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Appendix D – Ecological Classification System Description

Introduction and Summary

The Ecological Classification System (ECS) is a capability information system to identify, organize, and describe ecological land units for interdisciplinary inventory and prediction of the natural resource response to management activities. Table D-1 displays the national hierarchy that has been followed in developing the Ottawa National Forest's (the Ottawa) ECS system. The goal of this work has been to provide an effective means of determining land capability and predicting resource response to management activities at the Forest, management area, and project level.

Table D-1. National Hierarchy of Ecological Units

Planning and Analysis Scale	Ecological Units	Purpose, Objectives, and General Use	General Size Range
Ecoregion			
Global	Domain	Broad applicability for modeling and sampling, strategic planning and assessment, and international planning	Millions to tens of thousands of square miles
Continental	Division		
Regional	Province		
Subregion	Section	Strategic, multi-forest, statewide, and multi-agency analysis and assessment	Thousands to tens of square miles
	Subsection		
Landscape	Landtype association (LTA)	Forest, area-wide planning and watershed analysis	Thousands to hundreds of acres
Land unit	Landtype	Project and management area planning and analysis	Hundreds to less than ten acres
	Landtype phase *Ecological Landtype Phase (ELTP)*		

Levels in the national hierarchy most commonly used on the Ottawa are the Landtype Association (LTA) and the Landtype phase, which is commonly referred to as the Ecological Landtype Phase, or ELTP. LTAs are defined by general topography, geomorphic processes, glacial landforms, post-glacial landforms, surficial geology, climate, and potential vegetation patterns. At this time, the Ottawa has approximately 44 LTAs, which have been defined, mapped and used as a tool. See Table D-2 and Figure D-1 for descriptions and spatial arrangement of the LTAs on the Ottawa.

ELTPs are defined by three components, landform, soils and potential natural vegetation or "Habitat Type". If any of the three components change, the result is a different ELTP. On the Ottawa, the national hierarchical framework was implemented so that any particular ELTP can occur in or be a member of only one LTA. Mapping processes for ELTPs on the Ottawa have conformed to the standards set forth in the National Cooperative Soil Survey, which tiers to the soil taxonomic classification system. This system defines map unit types (such as con-association, complex, association); sets standards for documentation and peer review process; as well as other nationally accepted protocols.

Table D-2. Landtype Associations on the Ottawa National Forest

LTA [1] Symbol	Ties to 1974 LTA	LTA Name[3]	Brief Description and Geomorphic Process	Overall Landform Pattern	Dominant Surface Texture	Dominant Particle Size Class	Native Plant Community (Habitat Types)	Dominant Disturbance Regime [4]	% of Forest [5]
Jb01	5	Penokee Gogebic Iron Range	Hilly bedrock - controlled moraine with loamy soils over acid, sandy loam till or igneous/metamorphic bedrock. Rock outcrops are abundant. Crab Lake Member of the Copper Falls Formation	Hilly bedrock - controlled moraine	Silt loam, fine sandy loam	Coarse - loamy	Acer-Tsuga-Dryopteris (ATD); Acer-Viola-Osmorhiza (AVO)	Wind - W2 Fire - F4	2
Jb02	11	Gile/Erwin till plain	Rolling bedrock - controlled, moraine with loamy soils over acid, sandy loam till. Igneous/metamorphic bedrock, and low rock outcrops are common.	Rolling bedrock - controlled, moraine	Fine sandy loam	Coarse-loamy	Acer-Tsuga-Dryopteris (ATD) Acer-Viola-Osmorhiza (AVO)	Wind - W2 Fire – F5	5
Jb03	9,5	Saxon/North Ironwood till plain	Undulating, till plain with loamy soils over acid, loamy till. Few rock outcrops. Hanson Creek Member of the Copper Falls Formation.	Undulating, till plain	Fine sandy loam, loam	Coarse - loamy	Acer-Tsuga-Dryopteris (ATD)	Wind - W3 Fire - F5	9
Jb04	5	Bald Mountain - Point Mountain - Black River Highlands moraines	Moderately steep, bedrock - controlled moraine with loamy soils over acid, sandy loam till. Some bedrock outcrops.	Moderately steep, bedrock - controlled moraine	Silt loam, fine sandy loam	Coarse - loamy	Acer-Viola-Osmorhizai (AVO); Acer-Tsuga-Dryopteris (ATD)	Wind – W.2 Fire - F3	1

