-2.9	Black Spruce	0.00	0.0%
	Tamarack	518	1.3	Tamarack	69	1.4	1.1	Tamarack	0.00	5.4%
	Lowland Northern White-Cedar	32	0.1	Northern White Cedar	0	0.0		Cedar	0.00	5.3%
	Group Sum	766	**1.9**	Group Sum	78	**1.6**	-1.2			
STAGNANT LOWLAND CONIFERS	Stagnant Black Spruce	0	0.0	Stagnant Spruce	0	0.0				
	Stagnant Tamarack	24	0.1	Stagnant Tamarack	0	0.0				
	Stagnant Northern White-Cedar	0	0.0	Stagnant Cedar	0	0.0				
	Stagnant Conifer	0	0.0							
	Group Sum	24	**0.1**	Group Sum	0	**0.0**				
SHRUBLAND	Upland Shrub	2,444	6.1	Upland Brush	2	0.0	-1.7			
				Cutover Area	176	3.6				
	Lowland Deciduous Shrub	4,033	10.1	Lowland Brush	1,489	30.7	3.0			
	Lowland Evergreen Shrub	0	0.0	Muskeg	0	0.0				
	Group Sum	6,478	**16.2**	Group Sum	1,668	**34.4**	2.1			
AQUATIC	Water	217	0.5	Permanent Water	76	1.6				
	Floating Aquatic	225	0.6	Non-Permanent Water	41	0.8				
	Broadleaf Sedge/Cattail	3,084	7.7	Marsh	273	5.6	-1.4			
	Sedge Meadow	3,891	9.7	Lowland Grass	339	7.0	-1.4			
	Group Sum	7,417	**18.6**	Group Sum	729	**15.0**	-1.2			
CROP/GRASS	Cropland	3,581	9.0	Agricultural	0	0.0				
	Grassland	4,976	12.5	Upland Grass	40	0.8	-15.0			
	Prairie	0	0.0							
	Group Sum	8,557	**21.4**	Group Sum	40	**0.8**	-25.8			
DEVELOPED	Low Intensity Urban	0	0.0	Development[6]	0	0.0				
	High Intensity Urban	0	0.0							
	Mixed Developed	0	0.0							
	Transportation	0	0.0	Roads	0	0.0				
	Group Sum	0	**0.0**	Group Sum	0	**0.0**				
	Other[7]	0	0.0	Other[8]	0	0.0				
	LTA TOTAL	39,929	100.0	LTA TOTAL	4,854	100.0				

Footnotes: 1. MN GAP data on all ownerships, 2. CSA data on DNR Forestry and Wildlife administered lands, 3. Magnitude of change (ex. -2.0 is a 2-fold decline and 4.5 is a 4.5-fold increase), 4. Includes Central Hardwoods, 5. Includes Scotch Pine, 6. Includes Industrial & Urban Development and Recreation Development, 7. Includes Barren and Lowland Conifer-Deciduous mix, 8. Includes Moss and Rock Outcrop

Nimrod Drumlin Plain (212Nc10)

OVERVIEW

Information presented in this document is specific to this LTA with some reference to the larger ECS subsection. This summary was written to provide additional forest management information in this landscape and includes the following main sections: overview, description, land management, and vegetation. See the LTA Assessment and Analysis Guide for section explanations, data descriptions, acronyms, and references.

DESCRIPTION

A landscape dominated by level Rainy and Wadena Lobe outwash plains. Long narrow ridges (drumlins) of till material are very common. Uplands occupy 64 percent, wetlands occupy 36 percent, and lakes occupy less than 1 percent of the LTA (MN DNR, 1998).

The majority of the mineral soils has sand over sandy loam textures and sandy loam over sand or gravel textures. They formed under forest vegetation. Hardpans are common in the subsoil. Uplands in the western third of the LTA have sandy soils with features formed under prairie and forest vegetation. Long narrow peatlands are very common. The majority of the upland pre-settlement vegetation was dry pine with minor amounts of lowland (boreal) hardwood-conifer (Shadis, 1999 and Marschner, 1974). The lowland presettlement vegetation was conifer bog and swamp (26 percent) and wet prairie (25 percent) (Marschner, 1974).

LAND MANAGEMENT

Land Stewardship

Based on GAP stewardship data, the majority of this LTA is private (74.5%), followed by county (13.4%), and state (12.1%). See table below. This LTA is located in Cass, Hubbard, and Wadena counties. The Crow Wing River flows through the LTA. Over 46,790 acres of protected waters exist inside the LTA.

Federal, state, county, and private industrial lands are scattered throughout the LTA. The majority of state lands are concentrated in the LTA's west half, whereas most county lands are distributed throughout the east half. Numerous holdings of Potlatch

Corporation lands are evenly distributed in the LTA. Nimrod is the LTA's only municipality.

Agency (%)	Acres	Percent
State (12.1%)		
DNR, Fish and Wildlife	2,732	2.0%
DNR, Forestry	13,775	9.9%
Other	13	0.0%
State (Undifferentiated)	227	0.2%
County (13.4%)		
Cass	12,581	9.1%
Hubbard	5,247	3.8%
Wadena	797	0.6%
Private (74.5%)		
Private	94,186	67.8%
Private Industrial	7,079	5.1%
Private Other	2,206	1.6%
Grand Total	**138,843 acres**	

* note - 1,034 acres of open water are included in the table above

Natural Resource Management Units

Federal

None known

State

Minnesota Department of Natural Resources

- State Forests: Huntersville (east/southeast portions), Badoura (south portion), Lyons (north two-thirds), Foothills (southwest corner)
- Wildlife Management Areas: North Germany, Strike, Huntersville, Burgen Lake Prairie

County

None known

Other

None known

VEGETATION

Pre-settlement Vegetation and Tree Species

The major Pre-settlement Vegetation types in this LTA include: Aspen-Birch (trending to Conifers) (23%), Conifer Bogs and Swamps (35 %), Jack Pine Barrens and Openings (22%), Mixed White Pine and Red Pine (5%), and Wet Prairie (10%).

The following list contains the number of section corner notes from the original Public Land Survey by vegetation/landscape characteristic within this LTA, forest, timber-289,

pine openings, pine barrens, scattered pine-3, scattering oak, scattering timber-15, thicket, brush, underbrush or only tree around-9, dry land, dry ridge, or island-1, lake, slough, pond-4, river, creek, bottom, or valley, ravine-22, marsh or swamp-285, meadow-9, wet prairie or prairie-3, windthrow, windfall-13, and burned area-40.

Bearing trees include: Ash-8, Black Ash-14, Aspen-103, Balm-of-Gilead-2, Balsam Fir-25, Basswood-12, Birch-38, Yellow Birch-1, Cottonwood-1, Elm-14, Ironwood-1, Maple-2, Oak-39 Pine-70, Jack Pine-372, Red Pine-192, White Pine-47, Spruce-51, Tamarack-477, and Willow-2.

Current Land Cover

As referenced from table on page 6:

- Top five GAP land cover classes on all ownerships (140,704 total acres):
  Aspen/White Birch (17.6%), Cropland (17.0%), Sedge Meadow (16.7%), Grassland (12.8%), and Lowland Deciduous Shrub (11.6%).

- Top five CSA main cover types on DNR Forestry and Wildlife land (16,737 total acres):
  Aspen (19.1 %), Marsh (18.0%), Jack Pine (17.1%), Lowland Brush (15.5%), and Lowland Grass (8.7%).

- Significant percentage differences in land cover between DNR Forestry and Wildlife land and all ownerships:
  DNR land has 6.7 times more Marsh, 4.9 times more Norway Pine, 1.7 times more Jack Pine, 1.9 times less Lowland Grass, and 3.3 times less in the Upland Grass group.

Changes in Tree Species Composition

As referenced from table on page 6, the following tree species were or are a significant component of the forest and their abundance has changed significantly since the original land survey (magnitude of change calculated by comparing FIA data to original bearing trees):

There is currently 18.0 times more Balm of Gilead, 4.8 times more Aspen, 3.4 times more Elm, 1.9 times more Paper Birch, 2.0 times less Red Pine, and 39.3 times less Tamarack in this LTA.

50-year Main Cover Type Goals

See main cover type 50-year goals in table on page 6. This is a priority LTA for Norway Pine cover type increase.

Potential Forest Ecosystem Types and Native Plant Communities

This LTA contains the following forest ecosystem types: Dry Pine. The following Native Plant Communities Classes are known to occur in this LTA **(bold text)** or occur in similar LTAs.

Upland Forests

FDn12, FDn33, FDc12, FDc23, FDc24, FDc34, MHn44, MHn47, MHc26, MHc36.

Wetland Forests

FFn57, FFn67, WFn53, WFn55, WFn64, FPn63, FPn82, APn81.

Non-Forested Communities

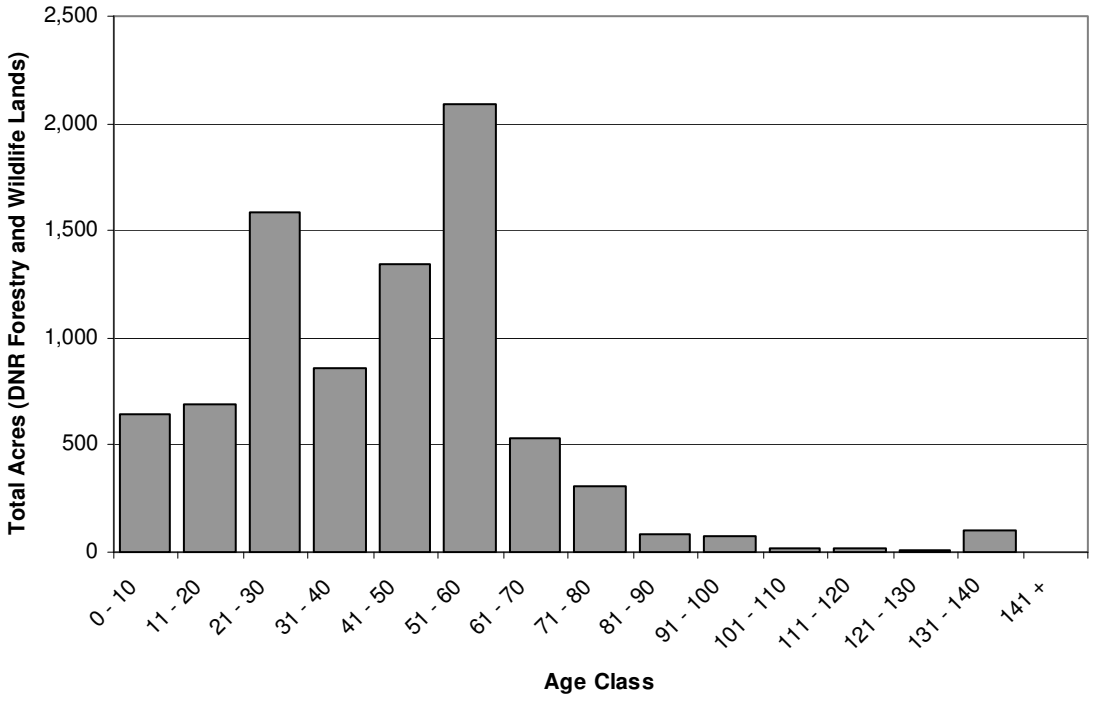
APn91, OPn81, OPn91, OPn92, WMn73, WMn82, FPn73.

Old Growth, Ecologically Important Lowland Conifers, and Extended Rotation Forests

This LTA contains 1 old growth stands with associated OFMC, 26 acres of EILC, and 1,836 acres of ERF on DNR Forestry and Wildlife land.

Age Classes

Figure below shows age-class distribution of all forested cover types in this LTA (8,348 total acres).



Patch Dynamics

This LTA contains 6 designated forest patches on state forestry and wildlife lands. They include 4 upland conifer patches (Bunny Hill, Howser's Corner, Mud Lake Duck Camp, and Lyons Shelter) and 2 lowland hardwood patches (Ansel Old Growth and Long Ash Corridor).

Nimrod Drumlin Plain (212Nc10)										
	Current GAP Land Cover[1] All Ownerships			Current CSA Land Cover[2] DNR Forestry and Wildlife			Comparison of DNR to All Ownerships[3]	Comparison of FIA data to Original Bearing Trees		CP-PMOP Cover Type 50-year Goal
GROUP	Land Cover Class	Acres	%	Main Cover Type	Acres	%		Tree Species	Change[3]	
UPLAND DECIDUOUS	Aspen/White Birch	24,726	17.6	Aspen	3,204	19.1	1.1	Aspen	4.76	-7.9%
				Balm of Gilead	107	0.6		Balm of Gilead	18.00	
				Birch	37	0.2		Paper Birch	1.88	PMOP -5.2%
				Offsite Aspen	0	0.0				
	Maple/Basswood	37	0.0	Northern Hardwoods[4]	0	0.0		Sugar Maple	0.00	-10.8%
								Red Maple	0.00	
								Basswood	0.00	
								Yellow Birch	0.00	
	Bur/White Oak	1,172	0.8	Oak	146	0.9	-2.6	Bur Oak	1.04	PMOP -10.9%
	Red Oak	1,971	1.4					Red Oak	0.00	
	Upland Deciduous	0	0.0	Offsite Oak	8	0.0				
	Group Sum	27,907	**19.8**	Group Sum	3,502	**20.9**	1.1			
LOWLAND DECIDUOUS	Black Ash	1,565	1.1	Ash	313	1.9	1.7	Ash	1.14	-10.7%
	Lowland Deciduous	0	0.0	Lowland Hardwood	12	0.1		Elm	3.38	
	Group Sum	1,565	**1.1**	Group Sum	325	**1.9**	1.7			
UPLAND CONIFERS	White Pine mix	192	0.1	White Pine	10	0.1	-2.2	White Pine	0.00	112.4%
	Red Pine	1,724	1.2	Norway Pine[5]	1,010	6.0	4.9	Red Pine	-2.03	17.1%
	Red/White Pine	0	0.0							
	Red/White Pine-Deciduous mix	0	0.0							
	Jack Pine	13,805	9.8	Jack Pine	2,866	17.1	1.7	Jack Pine	1.82	84.4%
	Jack Pine-Deciduous mix	0	0.0							
	White Spruce	16	0.0	White Spruce	485	2.9	247.8	White Spruce	0.00	2.0%
	Balsam Fir mix	90	0.1	Balsam Fir	8	0.1	-1.3	Balsam Fir	0.00	-3.3%
	Spruce/Fir-Deciduous mix	0	0.0							
	Upland Black Spruce	0	0.0	Black Spruce, Upland	3	0.0				0.0%
	Upland Northern White-Cedar	0	0.0							
	Upland Conifer	0	0.0							
	Group Sum	15,828	**11.2**	Group Sum	4,383	**26.2**	2.3			
LOWLAND CONIFERS	Lowland Black Spruce	48	0.0	Black Spruce, Lowland	45	0.3	7.9	Black Spruce	0.00	0.0%
	Tamarack	1,196	0.9	Tamarack	92	0.6	-1.5	Tamarack	-39.25	5.4%
	Lowland Northern White-Cedar	14	0.0	Northern White Cedar	0	0.0		Cedar	0.00	5.3%
	Group Sum	1,258	**0.9**	Group Sum	137	**0.8**	-1.1			
STAGNANT LOWLAND CONIFERS	Stagnant Black Spruce	0	0.0	Stagnant Spruce	0	0.0				
	Stagnant Tamarack	88	0.1	Stagnant Tamarack	0	0.0				
	Stagnant Northern White-Cedar	0	0.0	Stagnant Cedar	0	0.0				
	Stagnant Conifer	0	0.0							
	Group Sum	88	**0.1**	Group Sum	0	**0.0**				
SHRUBLAND	Upland Shrub	7,629	5.4	Upland Brush	271	1.6	-2.0			
				Cutover Area	192	1.1				
	Lowland Deciduous Shrub	16,348	11.6	Lowland Brush	2,589	15.5	1.3			
	Lowland Evergreen Shrub	0	0.0	Muskeg	0	0.0				
	Group Sum	23,977	**17.0**	Group Sum	3,053	**18.2**	1.1			
AQUATIC	Water	798	0.6	Permanent Water	185	1.1				
	Floating Aquatic	38	0.0	Non-Permanent Water	9	0.1				
	Broadleaf Sedge/Cattail	3,794	2.7	Marsh	3,016	18.0	6.7			
	Sedge Meadow	23,463	16.7	Lowland Grass	1,457	8.7	-1.9			
	Group Sum	28,094	**20.0**	Group Sum	4,667	**27.9**	1.4			
CROP/GRASS	Cropland	23,981	17.0	Agricultural	6	0.0	-495.3			
	Grassland	17,999	12.8	Upland Grass	658	3.9	-3.3			
	Prairie	0	0.0							
	Group Sum	41,980	**29.8**	Group Sum	664	**4.0**	-7.5			
DEVELOPED	Low Intensity Urban	7	0.0	Development[6]	0	0.0				
	High Intensity Urban	1	0.0							
	Mixed Developed	0	0.0							
	Transportation	0	0.0	Roads	6	0.0				
	Group Sum	8	**0.0**	Group Sum	6	**0.0**	6.6			
	Other[7]	0	0.0	Other[8]	0	0.0				
	LTA TOTAL	140,704	100.0	LTA TOTAL	16,737	100.0				

Footnotes: 1. MN GAP data on all ownerships, 2. CSA data on DNR Forestry and Wildlife administered lands, 3. Magnitude of change (ex. -2.0 is a 2-fold decline and 4.5 is a 4.5-fold increase), 4. Includes Central Hardwoods, 5. Includes Scotch Pine, 6. Includes Industrial & Urban Development and Recreation Development, 7. Includes Barren and Lowland Conifer-Deciduous mix, 8. Includes Moss and Rock Outcrop

Park Rapids Sand Plain (212Nc11)

OVERVIEW

Information presented in this document is specific to this LTA with some reference to the larger ECS subsection. This summary was written to provide additional forest management information in this landscape and includes the following main sections: overview, description, land management, and vegetation. See the LTA Assessment and Analysis Guide for section explanations, data descriptions, acronyms, and references.

DESCRIPTION

A landscape dominated by level to rolling outwash plains formed by the Wadena Lobe Glacier. Channels formed by post-glacial melt water are common. Uplands occupy 82 percent, wetlands occupy 11 percent, and lakes occupy 7 percent of the LTA (MN DNR,1998). The majority of the mineral soils have sandy loam (52 percent) or sand (40 percent) textures. Fifty-five percent of the upland soils formed under a combination of prairie and forest vegetation while 43 percent formed under forest vegetation.

The majority of the upland pre-settlement vegetation was dry pine forest (53 percent) and lowland (boreal) hardwood-conifer (22 percent) (Shadis, 1999 and Marschner, 1974). The majority of lowland pre-settlement vegetation was conifer bog and swamp (Marschner, 1974).

LAND MANAGEMENT

Land Stewardship

Based on GAP stewardship data, the majority of this LTA is private (87.5%), followed by state (6.9%), and county (4.9%). See table below. This LTA is located in Hubbard, Cass, Becker, and Wadena counties. Over 59,587 acres of protected waters exist inside the LTA. Lakes within or adjacent to the LTA include Fish Hook, Crow Wing chain of lakes, Belle Taine, Big Sand, Shell, and Straight.

Small portions of the LTA are inside White Earth Indian Reservation and Chippewa National Forest. Federal, state, county, and private industrial lands are widely scattered throughout the LTA. The majority of public lands include both state-owned and county

administered lands. Large blocks of state land exist in the southeast portion of the LTA, while the largest contiguous blocks of county lands occur in the east central and northwest portions. Most Potlatch Corporation lands are distributed within the south two-thirds of the LTA. Municipalities include Akeley, Menahga, Park Rapids, and Nevis.

