

Western Upper Peninsula Regional Forest Management Plan - Section 6 - Appendices

Appendix A

Forest Certification Standards

The Forest Stewardship Council standards can be found at the following site:

http://www.michigan.gov/documents/FSC_RegionalForestStewardshipStandard_161428_7.pdf

The Sustainable Forestry Initiative standards can be found at the following site:

http://www.michigan.gov/documents/dnr/SFIStandard2010-2014Section2_314055_7.pdf

Appendix B

Description of Management Area Boundary Determination Process

The process for the western Upper Peninsula ecoregion can be found at the following site:

http://www.michigan.gov/documents/dnr/Draft-ManagementAreas-WUP_431225_7.pdf?20131025110618

The process for the eastern Upper Peninsula ecoregion can be found at the following site:

http://www.michigan.gov/documents/dnr/DraftMgtAreas-EUP_431227_7.pdf

The process for the northern Lower Peninsula ecoregion can be found at the following site:

http://www.michigan.gov/documents/dnr/DraftMgtAreas-NLP-SLP_Ecoregions_431226_7.pdf

Appendix C

Limiting Factors, Integrated Forest Monitoring, Assessment and Prescriptions (IFMAP) Classifications, IFMAP Classification Rules and General Silvicultural Rules

Available for Management	Condition/Description	Definition
	<u>1. Administrative and Legal Factors</u>	
Unavailable	1A: Federal/State/Local Law	Specify Federal/State/Local law in comments (e.g., Natural Rivers Act)
Unavailable	1B: Non-Department of Natural Resources (DNR) Agency Concerns	Specify agency and their concerns in comments (e.g., United States Forest Service (USFS))
Unavailable	1C: Other Department or Division Procedures/Practices	Specify department or division (other than Forest Resources Division (FRD)) in comments and describe
Unavailable	1D: Interest Group/Neighbor	Specify decision based on input from interest group(s)/neighbor in comments
	<u>2. Accessibility Factors</u>	
Unavailable	2A: Adjacent Landowner Denied Access	Access has been sought and denied
Available	2B: Unknown if Access through Adjacent Landowner(s) is Possible	Access has not been sought yet
Available	2C: Engineered Bridge Needed (Department Portable Bridge Not Available or Inadequate)	Specify type and length of bridge needed
Available	2D: Portable Bridge Needed (Department Bridge will be Adequate)	Specify length of bridge needed
Available	2E: Road Needed	Resources are not currently available to build road and onus may be too much to put on timber sale contractor
Unavailable	2F: Too Steep	Area cannot be operated on with current equipment capabilities without unacceptable damage to the soil.
Unavailable	2G: Too Wet (Sensitive Soils, Year-Round High Water Table, Does Not Include Access Issues)	Area cannot be operated on with current equipment capabilities without unacceptable damage to the soil or water table
Unavailable	2H: Blocked by Physical Obstacle (eg., Upland Stand in a Lowland Area - Marsh Islands)	Area cannot be accessed without crossing an obstacle (e.g., travel through wetlands, topography limitations, etc.)
Available	2I: Survey Needed	Unlikely that current department survey personnel can complete survey as needed

3. Special Management or Use Designations

Unavailable	3A: Potential Old Growth/Biodiversity Specify in comments
Unavailable	3B: Threatened, Endangered, and Special Concern Species/Communities Specify in locked comments
Unavailable	3C: Designated Quiet Area, Natural Area, or Wilderness Official designations only, specify in comments
Unavailable	3D: Recreational/Scenic Values Specify recreational site or scenic values in comments
Unavailable	3E: Easement/Lease, Non-military Specify easement/lease in comments (e.g., Luce County managed lands, Consumers Power red pine, undivided interests)
Unavailable	3F: Military Easement/Lease Specify easement/lease in comments (e.g., Camp Grayling)
Unavailable	3G: Other Influence Zones - See Comments Specify in comments (e.g., travel or water influence zones, etc.)
Unavailable	3H: Deer Wintering Areas Deer management decisions constrain management of the stand
Unavailable	3I: Historical/Archeological Identify in locked comment box
Unavailable	3J: Water quality/Best Management Practices (BMPs) (Stream, River, or Lake) Management is constrained by concerns over the impact of treatment on the quality of nearby watercourses
Unavailable	3K: Rare or Unique Landforms Identify in locked comment box
Unavailable	3L: Other Wildlife Concerns Wildlife management, other than deer, decisions constrain management of the stand

4. Markets and Industrial Factors

Available	4A: No Merchantable Products (See Product Standards) We can sell everything from small acreage to low volumes, but not unmerchantable products
-----------	--

5. Technological/Ecological Factors

Unavailable	5A: Not Able to Obtain Desirable Regeneration Desired regeneration is hampered by ecological factors (e.g., too much deer browse, etc)
Available	5B: Retention for Regeneration Purposes e.g., shelterwood cuts
Available	5C: Delay Treatment for Age/Size Class Diversity or Exceptional Site Quality Equalizing age/size class diversity within cover types
Unavailable	5D: Unproductive Forest Land Land supporting trees, but not capable of producing more than 20 cubic feet/acre/year of any timber species (e.g., treed bogs, etc.)