LTA [1] Symbol	Ties to 1974 LTA	LTA Name[3]	Brief Description and Geomorphic Process	Overall Landform Pattern	Dominant Surface Texture	Dominant Particle Size Class	Native Plant Community (Habitat Types)	Dominant Disturbance Regime [4]	% of Forest [5]
Jb05	14	Gurney/ Ontonagon spillway	Undulating acid, glaciofluvial deposits and lacustrine sediments from the discharge of Glacial Lake Ontonagon. Unnamed Member of the Miller Creek Formation	Undulating, glacio-fluvial channel	Loamy sand	Sandy, coarse - loamy	Acer-Tsuga-Dryopteris (ATD)	Wind - W3 Fire - F3	<1
Jb06	5	Porcupine Mountain bedrock-controlled till	Steep, shallow to bedrock, silty and loamy soils over acid, sandy loam, to loam till. Bedrock outcrops common. Unnamed member of the Copper Falls Formation.	Steep, bedrock-controlled hills and valleys	Silt loam, fine sandy loam	Coarse-loamy	Acer-Tsuga-Dryopteris (ATD)	Wind - W2 Fire - F5	<1
Jb07	5	Gogebic Ridge - Bergland Hill - Trap Hills - Norwich Bluffs moraine	High, very steep, bedrock controlled moraine and bedrock outcrops. Silty soils over acid, sandy loam till. Escarpments on southern aspects. Unnamed member of the Copper Falls Formation.	Very steep, bedrock - controlled moraine with bedrock outcrops and escarpments.	Silt loam, fine sandy loam	Coarse - loamy	Acer-Viola-Osmorhizai (AVO); Acer-Tsuga-Dryopteris (ATD)	Wind - W2 Fire - F4	3
Jb08	10	Lake Gogebic lowlands	Gently sloping, wet, stony till plain with loamy soils over acid, sandy loam till. Numerous wetlands.	Discontinuous low ridges and peri-glacial drainways orientated north to south on the gently sloping, wet, stony, till plain	Fine sandy loam	Coarse-loamy	Acer-Tsuga-Dyropteris (ATD); Tsuga-Thuja-Sphagmum (TTS)	Wind - W2 Fire - F5	3
Jb14	9	Tenderfoot Creek till plain	Strongly sloping, knobby, loamy soils over acid, loamy till. Low hummocky knolls and depressions in non-linear patterns.	Strongly sloping, loamy till plain	Fine sandy loam	Coarse - loamy	Acer-Tsuga-Dryopteris (ATD)	Wind - W3 Fire - F5	4