Agency (%)	Acres	Percent
State (6.9%)		
DNR, Ecological Resources	200	0.1%
DNR, Fish and Wildlife	4,396	1.3%
DNR, Forestry	19,161	5.6%
County (4.9%)		
Becker	4,230	1.2%
Cass	2,137	0.6%
Hubbard	10,271	3.0%
Wadena	274	0.1%
Federal (0.3%)		
Bureau of Indian Affairs	429	0.1%
Other	405	0.1%
U.S. Forest Service	162	0.0%
White Earth Reservation	86	0.0%
Other Public (0.3%)		
City of Nevis	42	0.0%
City of Park Rapids	1,026	0.3%
School District	123	0.0%
Private (87.5%)		
Private	260,497	75.6%
Private Industrial	41,129	11.9%
Private Other	183	0.1%
Grand Total	**344,751 acres**	

* note - 26,939 acres of open water are included in the table above

Natural Resource Management Units

Federal

United States Forest Service

- National Forests: Chippewa (southwest corner)

State

Minnesota Department of Natural Resources

- State Forests: Paul Bunyan (southwest and southeast portions), Huntersville (southeast portion), Two Inlets (northwest, west central, and southwest) Badoura (south portion), Smokey Hills (north boundary), White Earth (extreme south), Foothills (southwest portion)
- Wildlife Management Areas: Kitten Creek, Yeager Lake, Lowe, Red Eye, Menahga, Huntersville, Burgen Lake Prairie, Crow Wing Chain
- Aquatic Management Areas: Sixth Crow Wing Lake, Straight River/Fish River, Shell Lake, Bog Lake

- Fish Management Areas: Park Rapids Hatchery, Fifth Crow Wing Lake, Fourth Crow Wing Lake, Straight River, Big Stony Lake, First Crow Wing Lake, Straight Lake, Cat Creek, Rogers Lake
- Scientific and Natural Areas: Greenwater Lake

County

None known

Other

White Earth Indian Reservation

VEGETATION

Pre-settlement Vegetation and Tree Species

The major Pre-settlement Vegetation types in this LTA include: Aspen-Birch (trending to Conifers) (24%), Conifer Bogs and Swamps (7 %), Jack Pine Barrens and Openings (54%), Lakes (open water) (5%), and Wet Prairie (6 %).

The following list contains the number of section corner notes from the original Public Land Survey by vegetation/landscape characteristic within this LTA, forest, timber- 903, pine grove or grove-1, pine openings, pine barrens, scattered pine-51, scattering oak, scattering timber-200, oak barrens or oak openings-4, thicket, brush, underbrush or only tree around-44, lake, slough, pond-136, river, creek, bottom, or valley, ravine-24, marsh or swamp-161, meadow-3, wet prairie or prairie-50, windthrow, windfall-9, and burned area-126.

Bearing trees include: Ash-9, Black Ash-6, Aspen-208, Balm-of-Gilead-1, Balsam Fir-11, Basswood-2, Birch-58, Elm-14, Maple-1, Oak-67, Bur Oak-40, Red Oak-16, Pine-60, Jack Pine-2371, Red Pine-796, White Pine-46, Spruce-50, and Tamarack-205.

Current Land Cover

As referenced from table on page 6:

- Top five GAP land cover classes on all ownerships (377,018 total acres):
  Cropland (32.1%), Aspen/White Birch (18.9%), Jack Pine (14.1%), Water (7.2%), and Grassland (7.1%).

- Top five CSA main cover types on DNR Forestry and Wildlife land (24,056 total acres):
  Norway Pine (24.5 %), Aspen (20.5%), Jack Pine (13.6%), Lowland Brush (7.2%), and Marsh (6.9%).

- Significant percentage differences in land cover between DNR Forestry and Wildlife land and all ownerships:

DNR land has 6.6 times more Norway Pine, 5.7 times more Marsh, 3.3 times more Tamarack, 2.1 times more Lowland Brush, 1.0 times less Jack Pine, and 3.2 times less in the Upland Grass group.

Changes in Tree Species Composition

As referenced from table on page 6, the following tree species were or are a significant component of the forest and their abundance has changed significantly since the original land survey (magnitude of change calculated by comparing FIA data to original bearing trees):

There is currently 10.0 times more Red Oak, 6.3 times more Balsam Fir, 5.7 times more Ash, 5.5 times more Aspen, 3.8 times more Paper Birch, 2.7 times more Bur Oak, 2.0 times less White Spruce, 2.7 times less Tamarack, and 3.3 times less White Pine in this LTA.

50-year Main Cover Type Goals

See main cover type 50-year goals in table on page 6. This is a priority LTA for Jack Pine cover type increase.

Potential Forest Ecosystem Types and Native Plant Communities

This LTA contains the following forest ecosystem types: Dry Pine. The following Native Plant Communities Classes are known to occur in this LTA **(bold text)** or occur in similar LTAs.

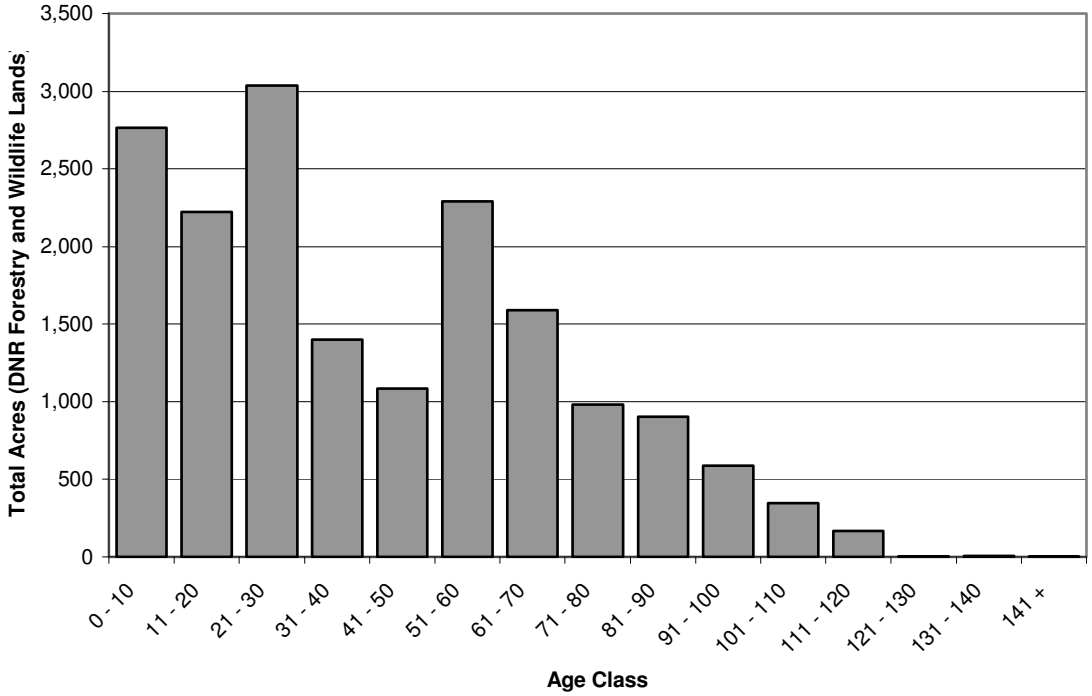
Upland Forests
FDn12, FDn33, **FDc12, FDc23, FDc24, FDc34**, MHn44, MHn47, MHc26, MHc36, MHc37
Wetland Forests
FFn57, FFn67, WFn53, WFn55, WFn64, FPn63, FPn82, APn81
Non-Forested Communities
APn91, OPn81, OPn91, OPn92, WMn73, WMn82, FPn73

Old Growth, Ecologically Important Lowland Conifers, and Extended Rotation Forests

This LTA contains 5 old growth stands with associated OFMCs, 40 acres of EILC, and 8,242 acres of ERF on DNR Forestry and Wildlife land.

Age Classes

Figure below shows age-class distribution of all forested cover types in this LTA (17,403 total acres).



Patch Dynamics

This LTA contains 13 designated forest patches on state forestry and wildlife lands. They include 11 upland conifer patches (Finn Lake, Mary Brown West, Howser's Corner, McKinley, Badoura Patch, Boot Lake, Mary Brown East, Shell City, Mantrap Lake, Crow Wing Pine, and Wallingford Creek Pine) and 2 lowland conifer patches (Crow Wing Tamarack and Wallingford Creek Tamarack).

Park Rapids Sand Plain (212Nc11)										
	Current GAP Land Cover[1] All Ownerships			Current CSA Land Cover[2] DNR Forestry and Wildlife			Comparison of DNR to All Ownerships[3]	Comparison of FIA data to Original Bearing Trees		CP-PMOP Cover Type 50-year Goal
GROUP	Land Cover Class	Acres	%	Main Cover Type	Acres	%		Tree Species	Change[3]	
UPLAND DECIDUOUS	Aspen/White Birch	71,122	18.9	Aspen	4,938	20.5	1.2	Aspen	5.52	-7.9%
				Balm of Gilead	0	0.0		Balm of Gilead	0.00	
				Birch	355	1.5		Paper Birch	3.79	PMOP -5.2%
				Offsite Aspen	0	0.0				
	Maple/Basswood	371	0.1	Northern Hardwoods[4]	98	0.4	4.1	Sugar Maple	0.00	-10.8%
								Red Maple	0.00	
								Basswood	0.00	
								Yellow Birch	0.00	
	Bur/White Oak	4,094	1.1	Oak	605	2.5	-1.1	Bur Oak	2.70	PMOP -10.9%
	Red Oak	6,128	1.6					Red Oak	10.00	
	Upland Deciduous	0	0.0	Offsite Oak	131	0.5				
	Group Sum	81,715	**21.7**	Group Sum	6,127	**25.5**	1.2			
LOWLAND DECIDUOUS	Black Ash	1,957	0.5	Ash	357	1.5	2.9	Ash	5.67	-10.7%
	Lowland Deciduous	0	0.0	Lowland Hardwood	38	0.2		Elm	1.67	
	Group Sum	1,957	**0.5**	Group Sum	395	**1.6**	3.2			
UPLAND CONIFERS	White Pine mix	1,456	0.4	White Pine	65	0.3	-1.4	White Pine	-3.33	112.4%
	Red Pine	13,883	3.7	Norway Pine[5]	5,884	24.5	6.6	Red Pine	-1.61	17.1%
	Red/White Pine	0	0.0							
	Red/White Pine-Deciduous mix	0	0.0							
	Jack Pine	53,266	14.1	Jack Pine	3,280	13.6	-1.0	Jack Pine	-1.63	84.4%
	Jack Pine-Deciduous mix	0	0.0							
	White Spruce	228	0.1	White Spruce	407	1.7	28.0	White Spruce	-2.00	2.0%
	Balsam Fir mix	646	0.2	Balsam Fir	198	0.8	4.8	Balsam Fir	6.33	-3.3%
	Spruce/Fir-Deciduous mix	0	0.0							
	Upland Black Spruce	0	0.0	Black Spruce, Upland	33	0.1				0.0%
	Upland Northern White-Cedar	0	0.0							
	Upland Conifer	0	0.0							
	Group Sum	69,478	**18.4**	Group Sum	9,867	**41.0**	2.2			
LOWLAND CONIFERS	Lowland Black Spruce	817	0.2	Black Spruce, Lowland	256	1.1	4.9	Black Spruce	1.00	0.0%
	Tamarack	3,380	0.9	Tamarack	720	3.0	3.3	Tamarack	-2.65	5.4%
	Lowland Northern White-Cedar	90	0.0	Northern White Cedar	0	0.0		Cedar	0.00	5.3%
	Group Sum	4,287	**1.1**	Group Sum	977	**4.1**	3.6			
STAGNANT LOWLAND CONIFERS	Stagnant Black Spruce	0	0.0	Stagnant Spruce	10	0.0				
	Stagnant Tamarack	359	0.1	Stagnant Tamarack	23	0.1	-1.0			
	Stagnant Northern White-Cedar	0	0.0	Stagnant Cedar	0	0.0				
	Stagnant Conifer	0	0.0							
	Group Sum	359	**0.1**	Group Sum	33	**0.1**	1.4			
SHRUBLAND	Upland Shrub	10,353	2.7	Upland Brush	72	0.3	1.4			
				Cutover Area	873	3.6				
	Lowland Deciduous Shrub	12,820	3.4	Lowland Brush	1,742	7.2	2.1			
	Lowland Evergreen Shrub	0	0.0	Muskeg	0	0.0				
	Group Sum	23,173	**6.1**	Group Sum	2,687	**11.2**	1.8			
AQUATIC	Water	27,188	7.2	Permanent Water	540	2.2				
	Floating Aquatic	25	0.0	Non-Permanent Water	113	0.5				
	Broadleaf Sedge/Cattail	4,511	1.2	Marsh	1,654	6.9	5.7			
	Sedge Meadow	15,428	4.1	Lowland Grass	393	1.6	-2.5			
	Group Sum	47,152	**12.5**	Group Sum	2,700	**11.2**	-1.1			
CROP/GRASS	Cropland	121,076	32.1	Agricultural	423	1.8	-18.3			
	Grassland	26,902	7.1	Upland Grass	530	2.2	-3.2			
	Prairie	0	0.0							
	Group Sum	147,978	**39.2**	Group Sum	953	**4.0**	-9.9			
DEVELOPED	Low Intensity Urban	715	0.2	Development[6]	252	1.0	4.5			
	High Intensity Urban	164	0.0							
	Mixed Developed	0	0.0							
	Transportation	0	0.0	Roads	47	0.2				
	Group Sum	878	**0.2**	Group Sum	299	**1.2**	5.3			
	Other[7]	41	0.0	Other[8]	18	0.1				
	LTA TOTAL	377,018	100.0	LTA TOTAL	24,056	100.0				

Footnotes: 1. MN GAP data on all ownerships, 2. CSA data on DNR Forestry and Wildlife administered lands, 3. Magnitude of change (ex. -2.0 is a 2-fold decline and 4.5 is a 4.5-fold increase), 4. Includes Central Hardwoods, 5. Includes Scotch Pine, 6. Includes Industrial & Urban Development and Recreation Development, 7. Includes Barren and Lowland Conifer-Deciduous mix, 8. Includes Moss and Rock Outcrop

Spring Brook Till Plain (212Nc13)

OVERVIEW

Information presented in this document is specific to this LTA with some reference to the larger ECS subsection. This summary was written to provide additional forest management information in this landscape and includes the following main sections: overview, description, land management, and vegetation. See the LTA Assessment and Analysis Guide for section explanations, data descriptions, acronyms, and references.

DESCRIPTION

A landscape dominated by a rolling till plains with small areas of hilly-pitted outwash, eskers, and melt water channels. The Rainy Lobe Glacier formed all landforms. Uplands occupy 68 percent, wetlands occupy 21 percent, and lakes occupy 11 percent of the LTA (MN DNR, 1998). The majority (63 percent) of the LTA has mineral soils with sandy loam texture. Twenty-four percent of the LTA has mineral soils with loam or clay-loam textures, while 11 percent are sandy. All upland soils formed under forest vegetation (NRCS, 1994). Lakes occupy 6 percent of the area.

The majority of the upland presettlement vegetation was mixed white pine-red pine (36 percent) and lowland (boreal) hardwood-conifer (13 percent) (Shadis, 1999 and Marschner, 1974). The majority of lowland pre-settlement vegetation was conifer bog and swamp (Marschner, 1974).

LAND MANAGEMENT

Land Stewardship

Based on GAP stewardship data, the majority of this LTA is county (58.9%), followed by private (30.6%), state (7.3%), and federal (2.0%). See table below. This LTA is located in Crow Wing and Cass counties. Over 29,116 acres of protected waters exist inside the LTA. Lakes within or adjacent to the LTA include Little Boy, Laura, Lower Trelipe, Inguadona, West Fox, and East Fox.

The majority of land within the LTA is publicly owned. Parts of the LTA are inside Leech Lake Indian Reservation and Chippewa National Forest. USFS lands are found in

the LTA's northern-most portion. Scattered blocks of state lands occur throughout the LTA, while county lands make up the bulk of the LTA's ownership. Potlatch Corporation land holdings are located in the south two-thirds of the LTA. Municipalities include Emily, Fifty Lakes, and Manhattan Beach.

Agency (%)	Acres	Percent
State (7.3%)		
DNR, Fish and Wildlife	834	0.8%
DNR, Forestry	6,740	6.4%
DNR, Trails and Waterways	32	0.0%
County (58.9%)		
Cass	40,006	38.2%
Crow Wing	19,970	19.1%
Hubbard	1,737	1.7%
Federal (2.0%)		
Other	98	0.1%
U.S. Forest Service	1,985	1.9%
Other Public (1.2%)		
Private	52	0.0%
University of Minnesota	1,198	1.1%
Private (30.6%)		
Private	28,811	27.5%
Private Industrial	3,231	3.1%
Grand Total	**104,694 acres**	

* note - 10,875 acres of open water are included in the table above

Natural Resource Management Units

Federal

United States Forest Service

- National Forests: Chippewa (southeastern fringe)

State

Minnesota Department of Natural Resources

- State Forests: Land O'Lakes (west portions)
- Wildlife Management Areas: Draggett Brook
- Aquatic Management Areas: Snowshoe Lake

County

None known

Other

Leech Lake Indian Reservation

VEGETATION

Pre-settlement Vegetation and Tree Species

The major Pre-settlement Vegetation types in this LTA include: Aspen-Birch (trending to Conifers) (13%), Conifer Bogs and Swamps (16%), Lakes (open water) (6%), Mixed Hardwood and Pine (Maple, White Pine, Basswood, etc) (19%), and Mixed White Pine and Red Pine (36%).

The following list contains the number of section corner notes from the original Public Land Survey by vegetation/landscape characteristic within this LTA, forest, timber-426, pine grove or grove-1, pine openings, pine barrens, scattered pine-1, scattering oak, scattering timber-4, thicket, brush, underbrush or only tree around-6, dry land, dry ridge, or island-2, lake, slough, pond-44, river, creek, bottom, or valley, ravine-1, marsh or swamp-81, windthrow, windfall-11, and burned area-13.

Bearing trees include: Ash-25, Black Ash-6, Aspen-240, Balsam Fir-28, Basswood-18, Birch-203, Yellow Birch-7, Cedar-49, Elm-11, Ironwood-7, Maple-69, Sugar Maple-15, Oak-32, Bur Oak-13, Red Oak-23, Pine-10, Jack Pine-41, Red Pine-121, White Pine-198, Spruce-57, Tamarack-175, and Willow-1.

Current Land Cover

As referenced from table on page 6:

- Top five GAP land cover classes on all ownerships (120,699 total acres):
  Aspen/White Birch (46.3%), Red Oak (8.9%), Sedge Meadow (7.6%), Water (7.0%), and Upland Shrub (6.4%).

- Top five CSA main cover types on DNR Forestry and Wildlife land (7,389 total acres):
  Aspen (49.9 %), Marsh (12.1%), Norway Pine (8.0%), Lowland Brush (4.6%), and Northern White Cedar (4.2%).

- Significant percentage differences in land cover between DNR Forestry and Wildlife land and all ownerships:
  DNR land has 14.1 times more Balsam Fir, 4.9 times more Marsh, 4.6 times more Norway Pine, 3.3 times less Oak, and 5.5 times less in the Lowland Grass group.