IFMAP Classification List

1 Urban

11 Low Intensity Urban

12 High Intensity Urban

- 121 Airport
- 122 Roads/Parking Lot
- 123 Other High Intensity Urban

2 Agricultural

21 Herbaceous Agriculture

- 211 Cropland
 - 2111 Non-vegetated Farmland
 - 2112 Row Crop
 - 2113 Forage Crop
 - 2114 Other Cropland
- 212 Non-tilled Herbaceous Agriculture

22 Non Herbaceous Agriculture

- 221 Christmas tree plantation
- 222 Orchard/Vineyard/Nursery

3 Upland Openland

- 310 Herbaceous Openland
 - 3101 Poverty Grass, Cladonia
 - 3102 Grass
 - 31021 Cool Season Grass
 - 31022 Warm Season Grass
 - 3103 Rubus, Fern
 - 3104 Degraded
 - 3105 Mixed Upland Herbaceous

- 320 Upland Shrub
 - 3201 Sweet Fern
 - 3202 Autumn Olive/Honeysuckle
 - 3203 Upland Blueberry
 - 3204 Mast Producing Shrub
 - 3205 Mixed Upland Shrub

- 330 Low Density Trees
 - 3301 Low Density Deciduous Trees
 - 3302 Low Density Conifer Trees
 - 3303 Mixed Low Density Trees

4 Upland Forest

41 Upland Deciduous Forest

411 Northern Hardwood

- 4110 Sugar Maple Association
- 4111 Sugar Maple, Hard Mast Association
- 4112 Maple Association
- 4113 Red Maple, Conifer
- 4114 Beech, Hemlock
- 4115 Yellow Birch, Hemlock
- 4116 Mixed Northern Hardwood – Aspen
- 4117 Mixed Northern Hardwood - Pine
- 4119 Mixed Northern Hardwoods

412 Oak

- 4120 Oak, Hickory
- 4121 Oak, Aspen
- 4122 Oak, Pine
- 4123 Red Oak
- 4124 Red with White Oak
- 4125 Black, Northern Pin Oak
- 4126 White, Black, Northern Pin Oak
- 4129 Mixed Oak

413 Aspen

- 4130 Aspen
- 4131 Aspen, Oak
- 4132 Aspen, Jack Pine
- 4133 Aspen, Mixed Pine
- 4134 Aspen, Spruce/Fir
- 4135 Aspen, Cedar
- 4136 Aspen, Mixed Conifer
- 4137 Aspen, Birch
- 4139 Aspen, Mixed Deciduous

414 Other Upland Deciduous

- 4140 Paper Birch

419 Mixed Upland Deciduous

- 4190 Mixed Upland Deciduous with Cedar
- 4191 Mixed Upland Deciduous with Conifer
- 4192 Mixed Southern Upland Deciduous
- 4193 Birch, Aspen

42 Upland Coniferous Forest

421 Planted Pines

4210 Planted White Pine types

42100 Planted White Pine

42101 Planted White Pine, Mixed Deciduous

4211 Planted Red Pine types

42110 Planted Red Pine

42111 Planted Red Pine, Mixed Deciduous

4212 Planted Jack Pine

42120 Planted Jack Pine

42121 Planted Jack Pine, Mixed Deciduous

4213 Planted Scotch Pine types

42130 Planted Scotch Pine

4214 Planted Mixed Pine types

42140 Planted Mixed Pine

42141 Planted Mixed Pine, Mixed Deciduous

422 Natural Pines

4220 Natural White Pine types

42200 Natural White Pine

42201 Natural White Pine, Mixed Deciduous

4221 Natural Red Pine Types

42210 Natural Red Pine

42211 Natural Red Pine, Mixed Deciduous

4222 Natural Jack Pine types

42220 Natural Jack Pine

42221 Natural Jack Pine, Mixed Deciduous

4226 Natural Mixed Pine Types

42290 Natural Mixed Pine

42250 Natural Pine, Oak

42260 Natural Mixed Pine, Mixed Deciduous

423 Other (Non-Pine) Upland Conifers

Planted Upland Conifers

42300 Planted Larch

42301 Planted Larch, Mixed Deciduous

42310 Planted Spruce

42311 Planted Spruce, Mixed Deciduous

Non-planted Upland Conifers

42320 Upland Spruce

- 42330 Upland Fir
- 42340 Upland Spruce/Fir
- 42350 Upland Hemlock
- 42360 Upland Cedar
- 42370 Upland Cedar, Aspen
- 42380 Non-Pine Upland Conifer, Mxd Deciduous
- 42390 Mixed Non-Pine Upland Conifers