LTA [1] Symbol	Ties to 1974 LTA	LTA Name[3]	Brief Description and Geomorphic Process	Overall Landform Pattern	Dominant Surface Texture	Dominant Particle Size Class	Native Plant Community (Habitat Types)	Dominant Disturbance Regime [4]	% of Forest [5]
Jb18	8	Lake Gogebic	Drainage lake, 13,380 acres, maximum depth of 38 feet average depth is 17.5 feet. Largest inland lake in the Upper Peninsula of Michigan.	Lake	n/a	n/a	n/a	n/a	1
Jb21	9	Trout Brook till plain	Strongly sloping, till plain with loamy soils over acid, loamy till. Undulating knolls and swells.	Strongly sloping, loamy till plain	Fine sandy loam	Coarse - loamy	Acer-Tsuga-Dryopteris (ATD)	Wind - W3 Fire - F5	2
Jc02	2	Winegar moraines	Rolling, collapsed and water-worked terminal moraine with loamy soils over acid, sandy loam till. Numerous depressions, many of which contain lakes and/or wetlands.	Collapsed hill and swale topography, hummocky, with numerous closed depressions	Fine sandy loam, loamy sand	Coarse - loamy, sandy	Acer-Tsuga-Dryopteris (ATD)	Wind - W3 Fire - F5	18
Jc05	-	Valhalla/ Marenisco (McDonald) moraine	Rolling, narrow, collapsed-till, terminal moraine with loamy soils over acid, sandy loam till.	Rolling, ridges and depressions in a linear pattern	Silt loam, fine sandy loam	Coarse - loamy	Acer-Viola-Osmorhizai (AVO); Acer-Tsuga-Dryopteris (ATD)	Wind - W3 Fire - F5	<1
Jc22	1	Calderwood hills	Hilly, stratified, ice-contact portion of Winegar Moraine with sandy soils over acid, sandy till.	Hilly, knoll and swale topography with closed depressions	Loamy sand	Sandy	Tsuga-Maianthemum (TM)	Wind - W3 Fire - F3	2
Jc24	14	Nesbitt Lake outwash plain	Undulating outwash plain with sandy soils over acid, stratified, gravelly outwash.	Undulating, outwash plain	Loamy sand, sand	Sandy	Acer-Quercus-Vaccinium (AQV)	Wind - W3 Fire - F3	1
Jc25	14	Watersmeet terraces	Nearly level river terraces with sandy and organic deposits over acid, sandy Winegar Moraine glacio-fluvial deposits.	Nearly level, terraces and recent floodplains	Loamy sand	Sandy	Acer-Quercus-Vaccinium (AQV)	Wind - W3 Fire - F3	1

LTA [1] Symbol	Ties to 1974 LTA	LTA Name[3]	Brief Description and Geomorphic Process	Overall Landform Pattern	Dominant Surface Texture	Dominant Particle Size Class	Native Plant Community (Habitat Types)	Dominant Disturbance Regime [4]	% of Forest [5]
Jo01	19, 16	Ontonagon Lake Plain	Nearly level, lake plain, dissected ravines loamy soils over calcareous, clayey till and lacustrine deposits. Glacial Lake Ontonagon occupied much of the Ontonagon River basin while the ice front stood along the Copper Range. Ravines created by post-glacial erosional processes.	Nearly level, broad plain	Silt loam	Very fine	Tsuga-Acer-Mitchella (TAM); Tsuga-Thuja-Petasites (TTP); Acer-Tsuga-Dryopterris (ATD)	Wind - W3 Fire - F4	9
Jo02	16, 20	Ontonagon River valleys	Very steep, unstable, river valleys. Evidence of past, present, and potential landslides, mass wasting, soil creep, and other natural erosion process within Glacial Lake Ontonagon deposits. Seepages (springs) are common. Bedrock outcrops in the river channels.	Valley-walls, floodplains, river channel	Variable	Variable	Variable	Wind - W3 Fire - F4	2
Jo03	14	Rousseau delta	Nearly level, delta with sandy soils, over acid, sandy outwash deposits. Outwash sand deposited in Glacial Lake Ontonagon, when it had a shoreline at about 1,200 ft. Outwash came off the Six Mile Moraine.	Broad plain, side-slopes, depressions	Sand	Sand	Tsuga-Maianthemum (TM)	Wind - W3 Fire - F3	<1