Changes in Tree Species Composition

As referenced from table on page 6, the following tree species were or are a significant component of the forest and their abundance has changed significantly since the original land survey (magnitude of change calculated by comparing FIA data to original bearing trees):

There is currently 3.0 times more Elm, 2.7 times more Bur Oak, 2.5 times more Aspen, 2.1 times more Red Oak, 2.3 times less Black Spruce, 2.4 times less Sugar Maple, 2.8 times less Red Pine, 2.9 times less Jack Pine, 5.8 times less White Spruce, 7.2 times less Tamarack, and 24.3 times less White Pine in this LTA.

50-year Main Cover Type Goals

See main cover type 50-year goals in table on page 6. This is a priority LTA for Norway Pine and White Pine cover type increase.

Potential Forest Ecosystem Types and Native Plant Communities

This LTA contains the following forest ecosystem types: Dry-Mesic Pine. The following Native Plant Communities Classes are known to occur in this LTA **(bold text)** or occur in similar LTAs.

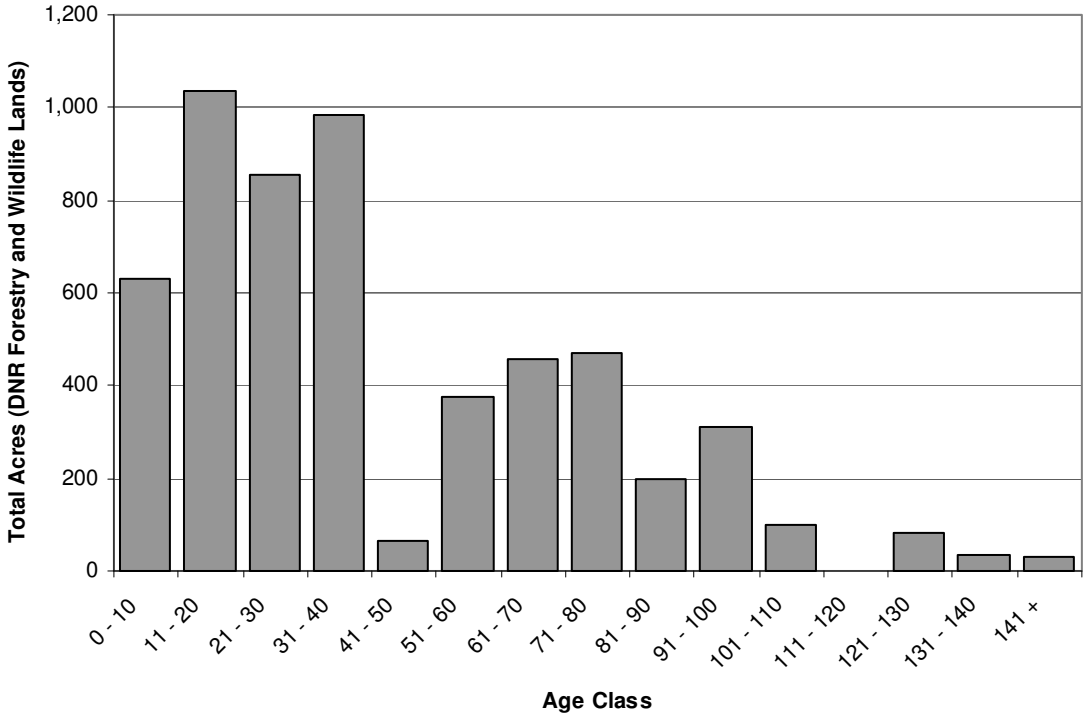
Upland Forests
FDn33, FDc24, FDc25**, FDc34, MHn35, MHn46**, MHn47, **MHc26,** MHc36, MHc47
Wetland Forests
FFn67, **WFn53,** WFn55, **WFn64**, FPn63, **FPn82**, APn80, **APn81**
Non-Forested Communities
APn91, MRn83**, OPn92, WMn82**

Old Growth, Ecologically Important Lowland Conifers, and Extended Rotation Forests

This LTA contains 2 old growth stands with associated OFMCs, 211 acres of EILC, and 1,525 acres of ERF on DNR Forestry and Wildlife land.

Age Classes

Figure below shows age-class distribution of all forested cover types in this LTA (5,631 total acres).



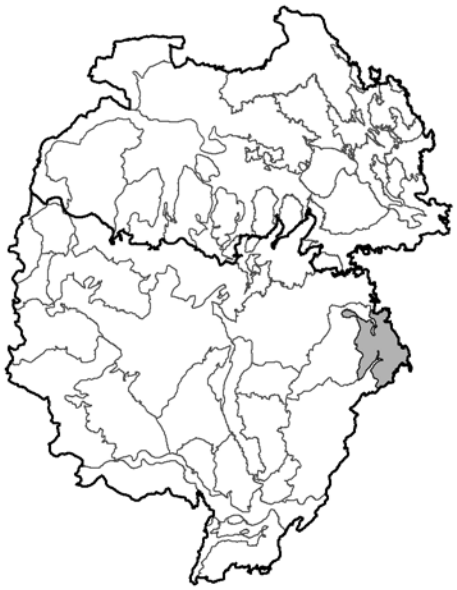
Patch Dynamics

This LTA contains 2 designated forest patches on state forestry and wildlife lands. They include an upland conifers patch (Dagget Brook) and a lowland conifers patch (Trelipe Creek).

Spring Brook Till Plain (212Nc13)										
	Current GAP Land Cover[1] All Ownerships			Current CSA Land Cover[2] DNR Forestry and Wildlife			Comparison of DNR to All Ownerships[3]	Comparison of FIA data to Original Bearing Trees		CP-PMOP Cover Type 50-year Goal
GROUP	Land Cover Class	Acres	%	Main Cover Type	Acres	%		Tree Species	Change[3]	
UPLAND DECIDUOUS	Aspen/White Birch	55,907	46.3	Aspen	3,685	49.9	1.1	Aspen	2.45	-7.9%
				Balm of Gilead	13	0.2		Balm of Gilead	0.00	
				Birch	114	1.5		Paper Birch	1.15	PMOP -5.2%
				Offsite Aspen	11	0.1				
	Maple/Basswood	842	0.7	Northern Hardwoods[4]	6	0.1	-8.6	Sugar Maple	-2.44	-10.8%
								Red Maple	1.25	
								Basswood	1.00	
								Yellow Birch	0.00	
	Bur/White Oak	325	0.3	Oak	204	2.8	-3.3	Bur Oak	2.67	PMOP -10.9%
	Red Oak	10,697	8.9					Red Oak	2.06	
	Upland Deciduous	0	0.0	Offsite Oak	0	0.0				
	Group Sum	67,770	**56.1**	Group Sum	4,033	**54.6**	-1.0			
LOWLAND DECIDUOUS	Black Ash	3,931	3.3	Ash	250	3.4	1.0	Ash	1.68	-10.7%
	Lowland Deciduous	0	0.0	Lowland Hardwood	37	0.5		Elm	3.00	
	Group Sum	3,931	**3.3**	Group Sum	287	**3.9**	1.2			
UPLAND CONIFERS	White Pine mix	248	0.2	White Pine	84	1.1	5.5	White Pine	-24.33	112.4%
	Red Pine	2,087	1.7	Norway Pine[5]	590	8.0	4.6	Red Pine	-2.75	17.1%
	Red/White Pine	0	0.0							
	Red/White Pine-Deciduous mix	0	0.0							
	Jack Pine	1,524	1.3	Jack Pine	8	0.1	-11.6	Jack Pine	-2.90	84.4%
	Jack Pine-Deciduous mix	0	0.0							
	White Spruce	72	0.1	White Spruce	57	0.8	13.0	White Spruce	-5.75	2.0%
	Balsam Fir mix	164	0.1	Balsam Fir	142	1.9	14.1	Balsam Fir	1.76	-3.3%
	Spruce/Fir-Deciduous mix	0	0.0							
	Upland Black Spruce	0	0.0	Black Spruce, Upland	0	0.0				0.0%
	Upland Northern White-Cedar	0	0.0							
	Upland Conifer	0	0.0							
	Group Sum	4,094	**3.4**	Group Sum	881	**11.9**	3.5			
LOWLAND CONIFERS	Lowland Black Spruce	1,697	1.4	Black Spruce, Lowland	37	0.5	-2.8	Black Spruce	-2.33	0.0%
	Tamarack	2,062	1.7	Tamarack	10	0.1	-12.5	Tamarack	-7.24	5.4%
	Lowland Northern White-Cedar	1,001	0.8	Northern White Cedar	311	4.2	5.1	Cedar	1.37	5.3%
	Group Sum	4,760	**3.9**	Group Sum	358	**4.8**	1.2			
STAGNANT LOWLAND CONIFERS	Stagnant Black Spruce	0	0.0	Stagnant Spruce	0	0.0				
	Stagnant Tamarack	226	0.2	Stagnant Tamarack	0	0.0				
	Stagnant Northern White-Cedar	0	0.0	Stagnant Cedar	72	1.0				
	Stagnant Conifer	0	0.0							
	Group Sum	226	**0.2**	Group Sum	72	**1.0**	5.2			
SHRUBLAND	Upland Shrub	7,721	6.4	Upland Brush	3	0.0	-159.2			
				Cutover Area	0	0.0				
	Lowland Deciduous Shrub	3,668	3.0	Lowland Brush	340	4.6	1.5			
	Lowland Evergreen Shrub	0	0.0	Muskeg	23	0.3				
	Group Sum	11,390	**9.4**	Group Sum	366	**5.0**	-1.9			
AQUATIC	Water	8,490	7.0	Permanent Water	120	1.6				
	Floating Aquatic	1,479	1.2	Non-Permanent Water	239	3.2				
	Broadleaf Sedge/Cattail	2,953	2.4	Marsh	895	12.1	4.9			
	Sedge Meadow	9,175	7.6	Lowland Grass	103	1.4	-5.5			
	Group Sum	22,098	**18.3**	Group Sum	1,357	**18.4**	1.0			
CROP/GRASS	Cropland	1,599	1.3	Agricultural	0	0.0				
	Grassland	4,817	4.0	Upland Grass	6	0.1	-46.4			
	Prairie	0	0.0							
	Group Sum	6,415	**5.3**	Group Sum	6	**0.1**	-61.8			
DEVELOPED	Low Intensity Urban	15	0.0	Development[6]	22	0.3	24.1			
	High Intensity Urban	0	0.0							
	Mixed Developed	0	0.0							
	Transportation	0	0.0	Roads	7	0.1				
	Group Sum	15	**0.0**	Group Sum	29	**0.4**	32.1			
	Other[7]	0	0.0	Other[8]	0	0.0				
	LTA TOTAL	120,699	100.0	LTA TOTAL	7,389	100.0				

Footnotes: 1. MN GAP data on all ownerships, 2. CSA data on DNR Forestry and Wildlife administered lands, 3. Magnitude of change (ex. -2.0 is a 2-fold decline and 4.5 is a 4.5-fold increase), 4. Includes Central Hardwoods, 5. Includes Scotch Pine, 6. Includes Industrial & Urban Development and Recreation Development, 7. Includes Barren and Lowland Conifer-Deciduous mix, 8. Includes Moss and Rock Outcrop

Outing Moraine (212Nc14)



OVERVIEW

Information presented in this document is specific to this LTA with some reference to the larger ECS subsection. This summary was written to provide additional forest management information in this landscape and includes the following main sections: overview, description, land management, and vegetation. See the LTA Assessment and Analysis Guide for section explanations, data descriptions, acronyms, and references.

DESCRIPTION

A landscape dominated by rolling till plains and steep end moraines dissected by outwash channels. The Rainy Lobe Glacier formed all features. Uplands occupy 71 percent, wetlands occupy 23 percent, and lakes occupy 6 percent of the LTA (MN DNR, 1998). Soil parent material is sandy-loam till, with many stones, in the till plains and moraines and sandy in the outwash channels. Soils were formed under forest vegetation.

The dominant upland pre-settlement vegetation was dry-mesic (white and red) pine/hardwood forest, wet-mesic hardwood-conifer (white pine) forest, and mesic northern hardwood forest (Marschner, 1974). The majority of lowland pre-settlement vegetation was conifer bog and swamp (Marschner, 1974). Historic fire regimes for the upland types were: a) 150- to 350-year forest replacement with five- to 50-year forest maintenance, b) 150- to 350-year forest replacement, and c) 250- to 1,000-year stand replacement, respectively.

LAND MANAGEMENT

Land Stewardship

Based on GAP stewardship data, the majority of this LTA is county (45.8%), followed by private (28.0%), state (24.6%), and federal (1.6%). See table below. This LTA is located in Cass, Aitkin, and Crow Wing counties. Over 19,518 acres of protected waters exist inside the LTA. Lakes within or adjacent to the LTA include Thunder, Big Rice, Washburn, Roosevelt, and Emily.

The majority of land within the LTA is publicly owned. The northern fringe of the LTA is inside Chippewa National Forest. USFS lands are found at the LTA's northern border. Scattered parcels of state land occur throughout the LTA, including a large contiguous block in the northeast segment. Significant amounts of county land appear in the remaining parts of the LTA. Some Potlatch Corporation land holdings are located in the LTA's southern portion. Municipalities include Emily and Fifty Lakes.

Agency (%)	Acres	Percent
State (24.6%)		
DNR, Fish and Wildlife	1,384	1.8%
DNR, Forestry	17,580	22.5%
Other	243	0.3%
State (Undifferentiated)	36	0.0%
County (45.8%)		
Aitkin	13	0.0%
Cass	28,489	36.4%
Crow Wing	7,267	9.3%
Federal (1.6%)		
U.S. Forest Service	1,242	1.6%
Private (28.0%)		
Private	21,817	27.9%
Private Industrial	111	0.1%
Grand Total	**78,182 acres**	

* note - 5,573 acres of open water are included in the table above

Natural Resource Management Units

Federal

United States Forest Service

- National Forests: Chippewa (extreme southeast portion)

State

Minnesota Department of Natural Resources

- State Forests: Land O'Lakes (nearly all), Hill River (extreme southwest fringe)
- Wildlife Management Areas: Moose Wallow, Duck Lake
- Aquatic Management Areas: Snowshoe Lake
- Fish Management Areas: Spire Valley Hatchery, Morrison Lake, Allen Lake

County

None known

Other

Leech Lake Indian Reservation

VEGETATION

Pre-settlement Vegetation and Tree Species

The major Pre-settlement Vegetation types in this LTA include: Aspen-Birch (trending to Conifers) (21%), Conifer Bogs and Swamps (17%), Mixed Hardwood and Pine (Maple, White Pine, Basswood, etc) (7%), and Mixed White Pine and Red Pine (49%).

The following list contains the number of section corner notes from the original Public Land Survey by vegetation/landscape characteristic within this LTA, forest, timber-285, scattering oak, scattering timber-1, dry land, dry ridge, or island-1, lake, slough, pond-27, marsh or swamp-75, windthrow, windfall-5, and burned area-10.

Bearing trees include: Ash-7, Black Ash-9, Aspen-114, Balsam Fir-25, Basswood-10, Birch-130, Yellow Birch-7, Cedar-13, Cottonwood-2, Elm-8, Ironwood-4, Maple-26, Sugar Maple-6, Oak-38, Bur Oak-10, Red Oak-16, Pine-27, Jack Pine-19, Red Pine-122, White Pine-179, Spruce-38, Tamarack-135, and Willow-1.

Current Land Cover

As referenced from table on page 6:

- Top five GAP land cover classes on all ownerships (84,822 total acres):
  Aspen/White Birch (51.9%), Red Oak (8.0%), Sedge Meadow (6.1%), Water (5.9%), and Black Ash (4.4%).

- Top five CSA main cover types on DNR Forestry and Wildlife land (18,915 total acres):
  Aspen (44.4 %), Oak (11.6%), Marsh (6.9%), Lowland Grass (5.5%), and Norway Pine (5.3%).

- Significant percentage differences in land cover between DNR Forestry and Wildlife land and all ownerships:
  DNR land has 3.8 times more Marsh, 2.1 times more Northern Hardwoods, 1.8 times more Norway Pine, 1.6 times more Lowland Brush, and 1.3 times less in the Lowland Black Spruce group.

Changes in Tree Species Composition

As referenced from table on page 6, the following tree species were or are a significant component of the forest and their abundance has changed significantly since the original land survey (magnitude of change calculated by comparing FIA data to original bearing trees):

There is currently 10.5 times more Red Maple, 3.9 times more Elm, 2.9 times more Red Oak, 2.7 times more Ash, 2.5 times more Balsam Fir, 2.4 times more Aspen, 2.0 times more Bur Oak, 5.3 times less Red Pine, 10.1 times less White Pine, and 13.4 times less Tamarack in this LTA.

50-year Main Cover Type Goals

See main cover type 50-year goals in table on page 6. This is a priority LTA for Norway Pine cover type increase.

Potential Forest Ecosystem Types and Native Plant Communities

This LTA contains the following forest ecosystem types: Dry-Mesic Pine/Oak. The following Native Plant Communities Classes are known to occur in this LTA **(bold text)** or occur in similar LTAs.

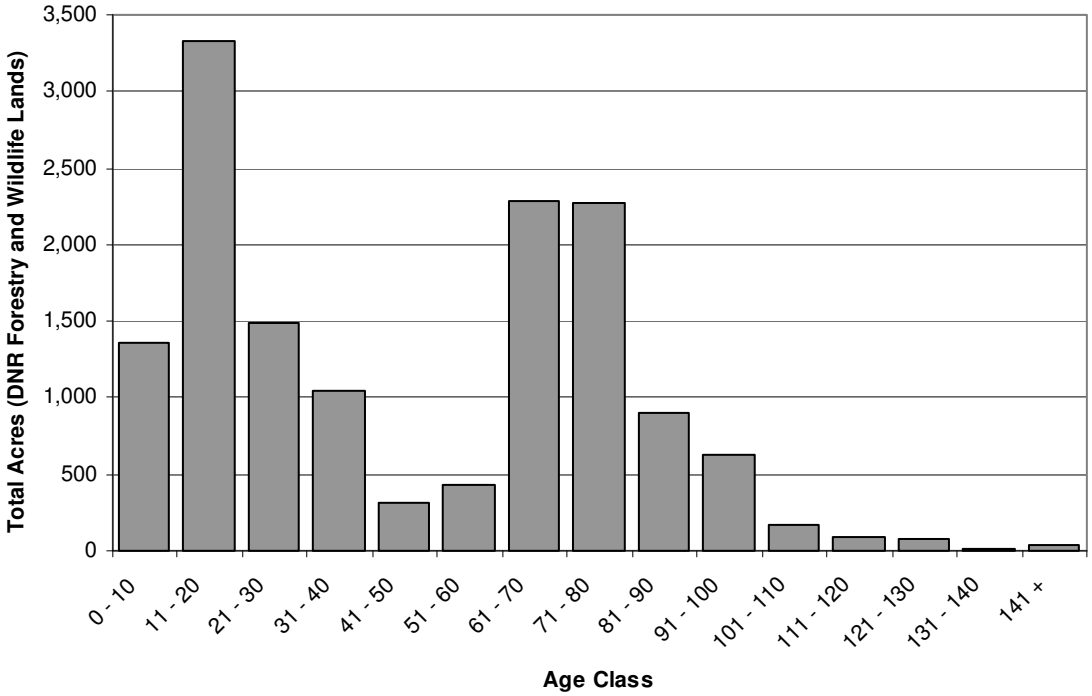
Upland Forests
FDn33, FDc24, FDc25, FDc34, **MHn35,** MHn46, MHn47, MHc26, MHc36, MHc47
Wetland Forests
FFn67, WFn53, **WFn55,** WFn64, FPn63, **FPn82, APn80**, APn81
Non-Forested Communities
APn91, **MRn83,** OPn92, WMn82

Old Growth, Ecologically Important Lowland Conifers, and Extended Rotation Forests

This LTA contains 3 old growth stands with associated OFMCs, 144 acres of EILC, and 5,448 acres of ERF on DNR Forestry and Wildlife land.