429 Mixed Upland Conifers

43 Upland Mixed Forest

- 4310 Pine, Oak Mix
- 4311 Pine, Aspen Mix
- 4312 Hemlock, Mixed Deciduous
- 4319 Mixed Upland Forest

5 Water

50 Water

6 Wetlands

61 Lowland Forest

611 Lowland Deciduous Forest

- 6110 Cottonwood
- 6111 Lowland Balsam Poplar
- 6112 Lowland Aspen
- 6113 Lowland Maple
- 6114 Lowland Oak
- 6115 Lowland Ash
- 6116 Lowland Birch
- 6117 Lowland Deciduous, Mixed Coniferous
- 6118 Lowland Deciduous with Cedar
- 6119 Mixed Lowland Deciduous Forest

612 Lowland Coniferous Forest

- 6120 Lowland Cedar
- 6121 Tamarack
- 6122 Black Spruce
- 6123 Lowland Fir
- 6124 Lowland Spruce-Fir
- 6125 Lowland Black Spruce, Jack Pine
- 6126 Lowland Jack Pine
- 6127 Lowland Pine
- 6128 Lowland Coniferous, Mixed Deciduous
- 6129 Mixed Coniferous Lowland Forest

- 613 Lowland Mixed Forest
 - 6130 Fir, Aspen, Maple
 - 6131 Hemlock, White Pine, Maple, Birch
 - 6132 Mixed Lowland Forest with Cedar
 - 6139 Mixed Lowland Forest

62 Non-forested Wetlands

- 621 Floating Aquatic
- 622 Lowland Shrub
 - 6220 Alder/Willow
 - 6221 Fen
 - 6222 Shrub-Carr
 - 6223 Inundated Shrub Swamp
 - 6224 Treed Bog
 - 6225 Bog
 - 6229 Mixed Lowland Shrub
- 623 Emergent Wetland
 - 6230 Cattail
 - 6231 Phragmites
 - 6232 Wet Prairie
 - 6233 Wet Meadow
 - 6239 Mixed Emergent Wetland
- 629 Mixed Non-forest Wetland

7 Bare/Sparsely Vegetated

- 710 Sand, Soil
- 720 Exposed Rock
- 730 Mud Flats
- 790 Other Bare/Sparsely Vegetated