LTA [1] Symbol	Ties to 1974 LTA	LTA Name[3]	Brief Description and Geomorphic Process	Overall Landform Pattern	Dominant Surface Texture	Dominant Particle Size Class	Native Plant Community (Habitat Types)	Dominant Disturbance Regime [4]	% of Forest [5]
Jo04	14 17SA4	Kits Creek delta	Nearly level, delta with sandy soils over acid, sandy river sediments. Sandy sediments from the Ontonagon River when a glacial lake occupying Lake Superior basin had an altitude of 645 ft. during the waning stages of the Ontonagon Lobe during the last advance.	Broad plain, side-slopes, depressions, drainways	Fine sand	Sandy	Tsuga-Maianthemum-Vaccinium (TMV)	Wind - W3 Fire - F4	1
Jo05	14b, 14	Sidnaw delta	Nearly level, delta with sandy soils over acid, sandy outwash. Outwash deposited in glacial lake when shoreline was at about 1,400 ft. Outwash came off the Watton Moraine.	Broad plain, drainways	Sand	Sandy	Acer-Quercus-Vaccinium (AQV), Tsuga-Maianthemum-Vaccinium (TMV)	Wind - W2 Fire - F4	1
Jo06	6a	Trout Creek moraine	Hilly, moraine, with sandy soils over acid, sandy and loamy glaciofluvial deposits.	Hilltop, side-slopes	Loamy sand	Sandy	Acer-Tsuga-Dryopteris (ATD)	Wind - W3 Fire - F4	1
Sc01	3	Net Lake till plain	Rolling, bedrock-controlled, stony, gray till plain with loamy soils over acid, loamy and sandy till. Numerous rock outcrops. Many stones and boulder, numerous erratics. Basal till deposited directly from the ice which display long, low linear ridges of boulder till aligned parallel to the ice movement direction.	Rolling, bedrock - controlled, stony, till plain with a linear north to south ridge-and-valley orientation	Cobbly silt loam	Coarse - loamy	Acer-Tsuga-Dryopteris (ATD)	Wind - W3 Fire - F5	1

LTA [1] Symbol	Ties to 1974 LTA	LTA Name[3]	Brief Description and Geomorphic Process	Overall Landform Pattern	Dominant Surface Texture	Dominant Particle Size Class	Native Plant Community (Habitat Types)	Dominant Disturbance Regime [4]	% of Forest [5]
Sn04	20	Sturgeon River sloughs	Nearly level, floodplain along Sturgeon River, Lower Otter River, and Snake River. Loamy and organic soils over acid, loamy and sandy alluvium.	Broad, flat bottomland in floodplains	Silt loam	Coarse - loamy	Fraxinus-Mentha-Carex.	Wind - W2 Fire - F5	<1
Sn06	12	Silver River lake plain	Nearly level, lake plain with loamy soils over acid, loamy glaciolacustine deposits. Lake sediments deposited in lakes ponded in front of the Keweenaw Bay Lobe ice margin.	Broad plains, ridges, drainways	Silt loam	Coarse - silty	Acer-Viola-Osmorhizai (AVO); Acer-Tsuga-Dryopteris (ATD)	Wind - W3 Fire - F4	1
Sn07	20	Sturgeon River gorge	Very steep, unstable, river valley walls and floodplains with variable acid soils. Numerous smaller streams have incised the valley walls, creating a complex, dissected, ridge and ravine landscape. Seepages (springs), landslides, soil creep, mass wasting, are quite common. Colluvial soils common.	Valley walls, steep, unstable side-slopes, floodplains	Variable	Variable	Acer-Tsuga-Dryopteris (ATD); Acer-Quercus-Vaccinium (AQV)	Wind - W3 Fire - F4	2
Sn11	14	Sidnaw outwash plain	Gently sloping, outwash plain with sandy soils over acid, sandy outwash.	Gently, sloping, outwash plain, pitted outwash	Loamy sand	Sandy	Acer-Quercus-Vaccinium (AQV); Tsuga-Maianthemum (TM); Quercus-Acer-Epigaea - (QAE)	Wind - W3 Fire - F2	2

LTA [1] Symbol	Ties to 1974 LTA	LTA Name[3]	Brief Description and Geomorphic Process	Overall Landform Pattern	Dominant Surface Texture	Dominant Particle Size Class	Native Plant Community (Habitat Types)	Dominant Disturbance Regime [4]	% of Forest [5]
Sn12	6	Watton - Six Mile moraines	Rolling, dissected, terminal moraine complex with loamy soils over calcareous, clay loam till. Some stony and bouldery areas.	Rolling, terminal moraine, hummocky topography which is curvilinear with discontinuous knolls	Silt loam	Coarse - loamy	Acer-Tsuga-Dryopteris (ATD); Acer-Viola-Osmorhiza (AVO)	Wind - W3 Fire - F5	5
Sn13	18	Merge Creek dissected moraines	Steep, dissected, water-worked and lacustrine deposits portion of Six Mile terminal moraine with sandy soils over acid, sandy till, fluvial lake-laid sediments.	Steep, dissected, with numerous ravines in a dendritic pattern	Fine sand	Sandy	Acer-Tsuga-Dryopteris (ATD)	Wind - W3 Fire - F4	<1
Sn14	14, 15, 17	Baraga sand plains	Nearly level, sandy lake plain with sandy soils over acid, sandy outwash fluvial and lacustrine sediments. Contains stabilized, post-glacial wind-blown (dunes) features. Largely jack pine barrens with some mixed pine-northern hardwood forests on the margins.	Nearly level, stabilized dune features throughout the area	Sand, fine sand	Sandy	Pinus-Vaccinium-Deschampsia (PVD); Acer-Quercus-Vaccinium (AQV)	Wind - W3 Fire - F2	1
Sq04	22	Dodge City moraine	Moderately sloping, disintegration moraine with sandy soils over acid, sandy till.	Moderately sloping, disintegration moraine with local outwash deposits	Loamy, sand	Sandy	Acer-Tsuga-Dryopteris (ATD)	Wind - W3 Fire - F4	<1