Age Classes

Figure below shows age-class distribution of all forested cover types in this LTA (14,444 total acres).



Patch Dynamics

This LTA contains 8 designated forest patches on state forestry and wildlife lands. They include 2 upland conifer patches (Thunder Hills and Dickerson Hill), 3 upland hardwood patches (Draper Tower, Coxie Lake, and Lower Lake), 2 lowland conifer patches (Goose Lake Bog and Rice Lake Bog), and a lowland hardwoods patch (Duck Lake).

Outing Moraine (212Nc14)

	Current GAP Land Cover[1] All Ownerships			Current CSA Land Cover[2] DNR Forestry and Wildlife			Comparison of DNR to All Ownerships[3]	Comparison of FIA data to Original Bearing Trees		CP-PMOP Cover Type 50-year Goal
GROUP	Land Cover Class	Acres	%	Main Cover Type	Acres	%		Tree Species	Change[3]	
UPLAND DECIDUOUS	Aspen/White Birch	44,002	51.9	Aspen	8,399	44.4	-1.1	Aspen	2.49	-7.9%
				Balm of Gilead	0	0.0		Balm of Gilead	0.00	
				Birch	301	1.6		Paper Birch	1.26	PMOP -5.2%
				Offsite Aspen	0	0.0				
	Maple/Basswood	1,549	1.8	Northern Hardwoods[4]	718	3.8	2.1	Sugar Maple	1.15	-10.8%
								Red Maple	10.50	
								Basswood	1.70	
								Yellow Birch	0.00	
	Bur/White Oak	88	0.1	Oak	2,196	11.6	1.4	Bur Oak	2.00	PMOP -10.9%
	Red Oak	6,781	8.0					Red Oak	2.85	
	Upland Deciduous	0	0.0	Offsite Oak	0	0.0				
	Group Sum	52,420	**61.8**	Group Sum	11,613	**61.4**	-1.0			
LOWLAND DECIDUOUS	Black Ash	3,716	4.4	Ash	511	2.7	-1.6	Ash	2.65	-10.7%
	Lowland Deciduous	0	0.0	Lowland Hardwood	32	0.2		Elm	3.88	
	Group Sum	3,716	**4.4**	Group Sum	542	**2.9**	-1.5			
UPLAND CONIFERS	White Pine mix	158	0.2	White Pine	17	0.1	-2.1	White Pine	-10.05	112.4%
	Red Pine	2,546	3.0	Norway Pine[5]	1,005	5.3	1.8	Red Pine	-5.31	17.1%
	Red/White Pine	0	0.0							
	Red/White Pine-Deciduous mix	0	0.0							
	Jack Pine	1,058	1.2	Jack Pine	10	0.1	-24.0	Jack Pine	-1.25	84.4%
	Jack Pine-Deciduous mix	0	0.0							
	White Spruce	64	0.1	White Spruce	112	0.6	7.8	White Spruce	1.57	2.0%
	Balsam Fir mix	105	0.1	Balsam Fir	41	0.2	1.8	Balsam Fir	2.48	-3.3%
	Spruce/Fir-Deciduous mix	0	0.0							
	Upland Black Spruce	0	0.0	Black Spruce, Upland	0	0.0				0.0%
	Upland Northern White-Cedar	0	0.0							
	Upland Conifer	0	0.0							
	Group Sum	3,931	**4.6**	Group Sum	1,185	**6.3**	1.4			
LOWLAND CONIFERS	Lowland Black Spruce	2,434	2.9	Black Spruce, Lowland	416	2.2	-1.3	Black Spruce	-1.43	0.0%
	Tamarack	1,992	2.3	Tamarack	451	2.4	1.0	Tamarack	-13.40	5.4%
	Lowland Northern White-Cedar	445	0.5	Northern White Cedar	151	0.8	1.5	Cedar	1.33	5.3%
	Group Sum	4,871	**5.7**	Group Sum	1,018	**5.4**	-1.1			
STAGNANT LOWLAND CONIFERS	Stagnant Black Spruce	56	0.1	Stagnant Spruce	0	0.0				
	Stagnant Tamarack	43	0.1	Stagnant Tamarack	85	0.4	8.9			
	Stagnant Northern White-Cedar	0	0.0	Stagnant Cedar	0	0.0				
	Stagnant Conifer	0	0.0							
	Group Sum	98	**0.1**	Group Sum	85	**0.4**	3.9			
SHRUBLAND	Upland Shrub	2,310	2.7	Upland Brush	21	0.1	-11.9			
				Cutover Area	23	0.1				
	Lowland Deciduous Shrub	2,670	3.1	Lowland Brush	962	5.1	1.6			
	Lowland Evergreen Shrub	0	0.0	Muskeg	110	0.6				
	Group Sum	4,980	**5.9**	Group Sum	1,115	**5.9**	1.0			
AQUATIC	Water	4,978	5.9	Permanent Water	449	2.4				
	Floating Aquatic	1,017	1.2	Non-Permanent Water	427	2.3				
	Broadleaf Sedge/Cattail	1,559	1.8	Marsh	1,307	6.9	3.8			
	Sedge Meadow	5,165	6.1	Lowland Grass	1,031	5.5	-1.1			
	Group Sum	12,719	**15.0**	Group Sum	3,213	**17.0**	1.1			
CROP/GRASS	Cropland	393	0.5	Agricultural	0	0.0				
	Grassland	1,669	2.0	Upland Grass	17	0.1	-22.3			
	Prairie	0	0.0							
	Group Sum	2,062	**2.4**	Group Sum	17	**0.1**	-27.5			
DEVELOPED	Low Intensity Urban	18	0.0	Development[6]	118	0.6	22.0			
	High Intensity Urban	6	0.0							
	Mixed Developed	0	0.0							
	Transportation	0	0.0	Roads	8	0.0				
	Group Sum	24	**0.0**	Group Sum	126	**0.7**	23.5			
	Other[7]	0	0.0	Other[8]	0	0.0				
	LTA TOTAL	84,822	100.0	LTA TOTAL	18,915	100.0				

Footnotes: 1. MN GAP data on all ownerships, 2. CSA data on DNR Forestry and Wildlife administered lands, 3. Magnitude of change (ex. -2.0 is a 2-fold decline and 4.5 is a 4.5-fold increase), 4. Includes Central Hardwoods, 5. Includes Scotch Pine, 6. Includes Industrial & Urban Development and Recreation Development, 7. Includes Barren and Lowland Conifer-Deciduous mix, 8. Includes Moss and Rock Outcrop

Itasca Moraine (212Nc16)

OVERVIEW

Information presented in this document is specific to this LTA with some reference to the larger ECS subsection. This summary was written to provide additional forest management information in this landscape and includes the following main sections: overview, description, land management, and vegetation. See the LTA Assessment and Analysis Guide for section explanations, data descriptions, acronyms, and references.

DESCRIPTION

A landscape characterized by steep, irregularly shaped slopes with many closed depressions. This end moraine formed by the Wadena Lobe Glacier. Uplands occupy 66 percent, wetlands occupy 16 percent, and lakes occupy 18 percent of the LTA (MN DNR,1998). Stream density is 0.2 miles per square mile (total of 66 miles). Soil parent material is a complex of sandy to loamy and clay loam till with a high content of granitic stones. Soils have formed under forest vegetation.

Pre-settlement vegetation was primarily drymesic (white) –pine-hardwoods with smaller amounts of dry pine (jack and red pine) in the southwest quarter and lowland –hardwood-conifer (spruce-fir) in the northeast quarter. The historic disturbance regimes were primarily high-intensity forest replacement fires every 70 to 350 years, with low- to moderate-intensity forest maintenance fires occurring every five to 50 years in southwest quarter and low- to moderate-intensity forest maintenance fires occurring every 25 to100 years in the northeast quarter.

LAND MANAGEMENT

Land Stewardship

Based on GAP stewardship data, the majority of this LTA is private (44.8%), followed by federal (27.4%), county (20.6%), and state (7.0%). See table below. This LTA exists as two separate units within Hubbard, Cass, and Crow Wing counties. Over 79,053 acres of protected waters exist inside the LTA. Lakes within or adjacent to the LTA include Leech, Ten Mile, Woman, Pine Mountain, Little Boy, and Big Rice.

Parts of the LTA are inside Leech Lake Indian Reservation and Chippewa National Forest. Federal, state, county, and private industrial lands are distributed throughout the LTA. Nearly the LTA's entire north unit is USFS land. Large contiguous tracts of additional USFS lands are located in the north one-third of the south unit. State and county lands occur throughout the LTA, with most county lands found in the southwestern portions of the south unit. The LTA contains only a few scattered Potlatch Corporation land holdings. Municipalities include Akeley, Backus, Longville, and Hackensack.

Agency (%)	Acres	Percent
State (7.0%)		
DNR, Fish and Wildlife	872	0.4%
DNR, Forestry	14,476	6.6%
Other	42	0.0%
County (20.6%)		
Cass	44,353	20.3%
Crow Wing	253	0.1%
Hubbard	474	0.2%
Federal (27.4%)		
Bureau of Indian Affairs	1,511	0.7%
Leech Lake Reservation	226	0.1%
Other	57	0.0%
U.S. Forest Service	57,986	26.5%
Private (44.8%)		
Private	96,113	44.0%
Private Industrial	1,747	0.8%
Tribal (0.2%)		
Leech Lake Reservation	313	0.1%
Minnesota Chippewa Indians	81	0.0%
Grand Total	**218,504 acres**	

* note – 49,283 acres of open water are included in the table above

Natural Resource Management Units

Federal

United States Forest Service

- National Forests: Chippewa (south portions)

State

Minnesota Department of Natural Resources

- State Forests: Badoura (extreme northeast corner), Bowstring (southwest corner), Foothills (north portions)
- Wildlife Management Areas: Woman Lake, Mule Lake, Ah-gwah-ching, George Cook
- Aquatic Management Areas: Kid/Lost Lakes, Boy River, Woman Lake, Louise Lake
- Fish Management Areas: Larson Lake, Webb Lake

County

None known

Other

Leech Lake Indian Reservation

VEGETATION

Pre-settlement Vegetation and Tree Species

The major Pre-settlement Vegetation types in this LTA include: Aspen-Birch (trending to Conifers) (19%), Conifer Bogs and Swamps (11%), Jack Pine Barrens and Openings (7%), Lakes (open water) (14%), Mixed Hardwood and Pine (Maple, White Pine, Basswood, etc) (11%), and Mixed White Pine and Red Pine (33%).

The following list contains the number of section corner notes from the original Public Land Survey by vegetation/landscape characteristic within this LTA, forest, timber-623, pine grove or grove-1, pine openings, pine barrens, scattered pine-9, scattering oak, scattering timber-49, oak barrens or oak openings-3, thicket, brush, underbrush or only tree around-71, dry land, dry ridge, or island-21, lake, slough, pond-174, river, creek, bottom, or valley, ravine-4, marsh or swamp-179, meadow-2, windthrow, windfall-11, and burned area-21.

Bearing trees include: Ash-23, Black Ash-5, Aspen-363, Balm-of-Gilead-4, Balsam Fir-51, Basswood-32, Birch-223, Yellow Birch-2, Cedar-69, Elm-25, Ironwood-19, Maple-87, Sugar Maple-14, Oak-113, Bur Oak-12, Red Oak-42, Pine-68, Jack Pine-190, Red Pine-461, White Pine 322, Spruce-89, Tamarack-267, and Willow-2.

Current Land Cover

As referenced from table on page 6:

- Top five GAP land cover classes on all ownerships (274,827 total acres):
  Aspen/White Birch (44.4%), Water (16.2%), Red Oak (4.8%), Upland Shrub (4.8%), and Grassland (4.0%).

- Top five CSA main cover types on DNR Forestry and Wildlife land (17,777 total acres):
  Aspen (30.4 %), Marsh (12.3%), Birch (6.6%), Lowland Brush (6.3%), and Permanent Water (6.1%).

- Significant percentage differences in land cover between DNR Forestry and Wildlife land and all ownerships:
  DNR land has 5.8 times more Northern White Cedar, 5.3 times more Northern Hardwoods, 4.8 times more Marsh, 2.1 times more Lowland Deciduous Shrub, and 1.9 times less in the Jack Pine group.

Changes in Tree Species Composition

As referenced from table on page 6, the following tree species were or are a significant component of the forest and their abundance has changed significantly since the original land survey (magnitude of change calculated by comparing FIA data to original bearing trees):

There is currently 4.0 times more Balm of Gilead, 3.3 times more Basswood, 2.7 times more Aspen, 2.5 times more Sugar Maple, 2.3 times more Red Oak, 2.7 times less Cedar, 3.6 times less Red Pine, 5.7 times less White Pine, 5.8 times less Tamarack, and 8.5 times less White Spruce in this LTA.

50-year Main Cover Type Goals

See main cover type 50-year goals in table on page 6. This is a priority LTA for Norway Pine, White Pine, and Northern White Cedar cover type increase.

Potential Forest Ecosystem Types and Native Plant Communities

This LTA contains the following forest ecosystem types: Dry Pine, Dry-Mesic Pine, Dry-Mesic Pine/Oak, and Boreal Hardwood Conifer. The following Native Plant Communities Classes are known to occur in this LTA **(bold text)** or occur in similar LTAs.

Upland Forests

FDn33, **FDc24, FDc34**, FDs37, **MHn35, MHn44, MHn46, MHc26,** MHc36, MHc37, MHs39

Wetland Forests

FFn57, FFn67**, WFn53**, WFn55, WFn64, WFs57, **FPn63,** FPn72, **FPn82, APn80, APn81**

Non-Forested Communities

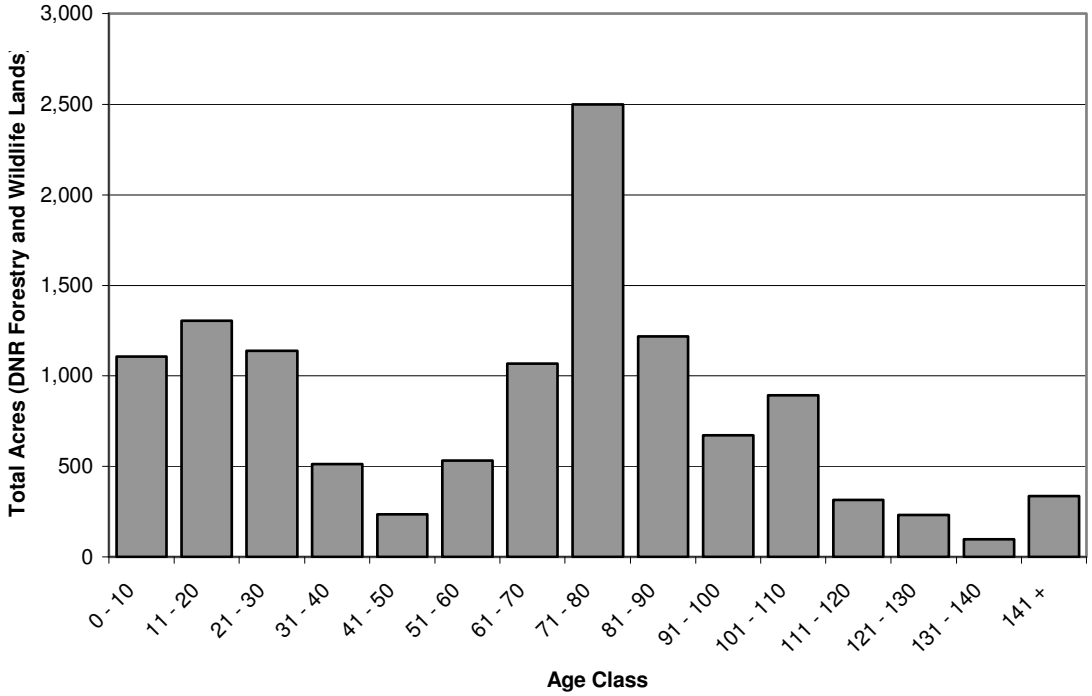
APn90, APn91, MRn83, OPn81, **OPn92, WMn73, WMn82, FPn73**

Old Growth, Ecologically Important Lowland Conifers, and Extended Rotation Forests

This LTA contains 14 old growth stands with associated OFMCs, 503 acres of EILC, and 4,526 acres of ERF on DNR Forestry and Wildlife land.

Age Classes

Figure below shows age-class distribution of all forested cover types in this LTA (12,161 total acres).



Patch Dynamics

This LTA contains 2 designated forest patches on state forestry and wildlife lands. They include a lowland conifers patch (Current Lake) and a lowland hardwoods patch (George Cook).

Itasca Moraine (212Nc16)

	Current GAP Land Cover[1] All Ownerships			Current CSA Land Cover[2] DNR Forestry and Wildlife			Comparison of DNR to All Ownerships[3]	Comparison of FIA data to Original Bearing Trees		CP-PMOP Cover Type 50-year Goal
GROUP	Land Cover Class	Acres	%	Main Cover Type	Acres	%		Tree Species	Change[3]	
UPLAND DECIDUOUS	Aspen/White Birch	122,116	44.4	Aspen	5,403	30.4		Aspen	2.74	-7.9%
				Balm of Gilead	25	0.1	-1.2	Balm of Gilead	4.00	
				Birch	1,174	6.6		Paper Birch	1.86	PMOP -5.2%
				Offsite Aspen	0	0.0				
	Maple/Basswood	2,952	1.1	Northern Hardwoods[4]	1,020	5.7	5.3	Sugar Maple	2.50	-10.8%
								Red Maple	1.04	
								Basswood	3.33	
								Yellow Birch	0.00	
	Bur/White Oak	888	0.3	Oak	575	3.2	-1.6	Bur Oak	1.84	PMOP -10.9%
	Red Oak	13,282	4.8					Red Oak	2.34	
	Upland Deciduous	1,379	0.5	Offsite Oak	0	0.0				
	Group Sum	140,617	**51.2**	Group Sum	8,196	**46.1**	-1.1			
LOWLAND DECIDUOUS	Black Ash	3,671	1.3	Ash	344	1.9	1.4	Ash	-1.22	-10.7%
	Lowland Deciduous	293	0.1	Lowland Hardwood	138	0.8	7.3	Elm	1.40	
	Group Sum	3,964	**1.4**	Group Sum	482	**2.7**	1.9			
UPLAND CONIFERS	White Pine mix	963	0.4	White Pine	71	0.4	1.1	White Pine	-5.65	112.4%
	Red Pine	7,506	2.7	Norway Pine[5]	863	4.9	1.8	Red Pine	-3.61	17.1%
	Red/White Pine	366	0.1							
	Red/White Pine-Deciduous mix	17	0.0							
	Jack Pine	3,953	1.4	Jack Pine	132	0.7	-1.9	Jack Pine	-1.15	84.4%
	Jack Pine-Deciduous mix	7	0.0							
	White Spruce	42	0.0	White Spruce	60	0.3	22.2	White Spruce	-8.50	2.0%
	Balsam Fir mix	459	0.2	Balsam Fir	173	1.0	5.8	Balsam Fir	1.61	-3.3%
	Spruce/Fir-Deciduous mix	0	0.0							
	Upland Black Spruce	0	0.0	Black Spruce, Upland	0	0.0				0.0%
	Upland Northern White-Cedar	164	0.1							
	Upland Conifer	36	0.0							
	Group Sum	13,513	**4.9**	Group Sum	1,299	**7.3**	1.5			
LOWLAND CONIFERS	Lowland Black Spruce	2,875	1.0	Black Spruce, Lowland	277	1.6	1.5	Black Spruce	-1.75	0.0%
	Tamarack	4,350	1.6	Tamarack	448	2.5	1.6	Tamarack	-5.82	5.4%
	Lowland Northern White-Cedar	2,030	0.7	Northern White Cedar	764	4.3	5.8	Cedar	-2.67	5.3%
	Group Sum	9,255	**3.4**	Group Sum	1,488	**8.4**	2.5			
STAGNANT LOWLAND CONIFERS	Stagnant Black Spruce	0	0.0	Stagnant Spruce	21	0.1				
	Stagnant Tamarack	633	0.2	Stagnant Tamarack	90	0.5	2.2			
	Stagnant Northern White-Cedar	0	0.0	Stagnant Cedar	578	3.3				
	Stagnant Conifer	107	0.0							
	Group Sum	740	**0.3**	Group Sum	688	**3.9**	14.4			
SHRUBLAND	Upland Shrub	13,207	4.8	Upland Brush	18	0.1	-22.8			
				Cutover Area	19	0.1				
	Lowland Deciduous Shrub	8,311	3.0	Lowland Brush	1,126	6.3	2.1			
	Lowland Evergreen Shrub	9	0.0	Muskeg	434	2.4	754.6			
	Group Sum	21,527	**7.8**	Group Sum	1,598	**9.0**	1.1			
AQUATIC	Water	44,399	16.2	Permanent Water	1,085	6.1				
	Floating Aquatic	4,591	1.7	Non-Permanent Water	162	0.9				
	Broadleaf Sedge/Cattail	7,102	2.6	Marsh	2,184	12.3	4.8			
	Sedge Meadow	9,379	3.4	Lowland Grass	334	1.9	-1.8			
	Group Sum	65,471	**23.8**	Group Sum	3,765	**21.2**	-1.1			
CROP/GRASS	Cropland	8,190	3.0	Agricultural	0	0.0				
	Grassland	11,125	4.0	Upland Grass	78	0.4	-9.2			
	Prairie	0	0.0							
	Group Sum	19,315	**7.0**	Group Sum	78	**0.4**	-16.0			
DEVELOPED	Low Intensity Urban	183	0.1	Development[6]	96	0.5	4.0			
	High Intensity Urban	185	0.1							
	Mixed Developed	0	0.0							
	Transportation	23	0.0	Roads	69	0.4	46.0			
	Group Sum	391	**0.1**	Group Sum	164	**0.9**	6.5			
	Other[7]	35	0.0	Other[8]	19	0.1				
	LTA TOTAL	274,827	100.0	LTA TOTAL	17,777	100.0				