Level 3 Code	Level 3 Name	Level 4 Code	Level 4 Name	OI Cross-over Code	Inventory Specific Covertypes Category	RAD Tools output IFMAP/OI Cross-Inventory Covertypes
413	Aspen Types	4130	Aspen	A	Aspen	Aspen
413	Aspen Types	4131	Aspen, Oak	A	Aspen	Aspen
413	Aspen Types	4132	Aspen, Jack Pine	A	Aspen	Aspen
413	Aspen Types	4133	Aspen, Mixed Pine	A	Aspen	Aspen
413	Aspen Types	4134	Aspen, Spruce/Fir	A	Aspen	Aspen
413	Aspen Types	4135	Aspen, Cedar	A	Aspen	Aspen
413	Aspen Types	4136	Aspen, Mixed Conifer	A	Aspen	Aspen
413	Aspen Types	4137	Aspen, Birch	A	Aspen	Aspen
413	Aspen Types	4139	Aspen, Mixed Deciduous	A	Aspen	Aspen
414	Other Upland Deciduous	414	Other Upland Deciduous	B	Paper Birch	Paper Birch
414	Other Upland Deciduous	4140	Other Upland Deciduous	B	Paper Birch	Paper Birch
419	Mixed Upland Deciduous	4193	Birch, Aspen	B	Paper Birch	Paper Birch
611	Lowland Deciduous Forest	6116	Lowland Birch	B	Paper Birch	Paper Birch
423	Other Upland Conifers	42360	Upland Cedar	C	Upland Conifers	Cedar
423	Other Upland Conifers	42370	Upland Cedar, Aspen	C	Upland Conifers	Cedar
612	Lowland Coniferous Forest	6120	Lowland Cedar	C	Lowland Conifers	Cedar
622	Lowland Shrub	6224	Treed Bog	D	Lowland Shrub	Treed Bog
611	Lowland Deciduous Forest	611	Lowland Deciduous Forest	E	Lowland Deciduous	Lowland Deciduous
611	Lowland Deciduous Forest	6110	Cottonwood	E	Lowland Deciduous	Lowland Deciduous
611	Lowland Deciduous Forest	6113	Lowland Maple	E	Lowland Deciduous	Lowland Deciduous
611	Lowland Deciduous Forest	6114	Lowland Oak	E	Lowland Deciduous	Lowland Deciduous
611	Lowland Deciduous Forest	6115	Lowland Ash	E	Lowland Deciduous	Lowland Deciduous
611	Lowland Deciduous Forest	6117	Lowland Deciduous, Mixed Coniferous	E	Lowland Deciduous	Lowland Deciduous
611	Lowland Deciduous Forest	6118	Lowland Deciduous with Cedar	E	Lowland Deciduous	Lowland Deciduous
611	Lowland Deciduous Forest	6119	Mixed Lowland Deciduous Forest	E	Lowland Deciduous	Lowland Deciduous
613	Lowland Mixed Forest	6130	Fir, Aspen, Maple	LM	Lowland Mixed Forest	Lowland Mixed Forest
423	Other Upland Conifers	42310	Planted Spruce	F	Upland Conifers	Upland Spruce/Fir
423	Other Upland Conifers	42311	Planted Spruce, Mixed Deciduous	F	Upland Conifers	Upland Spruce/Fir
423	Other Upland Conifers	42320	Upland Spruce	F	Upland Conifers	Upland Spruce/Fir
423	Other Upland Conifers	42330	Upland Fir	F	Upland Conifers	Upland Spruce/Fir
423	Other Upland Conifers	42340	Upland Spruce/Fir	F	Upland Conifers	Upland Spruce/Fir
211	Cropland	2111	Non-vegetated Farmland	G	Cropland	Cropland
211	Cropland	2112	Row Crops	G	Cropland	Cropland
211	Cropland	2113	Forage Crops	G	Cropland	Cropland
211	Cropland	2114	Other Cropland	G	Cropland	Cropland
212	Non-tilled Herbaceous Agriculture	212	Non-tilled Herbaceous Agriculture	G	Non-tilled Herbaceous Agriculture	Cropland
221	Xmas trees	221	Xmas trees	G	Xmas trees	Cropland
222	Orchards/Vineyards/Nursery	222	Orchards/Vineyards/Nursery	G	Orchards/Vineyards/Nursery	Cropland
310	Herbaceous Openland	310	Herbaceous Openland	G	Herbaceous Openland	Herbaceous Openland
310	Herbaceous Openland	3101	Poverty Grass, Cladonia	G	Herbaceous Openland	Herbaceous Openland
310	Herbaceous Openland	3102	Grass	G	Herbaceous Openland	Herbaceous Openland
310	Herbaceous Openland	3103	Rubus-Fern	G	Herbaceous Openland	Herbaceous Openland
310	Herbaceous Openland	3104	Degraded	G	Herbaceous Openland	Herbaceous Openland