LTA [1] Symbol	Ties to 1974 LTA	LTA Name[3]	Brief Description and Geomorphic Process	Overall Landform Pattern	Dominant Surface Texture	Dominant Particle Size Class	Native Plant Community (Habitat Types)	Dominant Disturbance Regime [4]	% of Forest [5]
Sq06	21, 23	Peshekee highlands	Very hilly, bedrock - controlled moraine with loamy soils over acid, loamy and sandy till. Rock outcrops are numerous. Bedrock - controlled areas have a thin veneer of till. Includes the Covington Moraine (kame moraine) and a large area of "dead" stagnant ice, which melted in place, washing bedrock knobs "clean" and depositing ablation till. The till of the Superior Lobe is redder and has more clay.	Very hilly, bedrock - controlled moraine with rock hills and ridges, thin loamy and sandy till, glacial channels and stream terraces	Cobbly very fine sandy loam	Coarse - loamy	Acer-Tsuga-Dryopteris (ATD)	Wind - W2 Fire - F4	1
Xb01	14	Northern Highlands outwash plains	Undulating, pitted and unpitted outwash plain with loamy soils over acid, outwash of the Crab Lake Member of the Copper Falls Formation.	Pitted and unpitted outwash plains, swamps, bogs, and lakes	Sandy loam	Coarse-loamy, sandy	Acer-Tsuga-Maianthemum (ATM)	Wind - W3 Fire - F3	<1
Xb02	-	Vilas - Oneida sandy hills	Rolling, collapsed outwash plain with sandy soils over acid, outwash or loamy sandy debris flow. Outwash of the Crab Lake Member of the Copper Falls Formation.	Collapsed outwash plains and bogs	Loamy sandy	Sandy	Acer-Quercus-Vaccinium (AQV)	Wind - W3 Fire - F4	0
Xb03	14	Vilas - Oneida Outwash Plains	Nearly level, pitted and unpitted outwash plains with sandy soils over acid, outwash. Outwash of the Copper Falls Formation, Crab Lake Member.	Pitted and unpitted outwash plain, bogs, and lakes	Sand	Sandy	Acer-Quercus-Vaccinium (AQV)	Wind - W3 Fire - F2	1