Footnotes: 1. MN GAP data on all ownerships, 2. CSA data on DNR Forestry and Wildlife administered lands, 3. Magnitude of change (ex. -2.0 is a 2-fold decline and 4.5 is a 4.5-fold increase), 4. Includes Central Hardwoods, 5. Includes Scotch Pine, 6. Includes Industrial & Urban Development and Recreation Development, 7. Includes Barren and Lowland Conifer-Deciduous mix, 8. Includes Moss and Rock Outcrop

Shell Lake Moraine (212Nc28)

OVERVIEW

Information presented in this document is specific to this LTA with some reference to the larger ECS subsection. This summary was written to provide additional forest management information in this landscape and includes the following main sections: overview, description, land management, and vegetation. See the LTA Assessment and Analysis Guide for section explanations, data descriptions, acronyms, and references.

DESCRIPTION

A landscape dominated by hummocky end moraines formed by the Wadena and Des Moines lobes. Soil parent material is coarse loamy (sandy loam) till. Hardpans and stones are common. Soils have formed under forest vegetation. Lakes are common.

LAND MANAGEMENT

Land Stewardship

Based on GAP stewardship data, the majority of this LTA is private (66.6%), followed by state (17.0%), federal (12.0%), and county (4.2%). See table below. This LTA is located in Becker County. Over 30,980 acres of protected waters exist inside the LTA. Lakes within or adjacent to the LTA include Flat, Tamarac, Height of Land, Pine, Shell, Toad, Wolf, and Island.

Part of the LTA is inside White Earth Indian Reservation. Federal, state, county, and private industrial lands are dispersed throughout the LTA. The majority of the LTA's public lands are state forestlands, which are located primarily in the eastern portion within the boundaries of Smokey Hills State Forest. The LTA's only municipality is Wolf Lake.

Agency (%)	Acres	Percent
State (17.0%)		
DNR, Ecological Resources	183	0.2%
DNR, Fish and Wildlife	255	0.2%
DNR, Forestry	17,164	16.6%
County (4.2%)		

Becker	4,353	4.2%
Federal (12.0%)		
U.S. Fish and Wildlife Service	12,399	12.0%
Other Public (0.1%)		
School District	127	0.1%
Private (66.6%)		
Private	68,514	66.2%
Private Industrial	416	0.4%
Grand Total	**103,411 acres**	

* note - 16,176 acres of open water are included in the table above

Natural Resource Management Units

Federal

United States Fish and Wildlife Service

- National Wildlife Refuges: Tamarac
- Waterfowl Production Areas: Lyman Lakes

State

Minnesota Department of Natural Resources

- State Forests: Smokey Hills (nearly all)
- Wildlife Management Areas: Hubbel Pond
- Aquatic Management Areas: Shell Lake, Twin Lake
- Fish Management Areas: Bass Lake, Toad Lake, Little Toad Lake
- Scientific and Natural Areas: Greenwater Lake

County

None known

Other

White Earth Indian Reservation

VEGETATION

Pre-settlement Vegetation and Tree Species

The major Pre-settlement Vegetation types in this LTA include: Aspen-Birch (trending to Conifers) (37%), Aspen-Birch (trending to hardwoods) (10%), Conifer Bogs and Swamps (12%), Lakes (open water) (11%), and Mixed White Pine and Red Pine (24%).

The following list contains the number of section corner notes from the original Public Land Survey by vegetation/landscape characteristic within this LTA, forest, timber-271, pine openings, pine barrens, scattered pine-2, scattering oak, scattering timber-25, thicket, brush, underbrush or only tree around-40, lake, slough, pond-80, river, creek, bottom, or valley, ravine-5, marsh or swamp-129, meadow-1, wet prairie or prairie-2, windthrow, windfall-6, and burned area-11.

Bearing trees include: Ash-10, Black Ash-2, Aspen-251, Balm-of-Gilead-19, Balsam Fir-19, Basswood-12, Birch-62, Yellow Birch-1, Cottonwood-6, Elm-28, Ironwood-4, Maple-14, Sugar Maple-10, Oak-114, Bur Oak-12, Northern Pin Oak-1, Red Oak-11, Pine-44, Jack Pine-55, Red Pine-149, White Pine-94, Spruce-42, and Tamarack-192.

Current Land Cover

As referenced from table on page 5:

- Top five GAP land cover classes on all ownerships (122,755 total acres):
  Aspen/White Birch (30.4%), Water (14.5%), Cropland (10.5%), Grassland (6.3%), and Bur/White Oak (5.5%).

- Top five CSA main cover types on DNR Forestry and Wildlife land (17,808 total acres):
  Aspen (40.1 %), Norway Pine (11.5%), Northern Hardwoods (9.5%), Tamarack (6.5%), and Lowland Brush (4.7%).

- Significant percentage differences in land cover between DNR Forestry and Wildlife land and all ownerships:
  DNR land has 4.4 times more Norway Pine, 2.7 times more Tamarack, 2.5 times more Ash, 2.0 times more Northern Hardwoods, 2.0 times more Marsh, 2.4 times less Oak, and 15.3 times less in the Upland Grass group.

Changes in Tree Species Composition

As referenced from table on page 5, the following tree species were or are a significant component of the forest and their abundance has changed significantly since the original land survey (magnitude of change calculated by comparing FIA data to original bearing trees):

There is currently 6.6 times more Basswood, 4.7 times more Ash, 3.1 times more Paper Birch, 3.0 times more Balsam Fir, 2.0 times more Elm, 2.2 times less Black Spruce, 4.2 times less Tamarack, 5.6 times less White Pine, and 14.9 times less Red Pine in this LTA.

50-year Main Cover Type Goals

See main cover type 50-year goals in table on page 5. This is a priority LTA for Norway Pine cover type increase.

Potential Forest Ecosystem Types and Native Plant Communities

This LTA contains the following forest ecosystem types: Dry Pine and Dry-Mesic Pine. The following Native Plant Communities Classes are known to occur in this LTA **(bold text)** or occur in similar LTAs.

Upland Forests

FDn12, FDn33, FDc12, FDc23, **FDc24,** FDc34, **MHn44**, MHn47, **MHc26**, MHc36, **MHc37**

Wetland Forests

FFn57, FFn67, WFn53, WFn55, WFn64, FPn63, FPn82, APn81

Non-Forested Communities

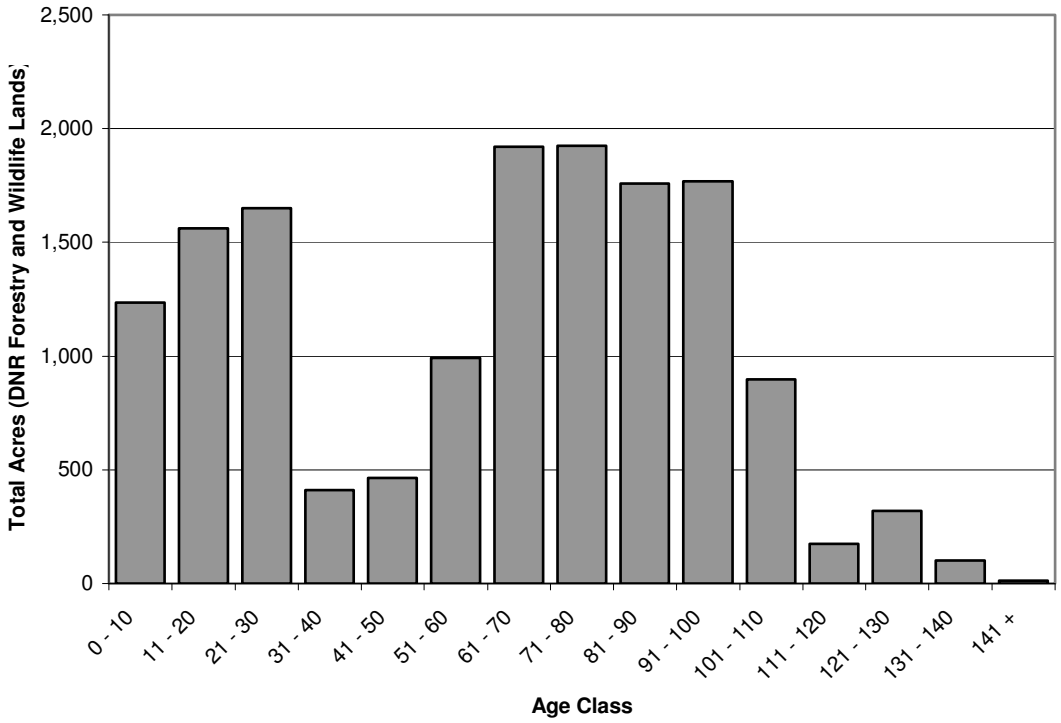
APn91, OPn81, OPn91, OPn92, WMn73, WMn82, FPn73

Old Growth, Ecologically Important Lowland Conifers, and Extended Rotation Forests

This LTA contains 9 old growth stands with associated OFMCs, 96 acres of EILC, and 5,476 acres of ERF on DNR Forestry and Wildlife land.

Age Classes

Figure below shows age-class distribution of all forested cover types in this LTA (15,194 total acres).



Patch Dynamics

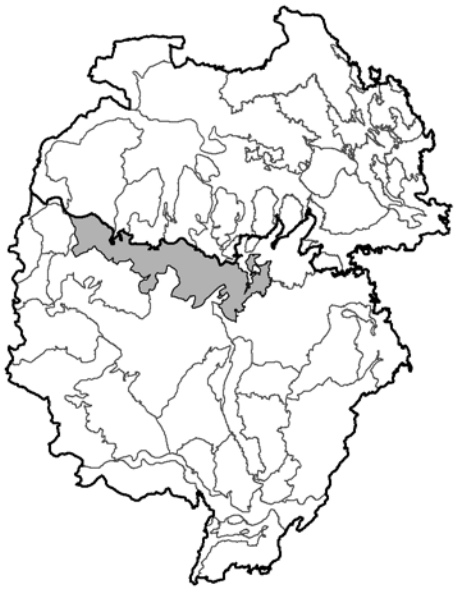
This LTA contains 5 designated forest patches on state forestry and wildlife lands. They include 3 upland conifer patches (Wolf Lake, Elbow Lake, and Osage), an upland hardwoods patch (Wolf Lake Hardwoods), and a lowland hardwoods patch (North Elbow Lake).

Shell Lake Moraine (212Nc28)

	Current GAP Land Cover[1] All Ownerships			Current CSA Land Cover[2] DNR Forestry and Wildlife			Comparison of DNR to All Ownerships[3]	Comparison of FIA data to Original Bearing Trees		CP-PMOP Cover Type 50-year Goal
GROUP	Land Cover Class	Acres	%	Main Cover Type	Acres	%		Tree Species	Change[3]	
UPLAND DECIDUOUS	Aspen/White Birch	37,355	30.4	Aspen	7,135	40.1	1.4	Aspen	1.41	-7.9%
				Balm of Gilead	46	0.3		Balm of Gilead	1.40	
				Birch	407	2.3		Paper Birch	3.12	PMOP -5.2%
				Offsite Aspen	0	0.0				
	Maple/Basswood	5,754	4.7	Northern Hardwoods[4]	1,686	9.5	2.0	Sugar Maple	1.58	-10.8%
								Red Maple	0.00	
								Basswood	6.63	
								Yellow Birch	0.00	
	Bur/White Oak	6,802	5.5	Oak	793	4.5	-2.4	Bur Oak	1.41	PMOP -10.9%
	Red Oak	6,398	5.2					Red Oak	1.69	
	Upland Deciduous	0	0.0	Offsite Oak	0	0.0				
	Group Sum	56,309	**45.9**	Group Sum	10,066	**56.5**	1.2			
LOWLAND DECIDUOUS	Black Ash	1,752	1.4	Ash	629	3.5	2.5	Ash	4.70	-10.7%
	Lowland Deciduous	0	0.0	Lowland Hardwood	39	0.2		Elm	2.00	
	Group Sum	1,752	**1.4**	Group Sum	667	**3.7**	2.6			
UPLAND CONIFERS	White Pine mix	87	0.1	White Pine	38	0.2	3.0	White Pine	-5.60	112.4%
	Red Pine	3,246	2.6	Norway Pine[5]	2,051	11.5	4.4	Red Pine	-14.89	17.1%
	Red/White Pine	0	0.0							
	Red/White Pine-Deciduous mix	0	0.0							
	Jack Pine	1,181	1.0	Jack Pine	510	2.9	3.0	Jack Pine	1.04	84.4%
	Jack Pine-Deciduous mix	0	0.0							
	White Spruce	173	0.1	White Spruce	82	0.5	3.3	White Spruce	-1.31	2.0%
	Balsam Fir mix	285	0.2	Balsam Fir	478	2.7	11.6	Balsam Fir	3.00	-3.3%
	Spruce/Fir-Deciduous mix	0	0.0							
	Upland Black Spruce	0	0.0	Black Spruce, Upland	0	0.0				0.0%
	Upland Northern White-Cedar	0	0.0							
	Upland Conifer	0	0.0							
	Group Sum	4,971	**4.0**	Group Sum	3,159	**17.7**	4.4			
LOWLAND CONIFERS	Lowland Black Spruce	354	0.3	Black Spruce, Lowland	122	0.7	2.4	Black Spruce	-2.20	0.0%
	Tamarack	2,995	2.4	Tamarack	1,154	6.5	2.7	Tamarack	-4.16	5.4%
	Lowland Northern White-Cedar	5	0.0	Northern White Cedar	0	0.0		Cedar	0.00	5.3%
	Group Sum	3,354	**2.7**	Group Sum	1,276	**7.2**	2.6			
STAGNANT LOWLAND CONIFERS	Stagnant Black Spruce	0	0.0	Stagnant Spruce	10	0.1				
	Stagnant Tamarack	444	0.4	Stagnant Tamarack	0	0.0				
	Stagnant Northern White-Cedar	0	0.0	Stagnant Cedar	0	0.0				
	Stagnant Conifer	0	0.0							
	Group Sum	444	**0.4**	Group Sum	10	**0.1**	-6.2			
SHRUBLAND	Upland Shrub	2,044	1.7	Upland Brush	22	0.1	-1.5			
				Cutover Area	171	1.0				
	Lowland Deciduous Shrub	6,313	5.1	Lowland Brush	836	4.7	-1.1			
	Lowland Evergreen Shrub	0	0.0	Muskeg	2	0.0				
	Group Sum	8,356	**6.8**	Group Sum	1,031	**5.8**	-1.2			
AQUATIC	Water	17,809	14.5	Permanent Water	379	2.1				
	Floating Aquatic	14	0.0	Non-Permanent Water	103	0.6				
	Broadleaf Sedge/Cattail	2,595	2.1	Marsh	742	4.2	2.0			
	Sedge Meadow	6,348	5.2	Lowland Grass	151	0.8	-6.1			
	Group Sum	26,766	**21.8**	Group Sum	1,375	**7.7**	-2.8			
CROP/GRASS	Cropland	12,941	10.5	Agricultural	96	0.5	-19.5			
	Grassland	7,691	6.3	Upland Grass	73	0.4	-15.3			
	Prairie	0	0.0							
	Group Sum	20,632	**16.8**	Group Sum	169	**0.9**	-17.7			
DEVELOPED	Low Intensity Urban	9	0.0	Development[6]	14	0.1	10.4			
	High Intensity Urban	0	0.0							
	Mixed Developed	0	0.0							
	Transportation	0	0.0	Roads	40	0.2				
	Group Sum	9	**0.0**	Group Sum	54	**0.3**	40.7			
	Other[7]	160	0.1	Other[8]	0	0.0				
	LTA TOTAL	122,755	100.0	LTA TOTAL	17,808	100.0				

Footnotes: 1. MN GAP data on all ownerships, 2. CSA data on DNR Forestry and Wildlife administered lands, 3. Magnitude of change (ex. -2.0 is a 2-fold decline and 4.5 is a 4.5-fold increase), 4. Includes Central Hardwoods, 5. Includes Scotch Pine, 6. Includes Industrial & Urban Development and Recreation Development, 7. Includes Barren and Lowland Conifer-Deciduous mix, 8. Includes Moss and Rock Outcrop

Itasca Moraine Steep (212Nc30)



OVERVIEW

Information presented in this document is specific to this LTA with some reference to the larger ECS subsection. This summary was written to provide additional forest management information in this landscape and includes the following main sections: overview, description, land management, and vegetation. See the LTA Assessment and Analysis Guide for section explanations, data descriptions, acronyms, and references.

DESCRIPTION

An end moraine characterized by steep rugged terrain. Uplands occupy 84 percent, wetlands occupy 10 percent, and lakes occupy 6 percent of the LTA (MN DNR, 1998). The soils are a complex of sandy, loamy, and sand over loamy textures. The majority is well-drained.

The majority of the upland pre-settlement vegetation was dry-mesic pine-oak and dry-mesic pine with minor amounts of dry pine (Shadis, 1999 and Marschner, 1974). The majority of lowland pre-settlement vegetation was conifer bog and swamp (Marschner,1974).

Native forest communities that have historically persisted on this LTA include: dry jack pine-red pine forest on areas that tend to be sandy and/or have historically had severe (crown) fires at 50- to 80-year intervals. Dry-mesic pine (white)/oak forest on areas with loamy subsoils present within the rooting zone. Historically low-intensity ground fires occurred every five to 40 years. Dry-mesic pine (white and red) on areas with loamy subsoils present within the rooting zone. Historically, low-intensity ground fires occurred every 10 to 40 years and severe (crown) fires occurred every 100 to 200 years.