310	Herbaceous Openland	3105	Mixed Upland Herbaceous	G	Herbaceous Openland	Herbaceous Openland
310	Herbaceous Openland	31021	Cool Season Grass	G	Herbaceous Openland	Herbaceous Openland
310	Herbaceous Openland	31022	Warm Season Grass	G	Herbaceous Openland	Herbaceous Openland
350	Parks and Golf Courses	350	Parks and Golf Courses	G	Parks and Golf Courses	Herbaceous Openland
423	Other Upland Conifers	42350	Upland Hemlock	H	Hemlock	Hemlock
43	Upland Mixed Forest	4312	Hemlock, Mixed Deciduous	H	Hemlock	Hemlock
421	Planted Pines	42120	Planted Jack Pine	J	Jack Pine	Jack Pine
421	Planted Pines	42121	Planted Jack Pine, Mixed Deciduous	J	Jack Pine	Jack Pine
422	Natural Pines	42220	Natural Jack Pine	J	Jack Pine	Jack Pine
422	Natural Pines	42221	Natural Jack Pine, Mixed Deciduous	J	Jack Pine	Jack Pine
612	Lowland Coniferous Forest	6126	Lowland Jack Pine	J	Jack Pine	Jack Pine
720	Exposed Rock	720	Exposed Rock	K	Exposed Rock	Exposed Rock
622	Lowland Shrub	622	Lowland Shrub	L	Lowland Shrub	Lowland Shrub
622	Lowland Shrub	6220	Alder/willow	L	Lowland Shrub	Lowland Shrub
622	Lowland Shrub	6221	Fen	L	Lowland Shrub	Lowland Shrub
622	Lowland Shrub	6222	Shrub-Carr	L	Lowland Shrub	Lowland Shrub
622	Lowland Shrub	6223	Inundated Shrub Swamp	L	Lowland Shrub	Lowland Shrub
622	Lowland Shrub	6229	Mixed lowland shrub	L	Lowland Shrub	Lowland Shrub
629	Mixed non-forested wetland	629	Mixed non-forested wetland	L	Mixed non-forested wetland	Lowland Shrub
613	Lowland Mixed Forest	613	Lowland Mixed Forest	LM	Lowland Mixed Forest	Lowland Mixed Forest
613	Lowland Mixed Forest	6131	Hemlock, White Pine, Maple, Birch	LM	Lowland Mixed Forest	Lowland Mixed Forest
613	Lowland Mixed Forest	6132	Mixed Lowland Forest with Cedar	LM	Lowland Mixed Forest	Lowland Mixed Forest
613	Lowland Mixed Forest	6139	Mixed Lowland Forest	LM	Lowland Mixed Forest	Lowland Mixed Forest
411	Northern Hardwood	4110	Sugar Maple Association	M	Northern Hardwood	Northern Hardwood
411	Northern Hardwood	4111	S.Maple, Hard Mast Association	M	Northern Hardwood	Northern Hardwood
411	Northern Hardwood	4112	Maple, Beech, Cherry Association	M	Northern Hardwood	Northern Hardwood
411	Northern Hardwood	4113	R.Maple, Conifer	M	Northern Hardwood	Northern Hardwood
411	Northern Hardwood	4114	Beech, Hemlock	M	Northern Hardwood	Northern Hardwood
411	Northern Hardwood	4115	Y.Birch, Hemlock NH	M	Northern Hardwood	Northern Hardwood
411	Northern Hardwood	4116	Mixed N. Hardwood – Aspen	M	Northern Hardwood	Northern Hardwood
411	Northern Hardwood	4117	Mixed N. Hardwood - Pine	M	Northern Hardwood	Northern Hardwood
411	Northern Hardwood	4119	Mixed Northern Hardwoods	M	Northern Hardwood	Northern Hardwood
421	Planted Pines	42130	Planted Scotch Pine	MC	Planted Pines	Planted Mixed Pines
421	Planted Pines	42140	Planted Mixed Pine	MC	Planted Pines	Planted Mixed Pines
421	Planted Pines	42141	Planted Mixed Pine, Mixed Deciduous	MC	Planted Pines	Planted Mixed Pines
422	Natural Pines	42250	Pine, Oak	MC	Natural Pines	Natural Mixed Pines
422	Natural Pines	42260	Natural Pine, Mixed Deciduous	MC	Natural Pines	Natural Mixed Pines
422	Natural Pines	42290	Natural Mixed Pine	MC	Natural Pines	Natural Mixed Pines
423	Other Upland Conifers	42380	Non Pine Upland Conifer, Mixed Deciduous	MC	Upland Conifers	Upland Conifers
423	Other Upland Conifers	42390	Mixed Non-Pine Upland Conifers	MC	Upland Conifers	Upland Conifers
429	Mixed Upland Conifers	429	Mixed Upland Conifers	MC	Upland Conifers	Upland Conifers
419	Mixed Upland Deciduous	4190	Mixed Upland Deciduous with Cedar	MD	Mixed Upland Deciduous	Mixed Upland Deciduous
419	Mixed Upland Deciduous	4191	Mixed Upland Deciduous with Conifer	MD	Mixed Upland Deciduous	Mixed Upland Deciduous