LTA [1] Symbol	Ties to 1974 LTA	LTA Name[3]	Brief Description and Geomorphic Process	Overall Landform Pattern	Dominant Surface Texture	Dominant Particle Size Class	Native Plant Community (Habitat Types)	Dominant Disturbance Regime [4]	% of Forest [5]
Xc01	7	Iron River/ Argonne drumlins	Hilly, drumloid ridges and valleys that are linear northeast to southwest, and a till plain with silty soils over acid, sandy loam and loamy sand till.	Till plain, drumlins and interdrumlin glaciofluvial fill	Silt loam, loam, sandy loam	Coarse-loamy	Acer-Viola-Osmorhizai (AVO); Acer-Tsuga-Dryopteris (ATD)	Wind - W3 Fire - F5	10
Xc02	14a	Argonne outwash plains	Undulating, intra-drumlin pitted and unpitted outwash plains and kame terraces with loamy and silty soils over acid, outwash. Outwash of the Nashville Member of the Copper Falls Formation.	Undulating, pitted and unpitted outwash plains, kame terraces, swamps and bogs	Sandy loam	Coarse-loamy, "saprists"	Acer-Tsuga-Maianthemum (ATM)	Wind - W3 Fire - F4	<1
Xc11	14a	Paint River Terraces	Nearly level, river valley terraces. Few bedrock outcrops. Loamy soils over acid, gravelly sandy outwash. Fast flowing meltwaters scoured peri-glacial valleys. Sand and gravel filled the valleys as the discharge slowed and created the river valley series of terraces.	Nearly level, river valley terraces, few bedrock outcrops	Silt loam, loam, fine sandy loam, sandy loam	Sandy, coarse - loamy	Tsuga-Maianthemum (TM); Tsuga-Thuja-Spahgnum (TTS)	Wind - W3 Fire - F3	3
Ya04	13	Iron/ Gogebic, dissected, lake bench	Undulating, dissected, lake-modified, till plain with silty soils over calcareous, clay loam till. Douglas Member of the Miller creek Formation; and post-glacial erosion.	Undulating, dissected, lake bench with unstable banks	Silt loam	Fine, fine-loamy, fine-silty	Acer-Tsuga-Dryopteris (ATD)	Wind - W1 Fire - F5	1

LTA [1] Symbol	Ties to 1974 LTA	LTA Name[3]	Brief Description and Geomorphic Process	Overall Landform Pattern	Dominant Surface Texture	Dominant Particle Size Class	Native Plant Community (Habitat Types)	Dominant Disturbance Regime [4]	% of Forest [5]
Ya05	12SA6	Iron River basin	Gently sloping, higher basin of the Iron River drainage system on a lake - modified, till plain. Loamy soils over calcareous, clay loam till with post-glacial erosion. Douglas Member of the Miller Creek Formation.	Gently sloping, till plain with post-glacial erosional features	Loamy	Fine	Acer-Tsuga-Dryopteris (ATD); Acer-Viola-Osmorhiza (AVO)	Wind - W2 Fire - F5	3
Ya06	12	Graveraet lake-modified, till plain	Undulating, dissected and water-worked, lake-modified, till plain dominated by loamy till and loamy and sandy glacialacustrine deposits.	Undulating, dissected, water-worked, lake modified till plain	Loam	Coarse - loamy	Acer-Tsuga-Dryopteris (ATD)	Wind - W1 Fire - F5	0
Ya10	13	Cranberry Creek fluted lake plain	Undulating, clayey lake plain with numerous, small intermittent, parallel drainages to Lake Superior. Loamy soils over calcareous, clay loam till with post - glacial erosion. Douglas Member of the Miller Creek Formation.	Undulating, strongly grooved, about every 400 ft., parallel drainways on a 50 feet/mi. slope to Lake Superior	Silt loam	Fine - loamy	Acer-Tsuga-Dryopteris (ATD)	Wind - W1 Fire - F5	2
Ya11	20	Copper Country gorge	Ontonagon River gorge, north of Copper Range. Major geologic erosion of Douglas Member of the Miller Creek Formation.	River valley walls and floodplains	Variable	Variable	Variable	Wind - W3 Fire - F3	<1

[1] Revised LTA map symbol from Dave Cleland of GLA 2000 version (map reference below).
[2] LTA symbol used prior to Forest Plan revision. The revised symbols are reflected in column 1 (LTA symbol) and map (Figure D-1).
[3] "Landtype Associations of the Western Upper Peninsula, Michigan" (Book and Map) - 01/2000; James K. Jordan, USFS NC Experiment Station, Rhinelander, WI. By request of the Great Lakes Ecological Assessment.