LAND MANAGEMENT

Land Stewardship

Based on GAP stewardship data, the majority of this LTA is state (36.0%), followed by county (28.2%), private (26.2%), and federal (8.8%). See table below. This LTA is located in Clearwater, Cass, Hubbard, and Becker counties. The Headwaters of the

Mississippi River is located in the LTA's northwest portion. Over 26,073 acres of protected waters exist inside the LTA. Lakes within or adjacent to the LTA include Itasca, Elk, George, Kabekona, Leech, Ten Mile, and Mantrap.

Parts of the LTA are inside White Earth and Leech Lake Indian Reservations and Chippewa National Forest. Federal, state, county, and private industrial lands are scattered throughout the LTA. Large tracts of contiguous USFS lands are located in the LTA's east segment. The majority of state lands occur in the east central portion of the LTA within Paul Bunyan State Forest. Most county lands are found in the LTA's west and central parts. Potlatch Corporation lands are found primarily in the south half of the LTA, including a 2,400-acre block. The only municipality is the city of Walker.

Agency (%)	**Acres**	**Percent**
State (36.0%)		
DNR, Ecological Resources	39	0.0%
DNR, Fish and Wildlife	266	0.1%
DNR, Forestry	55,662	25.4%
DNR, Parks	22,919	10.5%
DNR, Trails and Waterways	20	0.0%
County (28.2%)		
Becker	255	0.1%
Cass	4,794	2.2%
Clearwater	18,601	8.5%
Hubbard	38,088	17.4%
Federal (8.8%)		
Bureau of Indian Affairs	621	0.3%
U.S. Forest Service	18,661	8.5%
Other Public (0.0%)		
School District	41	0.0%
Private (26.2%)		
Private	52,677	24.0%
Private Industrial	4,663	2.1%
Tribal (0.9%)		
Leech Lake Reservation	40	0.0%
Minnesota Chippewa Indians	156	0.1%
White Earth Reservation	1,739	0.8%
Grand Total	**219,242 acres**	

* note - 14,578 acres of open water are included in the table above

Natural Resource Management Units

Federal

United States Forest Service

- National Forests: Chippewa (southwest corner)

State

Minnesota Department of Natural Resources

- State Forests: Paul Bunyan (south half), White Earth (east and southeast portions), Foothills (northwest portion)

- Wildlife Management Areas: Stassen Lake, Sucker Lake, Kabekona, Frellsen Lake, Sugar Bush Lake
- Aquatic Management Areas: Long Lake
- Fish Management Areas: Sucker Brook, Gould Lake, Leech Lake, Ah-gwah-ching, Howard Lake
- Scientific and Natural Areas: Itasca Wilderness Sanctuary
- State Parks: Itasca

County

None known

Other

Leech Lake Indian Reservation
White Earth Indian Reservation

VEGETATION

Pre-settlement Vegetation and Tree Species

The major Pre-settlement Vegetation types in this LTA include: Aspen-Birch (trending to Conifers) (34%), Jack Pine Barrens and Openings (27%), and Mixed White Pine and Red Pine (30%).

The following list contains the number of section corner notes from the original Public Land Survey by vegetation/landscape characteristic within this LTA, forest, timber-732, pine openings, pine barrens, scattered pine-1, scattering oak, scattering timber-74, thicket, brush, underbrush or only tree around-70, dry land, dry ridge, or island-12, lake, slough, pond-64, marsh or swamp-74, windthrow, windfall-12, and burned area-3.

Bearing trees include: Ash-11, Black Ash-1, Aspen-610, Balm-of-Gilead-13, Balsam Fir-12, Basswood-13, Birch-221, Cedar-17, Elm-16, Ironwood-4, Maple-21, Sugar Maple-12, Oak-86, Bur Oak-4, Red Oak-37, Pine-14, Jack Pine-608, Red Pine-576, White Pine-281, Spruce-27, Tamarack-113, and Willow-1.

Current Land Cover

As referenced from table on page 6:

- Top five GAP land cover classes on all ownerships (239,074 total acres):
  Aspen/White Birch (60.5%), Red Oak (6.9%), Water (5.7%), Red Pine (3.3%), and Upland Shrub (3.1%).

- Top five CSA main cover types on DNR Forestry and Wildlife land (56,957 total acres):
  Aspen (78.1 %), Norway Pine (5.1%), Permanent Water (2.3%), Oak (2.2%), and Birch (1.5%).

- Significant percentage differences in land cover between DNR Forestry and Wildlife land and all ownerships:
  DNR land has 1.6 times more Norway Pine, and 3.9 times less in the Oak group.

Changes in Tree Species Composition

As referenced from table on page 6, the following tree species were or are a significant component of the forest and their abundance has changed significantly since the original land survey (magnitude of change calculated by comparing FIA data to original bearing trees):

There is currently 11.0 times more Red Maple, 5.5 times more Balm of Gilead, 5.5 times more Black Spruce, 4.7 times more Bur Oak, 4.5 times more Ash, 4.3 times more Basswood, 3.4 times more Balsam Fir, 2.5 times more Cedar, 2.3 times more Aspen, 4.9 times less White Pine, 7.1 times less Red Pine, 7.7 times less Jack Pine, and 10.3 times less Tamarack in this LTA.

50-year Main Cover Type Goals

See main cover type 50-year goals in table on page 6. This is a priority LTA for Jack Pine, Norway Pine, and White Pine cover type increase.

Potential Forest Ecosystem Types and Native Plant Communities

This LTA contains the following forest ecosystem types: Dry-Mesic Pine and Dry-Mesic Pine/Oak. The following Native Plant Communities Classes are known to occur in this LTA **(bold text)** or occur in similar LTAs.

Upland Forests
FDn33, FDc12, FDc23, **FDc24, FDc34**, FDs37**, MHn35, MHn44, MHn46, MHc26**, MHc36, **MHc37**

Wetland Forests
FFn57, FFn67, **WFn53**,WFn55, WFn64, **WFs57, FPn63**, FPn72, **FPn82,** APn81

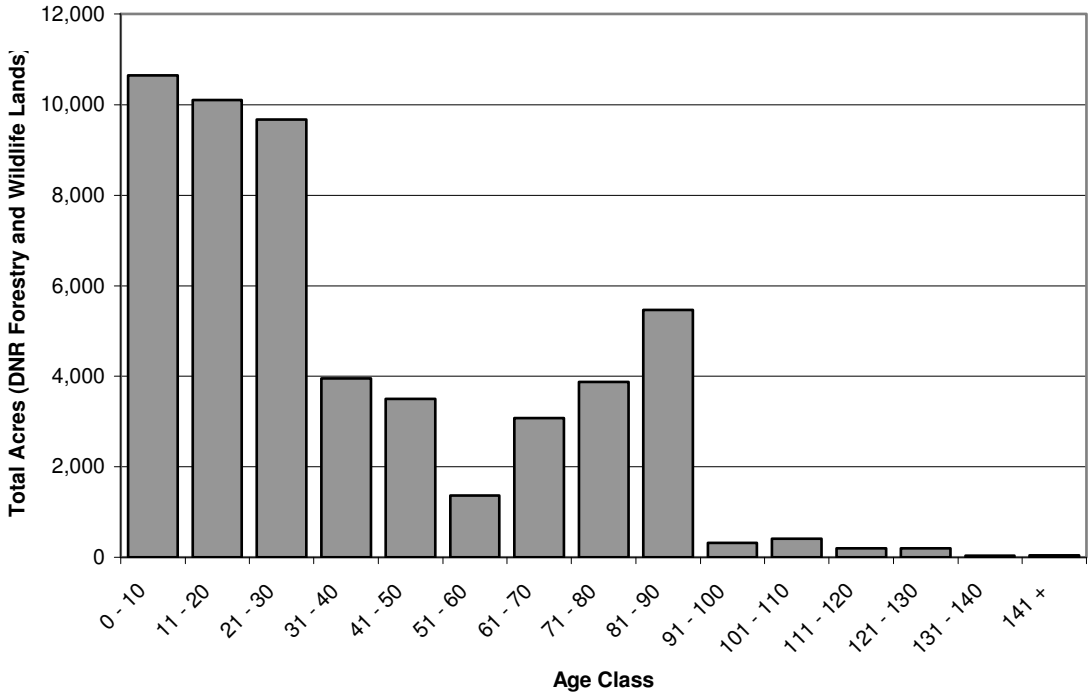
Non-Forested Communities
APn90, APn91, MRn83, **OPn81, OPn92**, WMn73, **WMn82**, FPn73

Old Growth, Ecologically Important Lowland Conifers, and Extended Rotation Forests

This LTA contains 19 old growth stands with associated OFMCs, 232 acres of EILC, and 18,522 acres of ERF on DNR Forestry and Wildlife land.

Age Classes

Figure below shows age-class distribution of all forested cover types in this LTA (52,854 total acres).



Patch Dynamics

This LTA contains 5 designated forest patches on state forestry and wildlife lands. They include an upland conifers patch (Teepee Lakes Pine) and 4 upland hardwood patches (Pineview, Teepee Lakes Hardwoods, Parkway, and Refuge).

Itasca Moraine Steep (212Nc30)

	Current GAP Land Cover[1] All Ownerships			Current CSA Land Cover[2] DNR Forestry and Wildlife			Comparison of DNR to All Ownerships[3]	Comparison of FIA data to Original Bearing Trees		CP-PMOP Cover Type 50-year Goal
GROUP	Land Cover Class	Acres	%	Main Cover Type	Acres	%		Tree Species	Change[3]	
UPLAND DECIDUOUS	Aspen/White Birch	144,718	60.5	Aspen	44,477	78.1	1.3	Aspen	2.29	-7.9%
				Balm of Gilead	31	0.1		Balm of Gilead	5.50	
				Birch	841	1.5		Paper Birch	1.90	PMOP -5.2%
				Offsite Aspen	0	0.0				
	Maple/Basswood	4,853	2.0	Northern Hardwoods[4]	767	1.3	-1.5	Sugar Maple	1.55	-10.8%
								Red Maple	11.00	
								Basswood	4.25	
								Yellow Birch	0.00	
	Bur/White Oak	4,566	1.9	Oak	1,268	2.2	-3.9	Bur Oak	4.71	PMOP -10.9%
	Red Oak	16,381	6.9					Red Oak	1.95	
	Upland Deciduous	2,215	0.9	Offsite Oak	28	0.0				
	Group Sum	172,732	**72.3**	Group Sum	47,412	**83.2**	1.2			
LOWLAND DECIDUOUS	Black Ash	1,105	0.5	Ash	332	0.6	1.3	Ash	4.50	-10.7%
	Lowland Deciduous	396	0.2	Lowland Hardwood	12	0.0	-7.9	Elm	1.14	
	Group Sum	1,500	**0.6**	Group Sum	344	**0.6**	-1.0			
UPLAND CONIFERS	White Pine mix	1,255	0.5	White Pine	446	0.8	1.5	White Pine	-4.90	112.4%
	Red Pine	7,781	3.3	Norway Pine[5]	2,899	5.1	1.6	Red Pine	-7.07	17.1%
	Red/White Pine	887	0.4							
	Red/White Pine-Deciduous mix	228	0.1							
	Jack Pine	4,946	2.1	Jack Pine	263	0.5	-4.5	Jack Pine	-7.69	84.4%
	Jack Pine-Deciduous mix	200	0.1							
	White Spruce	113	0.0	White Spruce	740	1.3	27.4	White Spruce	-1.17	2.0%
	Balsam Fir mix	632	0.3	Balsam Fir	140	0.2	-1.1	Balsam Fir	3.40	-3.3%
	Spruce/Fir-Deciduous mix	15	0.0							
	Upland Black Spruce	0	0.0	Black Spruce, Upland	0	0.0				0.0%
	Upland Northern White-Cedar	58	0.0							
	Upland Conifer	268	0.1							
	Group Sum	16,384	**6.9**	Group Sum	4,488	**7.9**	1.1			
LOWLAND CONIFERS	Lowland Black Spruce	891	0.4	Black Spruce, Lowland	121	0.2	-1.8	Black Spruce	5.50	0.0%
	Tamarack	1,007	0.4	Tamarack	158	0.3	-1.5	Tamarack	-10.25	5.4%
	Lowland Northern White-Cedar	659	0.3	Northern White Cedar	232	0.4	1.5	Cedar	2.50	5.3%
	Group Sum	2,558	**1.1**	Group Sum	510	**0.9**	-1.2			
STAGNANT LOWLAND CONIFERS	Stagnant Black Spruce	0	0.0	Stagnant Spruce	53	0.1				
	Stagnant Tamarack	63	0.0	Stagnant Tamarack	24	0.0	1.6			
	Stagnant Northern White-Cedar	0	0.0	Stagnant Cedar	22	0.0				
	Stagnant Conifer	32	0.0							
	Group Sum	95	**0.0**	Group Sum	99	**0.2**	4.4			
SHRUBLAND	Upland Shrub	7,330	3.1	Upland Brush	281	0.5	-3.7			
				Cutover Area	185	0.3				
	Lowland Deciduous Shrub	4,609	1.9	Lowland Brush	356	0.6	-3.1			
	Lowland Evergreen Shrub	49	0.0	Muskeg	120	0.2	10.2			
	Group Sum	11,988	**5.0**	Group Sum	941	**1.7**	-3.0			
AQUATIC	Water	13,518	5.7	Permanent Water	1,295	2.3				
	Floating Aquatic	132	0.1	Non-Permanent Water	352	0.6				
	Broadleaf Sedge/Cattail	3,603	1.5	Marsh	682	1.2	-1.3			
	Sedge Meadow	4,244	1.8	Lowland Grass	109	0.2	-9.3			
	Group Sum	21,497	**9.0**	Group Sum	2,439	**4.3**	-2.1			
CROP/GRASS	Cropland	6,854	2.9	Agricultural	0	0.0				
	Grassland	4,800	2.0	Upland Grass	57	0.1	-19.9			
	Prairie	0	0.0							
	Group Sum	11,655	**4.9**	Group Sum	57	**0.1**	-48.3			
DEVELOPED	Low Intensity Urban	286	0.1	Development[6]	141	0.2	1.3			
	High Intensity Urban	167	0.1							
	Mixed Developed	0	0.0							
	Transportation	134	0.1	Roads	191	0.3	6.0			
	Group Sum	587	**0.2**	Group Sum	332	**0.6**	2.4			
	Other[7]	78	0.0	Other[8]	334	0.6				
	LTA TOTAL	239,074	100.0	LTA TOTAL	56,957	100.0				

Footnotes: 1. MN GAP data on all ownerships, 2. CSA data on DNR Forestry and Wildlife administered lands, 3. Magnitude of change (ex. -2.0 is a 2-fold decline and 4.5 is a 4.5-fold increase), 4. Includes Central Hardwoods, 5. Includes Scotch Pine, 6. Includes Industrial & Urban Development and Recreation Development, 7. Includes Barren and Lowland Conifer-Deciduous mix, 8. Includes Moss and Rock Outcrop

Two Inlets Moraine (212Nc31)

OVERVIEW

Information presented in this document is specific to this LTA with some reference to the larger ECS subsection. This summary was written to provide additional forest management information in this landscape and includes the following main sections: overview, description, land management, and vegetation. See the LTA Assessment and Analysis Guide for section explanations, data descriptions, acronyms, and references.

DESCRIPTION

A rolling to hummocky landscape dominated by a complex of outwash plains and end moraines formed by the Wadena Lobe Glacier. Ice-walled lake features are common in the east half of township 142 to 37 and the west half of township 142 to 36. Uplands occupy 73 percent, wetlands occupy 18 percent, and lakes occupy 9 percent of the LTA (MN DNR, 1998). Soil parent material is loamy till with stones and hardpans on the moraines. Sandy soils are dominant on outwash plains and inclusions in the moraines. Ice-wall lake features have sandy or loamy soils on the hillsides and silts and/or clays on the flat tops. All soils formed under forest vegetation.

The majority of the upland pre-settlement vegetation was dry pine (41 percent) and dry-mesic pine (21 percent) (Shadis, 1999 and Marschner, 1974). The majority of lowland pre-settlement vegetation was conifer bog and swamp (Marschner, 1974).

LAND MANAGEMENT

Land Stewardship

Based on GAP stewardship data, the majority of this LTA is private (47.0%), followed by county (34.2%), and state (18.2%). See table below. This LTA is located in Hubbard, Clearwater, and Becker counties. Over 26,176 acres of protected waters exist inside the LTA. Lakes within or adjacent to the LTA include Long Lost, Bad Medicine, Little Mantrap, Potato, Fish Hook, Many Point, and Round.

The west half of the LTA is inside White Earth Indian Reservation. Federal, state, county, and private industrial lands are scattered throughout the LTA. The majority of

the LTA's public lands are state and county forestlands. Most state lands occur within the south central portion of the LTA, while the bulk of county lands are situated in the west half. Potlatch Corporation land holdings are found primarily in the LTA's east half. There are no municipalities in the LTA, but Park Rapids is its nearest city.

Agency (%)	Acres	Percent
State (18.2%)		
DNR, Ecological Resources	66	0.1%
DNR, Fish and Wildlife	165	0.1%
DNR, Forestry	20,081	16.6%
DNR, Parks	1,721	1.4%
County (34.2%)		
Becker	33,272	27.5%
Clearwater	2,596	2.1%
Hubbard	5,523	4.6%
Federal (0.2%)		
Other	254	0.2%
Other Public (0.1%)		
School District	162	0.1%
Private (47.0%)		
Private	54,957	45.4%
Private Industrial	1,927	1.6%
Tribal (0.2%)		
White Earth Reservation	244	0.2%
Grand Total	**120,968 acres**	

* note - 12,269 acres of open water are included in the table above

Natural Resource Management Units

Federal

None known

State

Minnesota Department of Natural Resources

- State Forests: White Earth (southeast portion), Two Inlets (nearly all)
- Wildlife Management Areas: Gardner Lake, Long Lost Lake, Glanders Lake, Long Lost Lake South, Frellsen Lake
- Fish Management Areas: Lost Lake
- Scientific and Natural Areas: Greenwater Lake
- State Parks: Itasca

County

None known

Other

White Earth Indian Reservation

VEGETATION

Pre-settlement Vegetation and Tree Species

The major Pre-settlement Vegetation types in this LTA include: Aspen-Birch (trending to Conifers) (23%), Conifer Bogs and Swamps (6%), Jack Pine Barrens and Openings (42%), Lakes (open water) (7%), and Mixed White Pine and Red Pine (21%).

The following list contains the number of section corner notes from the original Public Land Survey by vegetation/landscape characteristic within this LTA, forest, timber-182, pine openings, pine barrens, scattered pine-14, scattering oak, scattering timber-3, thicket, brush, underbrush or only tree around-3, lake, slough, pond-63, river, creek, bottom, or valley, ravine-7, marsh or swamp-97, and burned area-1.

Bearing trees include: Ash-8, Aspen-239, Balm-of-Gilead-26, Balsam Fir-12, Basswood-6, Birch-46, Elm-12, Ironwood-2, Maple-3, Sugar Maple-6, Oak-19, Bur Oak-11, Red Oak-10, Jack Pine-468, Red Pine-248, White Pine-77, Spruce-33, Tamarack-192, and Willow-1.

Current Land Cover

As referenced from table on page 6:

- Top five GAP land cover classes on all ownerships (131,748 total acres):
  Aspen/White Birch (41.5%), Water (10.1%), Jack Pine (7.1%), Cropland (6.3%), and Lowland Deciduous Shrub (5.0%).