419	Mixed Upland Deciduous	4192	Mixed Southern Upland Deciduous	MD	Mixed Upland Deciduous	Mixed Upland Deciduous
419	Mixed Upland Deciduous	4199	Other Mixed Upland Deciduous	MD	Mixed Upland Deciduous	Mixed Upland Deciduous
623	Emergent Wetland	623	Emergent Wetland	N	Emergent Wetland	Marsh
623	Emergent Wetland	6230	Cattail	N	Emergent Wetland	Marsh
623	Emergent Wetland	6231	Phragmites	N	Emergent Wetland	Marsh
623	Emergent Wetland	6232	Wet Prairie	N	Emergent Wetland	Marsh
623	Emergent Wetland	6233	Wet Meadow	N	Emergent Wetland	Marsh
623	Emergent Wetland	6239	Mixed Emergent Wetland	N	Emergent Wetland	Marsh
730	Mud Flats	730	Mud Flats	Y	Sand, Soil	Sand, Soil
412	Oak Types	4120	Oak, Hickory	O	Oak	Oak
412	Oak Types	4121	Oak, Aspen	O	Oak	Oak
412	Oak Types	4122	Oak, Pine	O	Oak	Oak
412	Oak Types	4123	Red Oak	O	Oak	Oak
412	Oak Types	4124	Red with White Oak	O	Oak	Oak
412	Oak Types	4125	Black, N. Pin Oak	O	Oak	Oak
412	Oak Types	4126	White, Black, N. Pin Oak	O	Oak	Oak
412	Oak Types	4129	Mixed Oak	O	Oak	Oak
611	Lowland Deciduous Forest	6111	Lowland Balsam Poplar	P	Lowland Deciduous	Lowland Aspen/Balsam Poplar
611	Lowland Deciduous Forest	6112	Lowland Aspen	P	Lowland Deciduous	Lowland Aspen/Balsam Poplar
612	Lowland Coniferous Forest	612	Lowland Coniferous Forest	Q	Lowland Conifers	Lowland Conifers
612	Lowland Coniferous Forest	6123	Lowland Fir	Q	Lowland Conifers	Lowland Conifers
612	Lowland Coniferous Forest	6124	Lowland Spruce-Fir	Q	Lowland Conifers	Lowland Conifers
612	Lowland Coniferous Forest	6125	Lowland Black Spruce, Jack Pine	Q	Lowland Conifers	Lowland Conifers
612	Lowland Coniferous Forest	6128	Lowland Coniferous, Mixed Deciduous	Q	Lowland Conifers	Lowland Conifers
612	Lowland Coniferous Forest	6129	Mixed Coniferous Lowland Forest	Q	Lowland Conifers	Lowland Conifers
421	Planted Pines	42110	Planted Red Pine	R	Red Pine	Red Pine
421	Planted Pines	42111	Planted Red Pine, Mixed Deciduous	R	Red Pine	Red Pine
422	Natural Pines	42210	Natural Red Pine	R	Red Pine	Red Pine
422	Natural Pines	42211	Natural Red Pine, Mixed Deciduous	R	Red Pine	Red Pine
612	Lowland Coniferous Forest	6122	Black Spruce	S	Lowland Conifers	Lowland Spruce/Fir
423	Other Upland Conifers	42300	Planted Larch	T	Upland Conifers	Tamarack
423	Other Upland Conifers	42301	Planted Larch, Mixed Deciduous	T	Upland Conifers	Tamarack
612	Lowland Coniferous Forest	6121	Tamarack	T	Lowland Conifers	Tamarack
320	Upland Shrub	320	Upland Shrub	U	Upland Shrub	Upland Shrub
320	Upland Shrub	3201	Sweet Fern	U	Upland Shrub	Upland Shrub
320	Upland Shrub	3202	Autumn Olive/Honeysuckle	U	Upland Shrub	Upland Shrub
320	Upland Shrub	3203	Upland Blueberry	U	Upland Shrub	Upland Shrub
320	Upland Shrub	3204	Mast Producing Shrub	U	Upland Shrub	Upland Shrub
320	Upland Shrub	3205	Mixed Upland Shrub	U	Upland Shrub	Upland Shrub
330	Low-Density Trees	330	Low-Density Trees	U	Low-Density Trees	Low-Density Trees
330	Low-Density Trees	3301	Low Density Deciduous Trees	U	Low-Density Trees	Low-Density Trees
330	Low-Density Trees	3302	Low Density Conifer Trees	U	Low-Density Trees	Low-Density Trees
330	Low-Density Trees	3303	Mixed Low Density Trees	U	Low-Density Trees	Low-Density Trees
43	Upland Mixed Forest	4310	Pine, Oak Mix	UM	Upland Mixed Forest	Upland Mixed Forest
43	Upland Mixed Forest	4311	Pine, Aspen Mix	UM	Upland Mixed Forest	Upland Mixed Forest
43	Upland Mixed Forest	4319	Mixed Upland Forest	UM	Upland Mixed Forest	Upland Mixed Forest

622	Lowland Shrub	6225	Bog	V	Lowland Shrub	Bog
421	Planted Pines	42100	Planted White Pine	W	White Pine	White Pine
421	Planted Pines	42101	Planted White Pine, Mixed Deciduous	W	White Pine	White Pine
422	Natural Pines	42200	Natural White Pine	W	White Pine	White Pine
422	Natural Pines	42201	Natural White Pine, Mixed Deciduous	W	White Pine	White Pine
612	Lowland Coniferous Forest	6127	Lowland Pine	Q	Lowland Conifers	Lowland Conifers
11	Low Intensity Urban	11	Low Intensity Urban	X	Low Intensity Urban	Urban
121	Airport	121	Airport	X	Airport	Urban
122	Road/Parking Lot	122	Road/Parking Lot	X	Road/Parking Lot	Urban
123	Other High Intensity Urban	123	Other High Intensity Urban	X	High Intensity Urban	Urban
760	Non-stocked Forest	760	Non-stocked Forest	X	Non-stocked Forest	Bare/Sparsely Vegetated
790	Other Bare/Sparsely Vegetated	790	Other Bare/Sparsely Vegetated	X	Bare/Sparsely Vegetated	Bare/Sparsely Vegetated
710	Sand, Soil	710	Sand, Soil	Y	Sand, Soil	Sand, Soil
50	Water	50	Water	Z	Water	Water
621	Floating Aquatic	621	Floating Aquatic	Z	Floating Aquatic	Water