[4] Disturbance regime codes:

Fire: F1. Very highly susceptible to wildfire
F2. Highly susceptible
F3. Moderately susceptible
F4. Unsusceptible
F5. Highly unsusceptible

Wind: W1. Frequent intervals and severity occurring along Lake Superior, often during late fall
W2. Limited rooting depth (i.e. imperfectly drained or shallow to bedrock)
W3. Unlimited rooting depth and/ or better drainage when susceptible to wind throw.\

[5]Estimated percentages, rounded to the nearest percent.
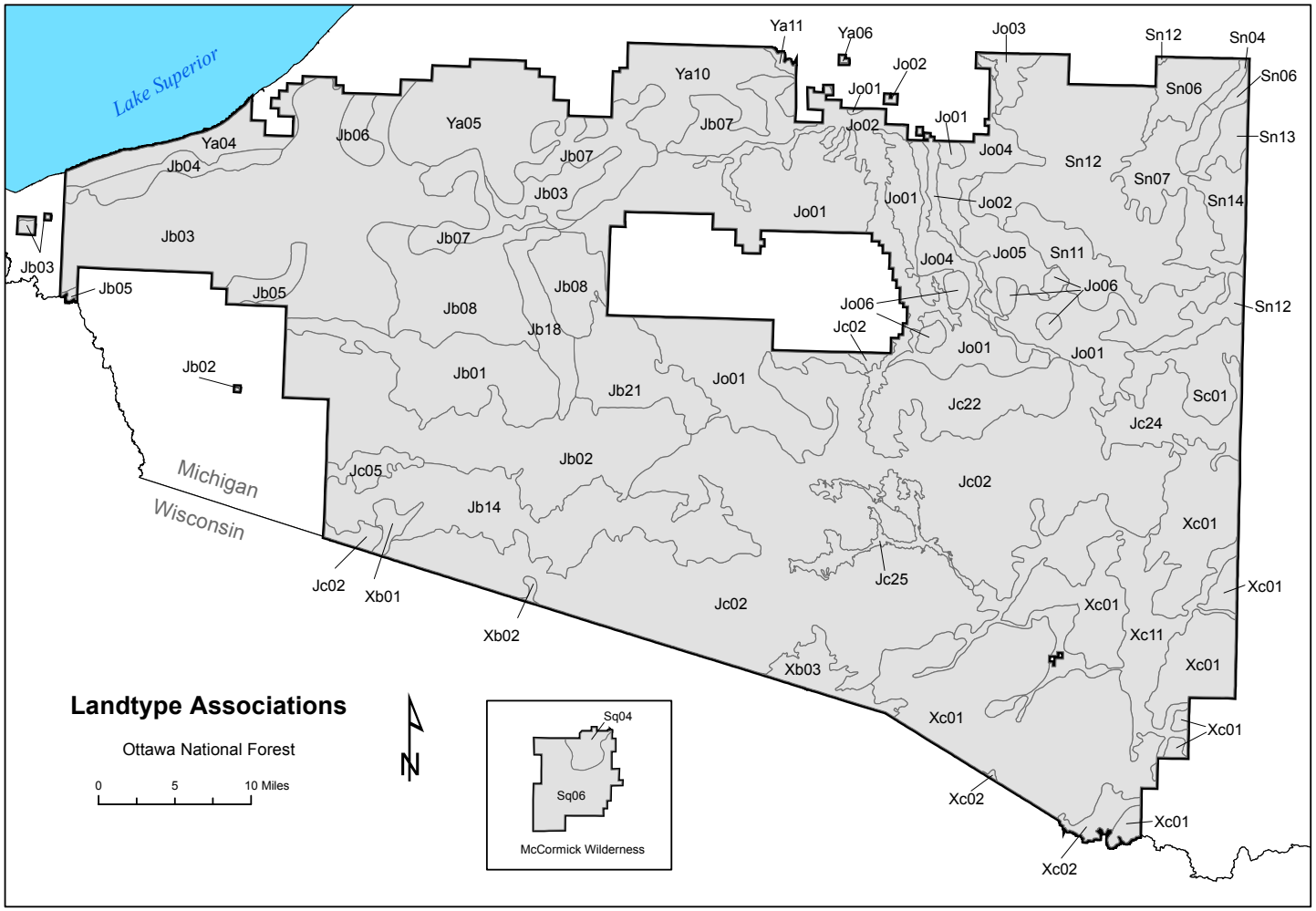
Figure D-1. Landtype Associations Map on the Ottawa National Forest