- Top five CSA main cover types on DNR Forestry and Wildlife land (21,508 total acres):
  Aspen (37.5 %), Norway Pine (15.9%), Marsh (7.6%), Jack Pine (5.1%), and Tamarack (4.8%).

- Significant percentage differences in land cover between DNR Forestry and Wildlife land and all ownerships:
  DNR land has 13.2 times more White Spruce, 5.7 times more Balsam Fir, 4.7 times more Norway Pine, 3.0 times more Marsh, 1.9 times more Tamarack, and 2.6 times less in the Lowland Grass group.

Changes in Tree Species Composition

As referenced from table on page 6, the following tree species were or are a significant component of the forest and their abundance has changed significantly since the original land survey (magnitude of change calculated by comparing FIA data to original bearing trees):

There is currently 6.0 times more Red Oak, 4.6 times more Ash, 3.6 times more Balsam Fir, 3.1 times more Paper Birch, 3.0 times more Basswood, 3.0 times more Bur Oak, 2.5 times more Aspen, 2.3 times more Black Spruce, 2.0 times

more Elm, 2.2 times less Red Pine, 2.5 times less Jack Pine, 4.0 times less White Pine, 4.1 times less Tamarack, and 7.0 times less White Spruce in this LTA.

50-year Main Cover Type Goals

See main cover type 50-year goals in table on page 6. This is a priority LTA for Jack Pine, Norway Pine, White Pine, and White Spruce cover type increase.

Potential Forest Ecosystem Types and Native Plant Communities

This LTA contains the following forest ecosystem types: Dry Pine, Dry-Mesic Pine, and Dry-Mesic Pine/Oak. The following Native Plant Communities Classes are known to occur in this LTA **(bold text)** or occur in similar LTAs.

Upland Forests

FDn12, FDn33, **FDc12**, FDc23, **FDc24, FDc34, MHn35**, MHn44, **MHn47**, MHc26, **MHc36, MHc37**

Wetland Forests

FFn67, WFn53, WFn55, WFn64, **FPn63, FPn82,** APn81

Non-Forested Communities

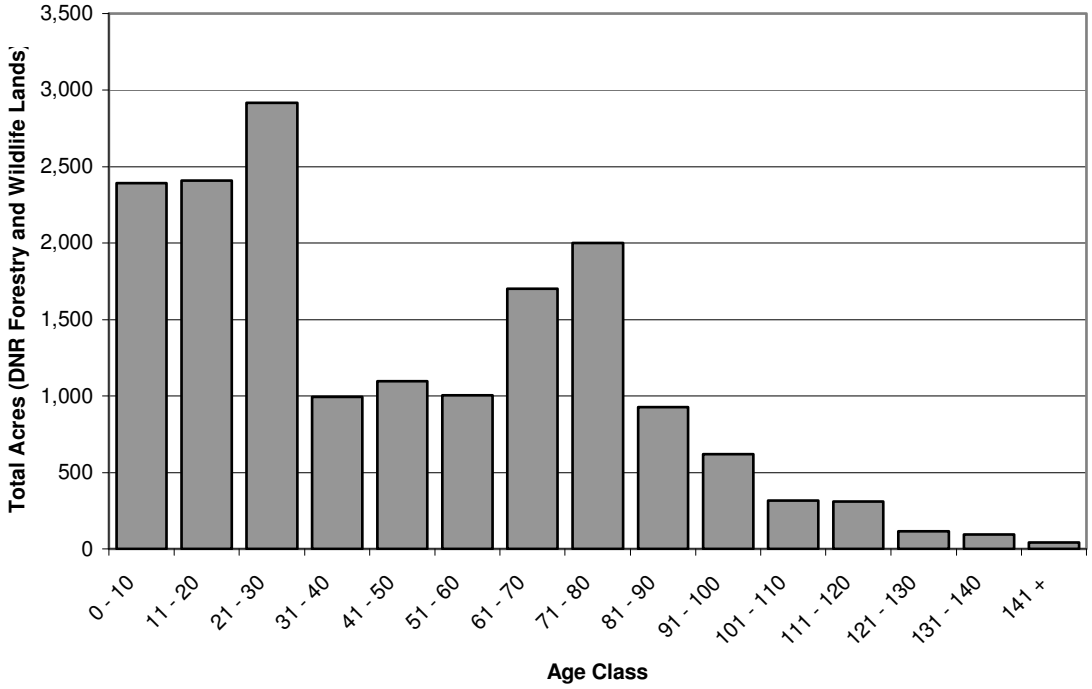
APn91, OPn81, OPn91, OPn92, WMn73, WMn82, FPn73

Old Growth, Ecologically Important Lowland Conifers, and Extended Rotation Forests

This LTA contains 5 old growth stands with associated OFMCs, 123 acres of EILC, and 7,386 acres of ERF on DNR Forestry and Wildlife land.

Age Classes

Figure below shows age-class distribution of all forested cover types in this LTA (16,942 total acres).



Patch Dynamics

This LTA contains 6 designated forest patches on state forestry and wildlife lands. They include 5 upland conifer patches (Indian Creek (Fir), Bad Medicine Lake, Hungry Man, Fool's Lake, and Small Lake) and a lowland conifers patch (Indian Creek).

Two Inlets Moraine (212Nc31)										
	Current GAP Land Cover[1] All Ownerships			Current CSA Land Cover[2] DNR Forestry and Wildlife			Comparison of DNR to All Ownerships[3]	Comparison of FIA data to Original Bearing Trees		CP-PMOP Cover Type 50-year Goal
GROUP	Land Cover Class	Acres	%	Main Cover Type	Acres	%		Tree Species	Change[3]	
UPLAND DECIDUOUS	Aspen/White Birch	54,696	41.5	Aspen	8,063	37.5	-1.1	Aspen	2.48	-7.9%
				Balm of Gilead	0	0.0		Balm of Gilead	-1.06	
				Birch	327	1.5		Paper Birch	3.13	PMOP -5.2%
				Offsite Aspen	0	0.0				
	Maple/Basswood	1,243	0.9	Northern Hardwoods[4]	147	0.7	-1.4	Sugar Maple	1.50	-10.8%
								Red Maple	0.00	
								Basswood	3.00	
								Yellow Birch	0.00	
	Bur/White Oak	4,041	3.1	Oak	116	0.5	-7.9	Bur Oak	2.95	PMOP -10.9%
	Red Oak	1,536	1.2					Red Oak	6.00	
	Upland Deciduous	0	0.0	Offsite Oak	22	0.1				
	Group Sum	61,516	**46.7**	Group Sum	8,676	**40.3**	-1.2			
LOWLAND DECIDUOUS	Black Ash	2,140	1.6	Ash	384	1.8	1.1	Ash	4.60	-10.7%
	Lowland Deciduous	0	0.0	Lowland Hardwood	21	0.1		Elm	2.00	
	Group Sum	2,140	**1.6**	Group Sum	405	**1.9**	1.2			
UPLAND CONIFERS	White Pine mix	401	0.3	White Pine	60	0.3	-1.1	White Pine	-4.00	112.4%
	Red Pine	4,439	3.4	Norway Pine[5]	3,416	15.9	4.7	Red Pine	-2.23	17.1%
	Red/White Pine	0	0.0							
	Red/White Pine-Deciduous mix	0	0.0							
	Jack Pine	9,337	7.1	Jack Pine	1,086	5.1	-1.4	Jack Pine	-2.49	84.4%
	Jack Pine-Deciduous mix	0	0.0							
	White Spruce	436	0.3	White Spruce	940	4.4	13.2	White Spruce	-7.00	2.0%
	Balsam Fir mix	1,005	0.8	Balsam Fir	939	4.4	5.7	Balsam Fir	3.63	-3.3%
	Spruce/Fir-Deciduous mix	0	0.0							
	Upland Black Spruce	0	0.0	Black Spruce, Upland	0	0.0				0.0%
	Upland Northern White-Cedar	0	0.0							
	Upland Conifer	0	0.0							
	Group Sum	15,618	**11.9**	Group Sum	6,441	**29.9**	2.5			
LOWLAND CONIFERS	Lowland Black Spruce	1,264	1.0	Black Spruce, Lowland	288	1.3	1.4	Black Spruce	2.25	0.0%
	Tamarack	3,316	2.5	Tamarack	1,034	4.8	1.9	Tamarack	-4.06	5.4%
	Lowland Northern White-Cedar	23	0.0	Northern White Cedar	29	0.1	7.5	Cedar	0.00	5.3%
	Group Sum	4,603	**3.5**	Group Sum	1,350	**6.3**	1.8			
STAGNANT LOWLAND CONIFERS	Stagnant Black Spruce	0	0.0	Stagnant Spruce	0	0.0				
	Stagnant Tamarack	351	0.3	Stagnant Tamarack	69	0.3	1.2			
	Stagnant Northern White-Cedar	0	0.0	Stagnant Cedar	0	0.0				
	Stagnant Conifer	0	0.0							
	Group Sum	351	**0.3**	Group Sum	69	**0.3**	1.2			
SHRUBLAND	Upland Shrub	5,938	4.5	Upland Brush	24	0.1	-2.9			
				Cutover Area	313	1.5				
	Lowland Deciduous Shrub	6,528	5.0	Lowland Brush	999	4.6	-1.1			
	Lowland Evergreen Shrub	0	0.0	Muskeg	3	0.0				
	Group Sum	12,467	**9.5**	Group Sum	1,339	**6.2**	-1.5			
AQUATIC	Water	13,276	10.1	Permanent Water	994	4.6				
	Floating Aquatic	35	0.0	Non-Permanent Water	135	0.6				
	Broadleaf Sedge/Cattail	3,296	2.5	Marsh	1,631	7.6	3.0			
	Sedge Meadow	4,552	3.5	Lowland Grass	289	1.3	-2.6			
	Group Sum	21,159	**16.1**	Group Sum	3,049	**14.2**	-1.1			
CROP/GRASS	Cropland	8,305	6.3	Agricultural	0	0.0				
	Grassland	5,574	4.2	Upland Grass	48	0.2	-19.1			
	Prairie	0	0.0							
	Group Sum	13,879	**10.5**	Group Sum	48	**0.2**	-47.5			
DEVELOPED	Low Intensity Urban	1	0.0	Development[6]	12	0.1	107.4			
	High Intensity Urban	0	0.0							
	Mixed Developed	0	0.0							
	Transportation	0	0.0	Roads	119	0.6				
	Group Sum	1	**0.0**	Group Sum	131	**0.6**	1196.7			
	Other[7]	14	0.0	Other[8]	0	0.0				
	LTA TOTAL	131,748	100.0	LTA TOTAL	21,508	100.0				

Footnotes: 1. MN GAP data on all ownerships, 2. CSA data on DNR Forestry and Wildlife administered lands, 3. Magnitude of change (ex. -2.0 is a 2-fold decline and 4.5 is a 4.5-fold increase), 4. Includes Central Hardwoods, 5. Includes Scotch Pine, 6. Includes Industrial & Urban Development and Recreation Development, 7. Includes Barren and Lowland Conifer-Deciduous mix, 8. Includes Moss and Rock Outcrop

Bass Lake Moraine (212Nc32)

OVERVIEW

Information presented in this document is specific to this LTA with some reference to the larger ECS subsection. This summary was written to provide additional forest management information in this landscape and includes the following main sections: overview, description, land management, and vegetation. See the LTA Assessment and Analysis Guide for section explanations, data descriptions, acronyms, and references.

DESCRIPTION

A rolling to hummocky landscape dominated by end moraines and pitted outwash plains formed by the Red River Lobe Glacier. A few outwash channels are present. Uplands occupy 85 percent, wetlands occupy 9 percent, and lakes occupy 6 percent of the LTA (MN DNR, 1998). Soil parent material is coarse loamy (sandy loam) till with hardpans and sandy outwash. Soils formed under forest vegetation.

LAND MANAGEMENT

Land Stewardship

Based on GAP stewardship data, the majority of this LTA is county (58.2%), followed by federal (15.3%), state (14.4%), private (8.5), and tribal (3.5%). See table below. This LTA is located in Mahnomen, Clearwater, and Becker counties. Over 5,727 acres of protected waters exist inside the LTA. Lakes within or adjacent to the LTA include Bass, Upper and Lower Camp, Big Rock, Long Lost, and Elbow.

Most of the LTA is inside White Earth Indian Reservation. Federal, state, and county lands are distributed throughout the LTA. The majority of state land is situated in the LTA's central portion. County lands are primarily found in the east half of the LTA, of which most is contiguous. There are no USFS lands, private industrial forestlands, or municipalities in the LTA.

Agency (%)	Acres	Percent
State (14.4%)		
DNR, Fish and Wildlife	210	0.4%

DNR, Forestry	6,573	13.8%
State (Undifferentiated)	74	0.2%
County (58.2%)		
Becker	26	0.1%
Clearwater	27,285	57.5%
Mahnomen	324	0.7%
Federal (15.3%)		
Bureau of Indian Affairs	6,840	14.4%
Other	64	0.1%
White Earth Reservation	375	0.8%
Private (8.5%)		
Private	4,045	8.5%
Tribal (3.5%)		
White Earth Reservation	1,670	3.5%
Grand Total	**47,486 acres**	

* note - 2,978 acres of open water are included in the table above

Natural Resource Management Units

Federal

None known

State

Minnesota Department of Natural Resources

- State Forests: White Earth (central and south central portions)
- Wildlife Management Areas: Upper Camp Lake, Wapatus Lake, McKenzie lake, Little Rock Lake, Island Lake, Little Bass Lake, Pickerel Lake
- Aquatic Management Areas: Elbow Lake Creek

County

None known

Other

White Earth Indian Reservation

VEGETATION

Pre-settlement Vegetation and Tree Species

The major Pre-settlement Vegetation types in this LTA include: Aspen-Birch (trending to Conifers) (15%), Aspen-Birch (trending to hardwoods) (7%), and Mixed White Pine and Red Pine (68%).

The following list contains the number of section corner notes from the original Public Land Survey by vegetation/landscape characteristic within this LTA, forest, timber-174, pine openings, pine barrens, scattered pine-3, lake, slough, pond-12, marsh or swamp-17, windthrow, windfall-4, and burned area-27.

Bearing trees include: Ash-3, Aspen-151, Balm-of-Gilead-20, Balsam Fir-5, Basswood-14, Birch-27, Elm-15, Ironwood-8, Maple-5, Sugar Maple-30, Oak-25, Bur Oak-12, Red Oak-22, Pine-1, Jack Pine-27, Red Pine-66, White Pine-117, Spruce-23, and Tamarack-23.

Current Land Cover

As referenced from table on page 5:

- Top five GAP land cover classes on all ownerships (50,008 total acres):
  Aspen/White Birch (51.5%), Maple/Basswood (11.7%), Red Oak (8.7%), Bur/White Oak (7.7%), and Water (7.5%).

- Top five CSA main cover types on DNR Forestry and Wildlife land (7,546 total acres):
  Aspen (52.1 %), Northern Hardwoods (22.0%), Permanent Water (8.0%), Norway Pine (4.4%), and Marsh (4.1%).

- Significant percentage differences in land cover between DNR Forestry and Wildlife land and all ownerships:
  DNR land has 3.8 times more Norway Pine, 3.7 times more Marsh, 1.9 times more Northern Hardwoods, and 15.0 times less in the Oak group.

Changes in Tree Species Composition

As referenced from table on page 5, the following tree species were or are a significant component of the forest and their abundance has changed significantly since the original land survey (magnitude of change calculated by comparing FIA data to original bearing trees):

There is currently 4.8 times more Basswood, 2.2 times more Paper Birch, 1.9 times more Sugar Maple, 2.0 times less Balsam Fir, 5.0 times less White Spruce, 6.6 times less Red Pine, 9.8 times less Tamarack, 11.5 times less Jack Pine, and 16.3 times less White Pine in this LTA.

50-year Main Cover Type Goals

See main cover type 50-year goals in table on page 5. This is a priority LTA for White Pine cover type increase.

Potential Forest Ecosystem Types and Native Plant Communities

This LTA contains the following forest ecosystem types: Dry-Mesic Pine and Dry-Mesic Pine/Oak. The following Native Plant Communities Classes are known to occur in this LTA **(bold text)** or occur in similar LTAs.

Upland Forests

FDc24, **FDc34, MHn35, MHc26**, MHc37

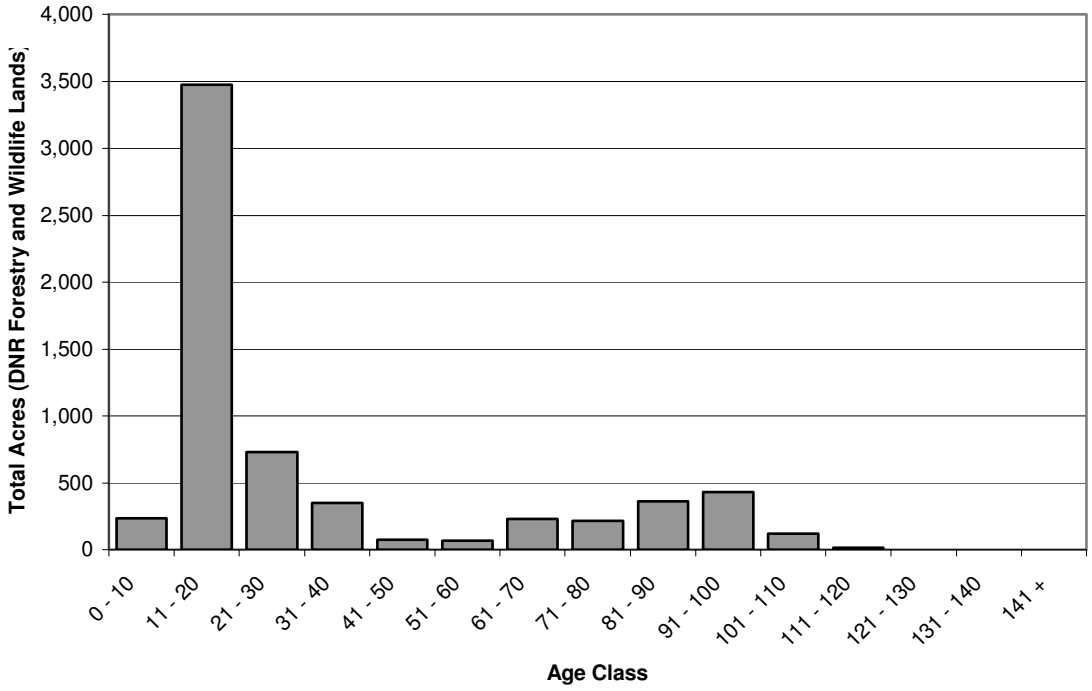
Wetland Forests
FFn67, WFn53, WFn55, WFn64, FPn82, **FPs63,** APn80, APn81
Non-Forested Communities
OPn81, WMn82

Old Growth, Ecologically Important Lowland Conifers, and Extended Rotation Forests

This LTA contains 21 old growth stands with associated OFMCs, 14 acres of EILC, and 3,135 acres of ERF on DNR Forestry and Wildlife land.

Age Classes

Figure below shows age-class distribution of all forested cover types in this LTA (6,310 total acres).



Patch Dynamics

This LTA contains 2 designated forest patches on state forestry and wildlife lands. They include an upland conifers patch (LaPrairie Conifers) and an upland hardwoods patch (LaPrairie Hardwoods).