IFMAP Classification Rules

<p>IF GREATER THAN 10% of the land area is covered with man-made structures including parking lots and paved or gravel roads THEN</p> <p>Urban (1)</p> <p>IF URBAN and GREATER THAN >25% of the land area is solid impervious cover from man-made materials THEN</p> <p>High Intensity Urban (12)</p> <p>IF High Intensity Urban within airport grounds including runways THEN</p> <p>Airport (121)</p> <p>IF High Intensity Urban, NOT Airport, but IS road or parking lot THEN</p> <p>Road/Parking Lot (122)</p> <p>ELSE (is High Intensity Urban but not above)</p> <p>Other High Intensity Urban (123)</p> <p>ELSE (i.e. URBAN and LESS THAN 25% is solid impervious cover)</p> <p>Low Intensity Urban (11)</p>
<p>ELSE IF land area has > 75% open water THEN</p> <p>Water (5)</p> <p>Water (50)</p>
<p>ELSE IF the vegetation is intensively managed for vegetation production excluding forestry THEN</p> <p>Agriculture (2)</p> <p>IF AGRICULTURE and LESS THAN 25% of the vegetation is woody THEN</p> <p>Herbaceous Agriculture (21)</p> <p>IF Herbaceous Agriculture is tilled for crop production THEN</p> <p>Cropland (211)</p> <p>IF Cropland and LESS THAN 25% of land area is vegetated THEN</p> <p>Non-vegetated Farmland (2111)</p> <p>IF Cropland and GREATER THAN 25% vegetated, and vegetation is annual crops planted in rows (e.g. corn, soybeans, etc) THEN</p> <p>Row Crops (2112)</p> <p>IF Cropland, not above, and vegetation is used for fodder production, alfalfa and hay, THEN</p> <p>Forage Crops (2113)</p> <p>ELSE Other Cropland (2114)</p> <p>ELSE IF Herbaceous Agriculture and vegetation is not tilled (includes pasture) THEN</p> <p>Non-tilled Herbaceous Agriculture (212)</p> <p>ELSE (Agriculture and GREATER THAN 25% of the vegetation is woody) THEN</p> <p>Non Herbaceous Agriculture (22)</p> <p>IF woody trees are grown for Christmas tree production THEN</p> <p>Christmas trees (221)</p> <p>ELSE Orchards/Vineyards/Nursery (222)</p>
<p>ELSE IF the ground area is LESS THAN 25% vegetated THEN</p> <p>Bare / Sparsely Vegetated (7)</p> <p>IF formed from sand or bare soil THEN</p> <p>Sand, Soil (710)</p> <p>ELSE IF formed from solid rock THEN</p> <p>Exposed Rock (720)</p> <p>ELSE IF periodically flooded THEN</p> <p>Mud Flats (730)</p> <p>ELSE Other Bare/Sparsely Vegetated (790)</p>
<p>ELSE IF LESS THAN 25% of the ground is covered by tree canopy AND there is no evidence of flooding during the past 5 years AND NOT supporting lowland indicator plants THEN</p> <p>Upland Openland (3)</p> <p>IF maintained for recreational purposes THEN</p> <p>Parks and Golf Courses (350)</p>
<p>ELSE IF GREATER THAN 15% of the ground is covered by tree canopy then</p> <p>Low-Density Trees (330)</p> <p>IF AT LEAST 60% tree canopy is in Deciduous species THEN</p> <p>Low Density Deciduous Trees (3301)</p> <p>ELSE IF AT LEAST 60% tree canopy is in Coniferous species then</p> <p>Low Density Coniferous Trees (3302)</p> <p>ELSE IF low density trees but not above THEN</p>

Mixed Low Density Trees (3303)

ELSE IF the combination of woody shrubs/trees total GREATER THAN 25% of the canopy THEN
Upland Shrub (320)
IF AT LEAST 25% of the ground is covered by sweet fern THEN
Sweet Fern (3210)
ELSE IF AT LEAST 50% of the ground is covered by autumn olive/honeysuckle THEN
Autumn Olive/Honeysuckle (3202)
ELSE IF AT LEAST 50% of the ground is covered by blueberry THEN
Upland Blueberry (3203)
ELSE IF AT LEAST 25% of the ground is covered by mast producing shrubs
(cherry spp., juneberry, hazel, dogwood, hawthorn, wild plum) THEN
Mast Producing Shrub (3204)
ELSE
Mixed Upland Shrub (3205)