Bass Lake Moraine (212Nc32)

	Current GAP Land Cover[1] All Ownerships			Current CSA Land Cover[2] DNR Forestry and Wildlife			Comparison of DNR to All Ownerships[3]	Comparison of FIA data to Original Bearing Trees		CP-PMOP Cover Type 50-year Goal
GROUP	Land Cover Class	Acres	%	Main Cover Type	Acres	%		Tree Species	Change[3]	
UPLAND DECIDUOUS	Aspen/White Birch	25,769	51.5	Aspen	3,931	52.1	1.0	Aspen	1.80	-7.9%
				Balm of Gilead	0	0.0		Balm of Gilead	-1.72	
				Birch	44	0.6		Paper Birch	2.23	PMOP -5.2%
				Offsite Aspen	0	0.0				
	Maple/Basswood	5,846	11.7	Northern Hardwoods[4]	1,661	22.0	1.9	Sugar Maple	1.90	-10.8%
								Red Maple	0.00	
								Basswood	4.83	
								Yellow Birch	0.00	
	Bur/White Oak	3,841	7.7	Oak	83	1.1	-15.0	Bur Oak	-1.08	PMOP -10.9%
	Red Oak	4,371	8.7					Red Oak	1.55	
	Upland Deciduous	154	0.3	Offsite Oak	0	0.0				
	Group Sum	39,982	**80.0**	Group Sum	5,719	**75.8**	-1.1			
LOWLAND DECIDUOUS	Black Ash	457	0.9	Ash	7	0.1	-9.4	Ash	1.40	-10.7%
	Lowland Deciduous	12	0.0	Lowland Hardwood	0	0.0		Elm	1.30	
	Group Sum	470	**0.9**	Group Sum	7	**0.1**	-9.6			
UPLAND CONIFERS	White Pine mix	28	0.1	White Pine	33	0.4	8.0	White Pine	-16.25	112.4%
	Red Pine	576	1.2	Norway Pine[5]	330	4.4	3.8	Red Pine	-6.59	17.1%
	Red/White Pine	0	0.0							
	Red/White Pine-Deciduous mix	3	0.0							
	Jack Pine	166	0.3	Jack Pine	0	0.0		Jack Pine	-11.50	84.4%
	Jack Pine-Deciduous mix	0	0.0							
	White Spruce	57	0.1	White Spruce	119	1.6	13.8	White Spruce	-5.00	2.0%
	Balsam Fir mix	73	0.1	Balsam Fir	70	0.9	6.4	Balsam Fir	-2.00	-3.3%
	Spruce/Fir-Deciduous mix	0	0.0							
	Upland Black Spruce	0	0.0	Black Spruce, Upland	0	0.0				0.0%
	Upland Northern White-Cedar	0	0.0							
	Upland Conifer	12	0.0							
	Group Sum	914	**1.8**	Group Sum	552	**7.3**	4.0			
LOWLAND CONIFERS	Lowland Black Spruce	14	0.0	Black Spruce, Lowland	0	0.0		Black Spruce	0.00	0.0%
	Tamarack	81	0.2	Tamarack	32	0.4	2.6	Tamarack	-9.75	5.4%
	Lowland Northern White-Cedar	0	0.0	Northern White Cedar	0	0.0		Cedar	0.00	5.3%
	Group Sum	95	**0.2**	Group Sum	32	**0.4**	2.2			
STAGNANT LOWLAND CONIFERS	Stagnant Black Spruce	0	0.0	Stagnant Spruce	0	0.0				
	Stagnant Tamarack	61	0.1	Stagnant Tamarack	0	0.0				
	Stagnant Northern White-Cedar	0	0.0	Stagnant Cedar	0	0.0				
	Stagnant Conifer	0	0.0							
	Group Sum	61	**0.1**	Group Sum	0	**0.0**				
SHRUBLAND	Upland Shrub	1,308	2.6	Upland Brush	48	0.6	-4.1			
				Cutover Area	0	0.0				
	Lowland Deciduous Shrub	980	2.0	Lowland Brush	94	1.3	-1.6			
	Lowland Evergreen Shrub	0	0.0	Muskeg	0	0.0				
	Group Sum	2,288	**4.6**	Group Sum	143	**1.9**	-2.4			
AQUATIC	Water	3,748	7.5	Permanent Water	607	8.0				
	Floating Aquatic	12	0.0	Non-Permanent Water	141	1.9				
	Broadleaf Sedge/Cattail	553	1.1	Marsh	310	4.1	3.7			
	Sedge Meadow	710	1.4	Lowland Grass	18	0.2	-5.9			
	Group Sum	5,022	**10.0**	Group Sum	1,077	**14.3**	1.4			
CROP/GRASS	Cropland	510	1.0	Agricultural	0	0.0				
	Grassland	660	1.3	Upland Grass	0	0.0				
	Prairie	0	0.0							
	Group Sum	1,170	**2.3**	Group Sum	0	**0.0**				
DEVELOPED	Low Intensity Urban	0	0.0	Development[6]	4	0.1				
	High Intensity Urban	0	0.0							
	Mixed Developed	0	0.0							
	Transportation	0	0.0	Roads	6	0.1				
	Group Sum	0	**0.0**	Group Sum	10	**0.1**				
	Other[7]	7	0.0	Other[8]	6	0.1				
	LTA TOTAL	50,008	100.0	LTA TOTAL	7,546	100.0				

Footnotes: 1. MN GAP data on all ownerships, 2. CSA data on DNR Forestry and Wildlife administered lands, 3. Magnitude of change (ex. -2.0 is a 2-fold decline and 4.5 is a 4.5-fold increase), 4. Includes Central Hardwoods, 5. Includes Scotch Pine, 6. Includes Industrial & Urban Development and Recreation Development, 7. Includes Barren and Lowland Conifer-Deciduous mix, 8. Includes Moss and Rock Outcrop

Naytahwaush Moraine (212Nc34)

OVERVIEW

Information presented in this document is specific to this LTA with some reference to the larger ECS subsection. This summary was written to provide additional forest management information in this landscape and includes the following main sections: overview, description, land management, and vegetation. See the LTA Assessment and Analysis Guide for section explanations, data descriptions, acronyms, and references.

DESCRIPTION

A landscape dominated by a rolling end moraine that is dissected by outwash channels. The Red River Lobe Glacier formed all features. Uplands occupy 81 percent, wetlands occupy 11 percent, and lakes occupy 8 percent of the LTA (MN DNR, 1998). Soil parent material is coarse loamy (sandy loam) outwash and till. Stones and hardpans are common. Soils have formed under forest vegetation.

LAND MANAGEMENT

Land Stewardship

Based on GAP stewardship data, the majority of this LTA is federal (47.1%), followed by county (21.2%), private (18.4%), state (12.1%), and tribal (1.2%). See table below. This LTA is located in Mahnomen, Clearwater, and Becker counties. Over 7,290 acres of protected waters exist inside the LTA. Lakes within or adjacent to the LTA include Roy, North and South Twin, Snider, Big Rat, Strawberry, and Tulaby.

The entire LTA is inside White Earth Indian Reservation. Federal, state, and county lands are spread throughout the LTA. Most state lands are located in the central portion of the LTA, while county forestlands are found primarily in the south one third. There are no USFS lands, private industrial forestlands, or municipalities in the LTA.

Agency (%)	Acres	Percent
State (12.1%)		
DNR, Fish and Wildlife	111	0.2%
DNR, Forestry	5,219	10.4%
DNR, Parks	96	0.2%

Mahnomen	11	0.0%
Other	196	0.4%
State (Undifferentiated)	422	0.8%
County (21.2%)		
Becker	8,497	16.9%
Clearwater	1,563	3.1%
Mahnomen	483	1.0%
Other	83	0.2%
Federal (47.1%)		
Bureau of Indian Affairs	18,813	37.5%
Other	2,310	4.6%
U.S. Fish and Wildlife Service	392	0.8%
White Earth Reservation	2,112	4.2%
Private (18.4%)		
Private	9,209	18.4%
Tribal (1.2%)		
White Earth Reservation	619	1.2%
Grand Total	**50,136 acres**	

* note - 4,360 acres of open water are included in the table above

Natural Resource Management Units

Federal

United States Fish and Wildlife Service

- National Wildlife Refuges: Tamarac

State

Minnesota Department of Natural Resources

- State Forests: White Earth (north central and southwest portions)
- Wildlife Management Areas: Roy Lake, Lower Rice
- Fish Management Areas: Strawberry Lake

County

None known

Other

White Earth Indian Reservation

VEGETATION

Pre-settlement Vegetation and Tree Species

The major Pre-settlement Vegetation types in this LTA include: Aspen-Birch (trending to Conifers) (12%), Aspen-Birch (trending to hardwoods) (6%), Conifer Bogs and Swamps (7%), Lakes (open water) (7%), and Mixed White Pine and Red Pine (61%).

The following list contains the number of section corner notes from the original Public Land Survey by vegetation/landscape characteristic within this LTA, forest, timber-92, pine openings, pine barrens, scattered pine-20, scattering oak, scattering timber-18, lake,

slough, pond-24, river, creek, bottom, or valley, ravine-1, marsh or swamp-21, wet prairie or prairie-2, windthrow, windfall-3, and burned area-66.

Bearing trees include: Ash-3, Aspen-100, Balm-of-Gilead-21, Balsam Fir-12, Basswood-19, Birch-17, Elm-39, Ironwood-1, Maple-3, Sugar Maple-25, Oak-30, Bur Oak-44, Red Oak-19, Pine-3, Jack Pine-12, Red Pine-28, White Pine-132, Spruce-15, and Tamarack-53.

Current Land Cover

As referenced from table on page 5:

- Top five GAP land cover classes on all ownerships (51,145 total acres):
  Aspen/White Birch (45.1%), Bur/White Oak (9.9%), Water (9.1%), Maple/Basswood (8.0%), and Red Oak (6.6%).

- Top five CSA main cover types on DNR Forestry and Wildlife land (5,167 total acres):
  Aspen (44.3 %), Northern Hardwoods (9.1%), Oak (6.9%), Norway Pine (6.3%), and Lowland Brush (4.4%).

- Significant percentage differences in land cover between DNR Forestry and Wildlife land and all ownerships:
  DNR land has 13.7 times more Balsam Fir, 11.6 times more Norway Pine, 1.1 times more Northern Hardwoods, and 2.4 times less in the Oak group.

Changes in Tree Species Composition

As referenced from table on page 5, the following tree species were or are a significant component of the forest and their abundance has changed significantly since the original land survey (magnitude of change calculated by comparing FIA data to original bearing trees):

There is currently 4.1 times more Ash, 2.5 times more Aspen, 1.9 times more Basswood, 3.1 times less Tamarack, 4.0 times less Red Pine, and 110.5 times less White Pine in this LTA.

50-year Main Cover Type Goals

See main cover type 50-year goals in table on page 5. This is a priority LTA for White Pine cover type increase.

Potential Forest Ecosystem Types and Native Plant Communities

This LTA contains the following forest ecosystem types: Dry-Mesic Pine. The following Native Plant Communities Classes are known to occur in this LTA **(bold text)** or occur in similar LTAs.

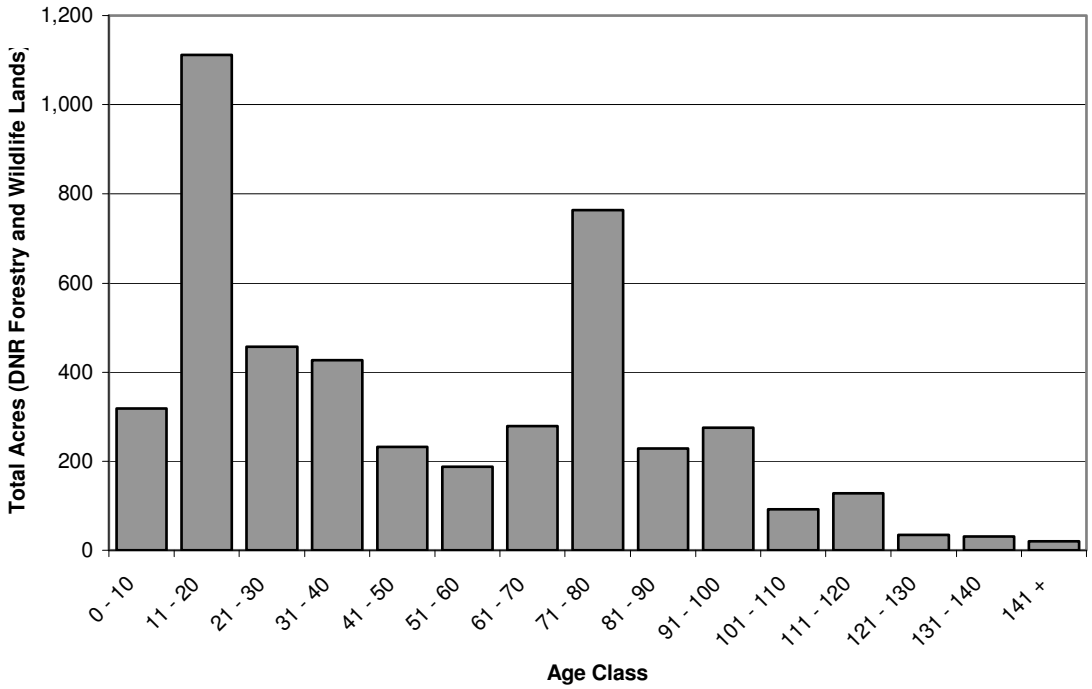
Upland Forests
FDc24, FDc34, MHn35, MHc26, MHc37
Wetland Forests
FFn67, **WFn53**, WFn55, **WFn64, FPn82,** FPs63, APn80, APn81
Non-Forested Communities
OPn81, WMn82

Old Growth, Ecologically Important Lowland Conifers, and Extended Rotation Forests

This LTA contains no old growth stands or associated OFMCs, 49 acres of EILC, and 1,356 acres of ERF on DNR Forestry and Wildlife land.

Age Classes

Figure below shows age-class distribution of all forested cover types in this LTA (4,589 total acres).



Patch Dynamics

This LTA contains 2 designated forest patches on state forestry and wildlife lands. They are upland conifer patches (South Little Elbow Conifers and North Little Elbow Conifers).

Naytahwaush Moraine (212Nc34)										
	Current GAP Land Cover[1] All Ownerships			Current CSA Land Cover[2] DNR Forestry and Wildlife			Comparison of DNR to All Ownerships[3]	Comparison of FIA data to Original Bearing Trees		CP-PMOP Cover Type 50-year Goal
GROUP	Land Cover Class	Acres	%	Main Cover Type	Acres	%		Tree Species	Change[3]	
UPLAND DECIDUOUS	Aspen/White Birch	23,041	45.1	Aspen	2,288	44.3	1.0	Aspen	2.49	-7.9%
				Balm of Gilead	0	0.0		Balm of Gilead	1.45	
				Birch	90	1.8		Paper Birch	1.69	PMOP -5.2%
				Offsite Aspen	0	0.0				
	Maple/Basswood	4,072	8.0	Northern Hardwoods[4]	470	9.1	1.1	Sugar Maple	1.07	-10.8%
								Red Maple	0.00	
								Basswood	1.94	
								Yellow Birch	0.00	
	Bur/White Oak	5,083	9.9	Oak	355	6.9	-2.4	Bur Oak	-1.80	PMOP -10.9%
	Red Oak	3,356	6.6					Red Oak	1.59	
	Upland Deciduous	529	1.0	Offsite Oak	0	0.0				
	Group Sum	36,082	**70.5**	Group Sum	3,203	**62.0**	-1.1			
LOWLAND DECIDUOUS	Black Ash	1,188	2.3	Ash	206	4.0	1.7	Ash	4.14	-10.7%
	Lowland Deciduous	95	0.2	Lowland Hardwood	196	3.8	20.5	Elm	1.66	
	Group Sum	1,283	**2.5**	Group Sum	402	**7.8**	3.1			
UPLAND CONIFERS	White Pine mix	4	0.0	White Pine	110	2.1	287.4	White Pine	-110.50	112.4%
	Red Pine	278	0.5	Norway Pine[5]	326	6.3	11.6	Red Pine	-4.00	17.1%
	Red/White Pine	5	0.0							
	Red/White Pine-Deciduous mix	46	0.1							
	Jack Pine	130	0.3	Jack Pine	6	0.1	-2.1	Jack Pine	1.19	84.4%
	Jack Pine-Deciduous mix	13	0.0							
	White Spruce	156	0.3	White Spruce	129	2.5	8.2	White Spruce	-1.25	2.0%
	Balsam Fir mix	140	0.3	Balsam Fir	194	3.7	13.7	Balsam Fir	1.21	-3.3%
	Spruce/Fir-Deciduous mix	3	0.0							
	Upland Black Spruce	0	0.0	Black Spruce, Upland	0	0.0				0.0%
	Upland Northern White-Cedar	1	0.0							
	Upland Conifer	46	0.1							
	Group Sum	822	**1.6**	Group Sum	764	**14.8**	9.2			
LOWLAND CONIFERS	Lowland Black Spruce	65	0.1	Black Spruce, Lowland	55	1.1	8.3	Black Spruce	-1.14	0.0%
	Tamarack	868	1.7	Tamarack	162	3.1	1.8	Tamarack	-3.07	5.4%
	Lowland Northern White-Cedar	2	0.0	Northern White Cedar	0	0.0		Cedar	0.00	5.3%
	Group Sum	935	**1.8**	Group Sum	216	**4.2**	2.3			
STAGNANT LOWLAND CONIFERS	Stagnant Black Spruce	0	0.0	Stagnant Spruce	0	0.0				
	Stagnant Tamarack	97	0.2	Stagnant Tamarack	0	0.0				
	Stagnant Northern White-Cedar	0	0.0	Stagnant Cedar	0	0.0				
	Stagnant Conifer	0	0.0							
	Group Sum	97	**0.2**	Group Sum	0	**0.0**				
SHRUBLAND	Upland Shrub	1,239	2.4	Upland Brush	7	0.1	-19.0			
				Cutover Area	0	0.0				
	Lowland Deciduous Shrub	1,287	2.5	Lowland Brush	226	4.4	1.7			
	Lowland Evergreen Shrub	0	0.0	Muskeg	0	0.0				
	Group Sum	2,525	**4.9**	Group Sum	232	**4.5**	-1.1			
AQUATIC	Water	4,644	9.1	Permanent Water	121	2.3				
	Floating Aquatic	0	0.0	Non-Permanent Water	58	1.1				
	Broadleaf Sedge/Cattail	479	0.9	Marsh	132	2.5	2.7			
	Sedge Meadow	839	1.6	Lowland Grass	5	0.1	-16.8			
	Group Sum	5,962	**11.7**	Group Sum	315	**6.1**	-1.9			
CROP/GRASS	Cropland	2,331	4.6	Agricultural	0	0.0				
	Grassland	1,019	2.0	Upland Grass	17	0.3	-6.2			
	Prairie	0	0.0							
	Group Sum	3,350	**6.6**	Group Sum	17	**0.3**	-20.3			
DEVELOPED	Low Intensity Urban	0	0.0	Development[6]	12	0.2				
	High Intensity Urban	0	0.0							
	Mixed Developed	0	0.0							
	Transportation	15	0.0	Roads	5	0.1	3.4			
	Group Sum	15	**0.0**	Group Sum	17	**0.3**	11.4			
	Other[7]	74	0.1	Other[8]	0	0.0				
	LTA TOTAL	51,145	100.0	LTA TOTAL	5,167	100.0				

Footnotes: 1. MN GAP data on all ownerships, 2. CSA data on DNR Forestry and Wildlife administered lands, 3. Magnitude of change (ex. -2.0 is a 2-fold decline and 4.5 is a 4.5-fold increase), 4. Includes Central Hardwoods, 5. Includes Scotch Pine, 6. Includes Industrial & Urban Development and Recreation Development, 7. Includes Barren and Lowland Conifer-Deciduous mix, 8. Includes Moss and Rock Outcrop