ELSE IF LESS THAN OR EQUAL TO 25% of the canopy is in woody shrubs or trees THEN
Herbaceous Openland (310)
IF the ground cover is AT LEAST 60% poverty grass, sweet fern, blueberry, and/or
cladonia THEN **Poverty Grass, Cladonia (3101)**
ELSE IF AT LEAST 60% of the herbaceous cover is grass THEN
Grass (3102)
IF AT LEAST 60% of the herbaceous cover is cool season grass/
legume (orchard grass, fescue, timothy, clover, vetch) THEN
Cool Season Grass (31021)
ELSE **Warm Season Grass (31022)**
ELSE IF AT LEAST 60% of the herbaceous cover is bracken fern, strawberry, or
raspberry/blackberry then
Rubus-Fern (3103)
ELSE IF AT LEAST 60% of the ground cover is exposed gravel or sand, spotted
knapweed, St John's-wort, or other invasive exotics THEN
Degraded (3104)
ELSE
Mixed Upland Herbaceous (3105)

ELSE IF LESS THAN 25% of the ground is covered by tree canopy AND either there IS evidence
of flooding during the past 5 years OR supporting lowland indicator plants THEN

Non-forested Wetlands (62)

IF AT LEAST 60% of the non-water ground cover is floating aquatic vegetation THEN
Floating Aquatic (621)

ELSE IF AT LEAST 60% of the non-water ground cover is shrub THEN
Lowland Shrub (622)
IF AT LEAST 60% of the cover is Alder (*alnus*) or Willow (*salix*) THEN
Alder/Willow (6220)
ELSE IF AT LEAST 60% is Shrubby cinquefoil (*Potentilla fruticosa*),
Dogwood (*Cornus*), Willow (*Salix*), Sedge (*Carex*) and/or Sphagnum/Peat
moss (*Sphagnum*) then
Fen (6221)
ELSE IF AT LEAST 30% is Dogwood (*Cornus*) and/or Michigan Holly
(*Ilex verticillata*) THEN
Shrub-Carr (6222)
ELSE IF AT LEAST 30% Button bush (*Cepalanthus*), Water Plantain
(*Alisma*), Smartweed (*Polygonum*), Cattail (*Typha*) THEN
Inundated Shrub Swamp (6223)
ELSE IF AT LEAST 30% is evergreen shrubs, Sphagnum/Peat moss
(*Sphagnum*) THEN bog
IF AT LEAST 10% of the cover is trees THEN
Treed Bog (6224)
ELSE
Bog (6225)
ELSE
Mixed Lowland Shrub (6229)

ELSE IF AT LEAST 60% of the non-water ground cover is non-woody vegetation THEN
Emergent Wetland (623)
IF AT LEAST 60% of the cover is cattail (*typha spp*) THEN
Cattail (6230)
ELSE IF AT LEAST 60% *Phragmites* THEN
Phragmites (6231)

ELSE IF AT LEAST 30% native warm season grasses including Big bluestem, Little bluestem, Broom sedge (*Andropogon spp.*), Indian grass (*Sorghastrum nutans*) THEN
Wet Prairie (6232)

ELSE IF AT LEAST 60% is sedges and grasses including Sedge (*Carex*), Bulrush (*Scirpus*), Reed grass (*Calamagrostis*), Reed canary grass (*Phalaris arundinaceae*), native warm season grasses (see above) THEN
Wet Meadow (6233)

ELSE **Mixed Emergent Wetland (6239)**

ELSE **Mixed Non-Forest Wetland (629)**

ELSE IF AT LEAST 25% of the ground is covered by tree crowns - FOREST

IF NO evidence of flooding during the past 5 years AND not supporting lowland indicator plants THEN

Upland Forest (4)

IF AT LEAST 60% of the tree canopy is deciduous THEN

Upland Deciduous Forest (41)

IF AT LEAST 60% is Maple + Beech + Basswood + White Ash + Cherry + Yellow Birch THEN

Northern Hardwood (411)

IF AT LEAST 80% is Sugar Maple + Basswood + White Ash + Cherry THEN

Sugar Maple Association (4110)

ELSE IF AT LEAST 60% is (Sugar Maple + Basswood) AND AT LEAST 10% is (Beech + Oak) THEN

Sugar Maple, Hard Mast Association (4111)

ELSE IF AT LEAST 80% is Maple spp + Beech + Cherry THEN

Maple Association (4112)

ELSE IF AT LEAST 60% is Beech + Hemlock THEN

Beech, Hemlock (4114)

ELSE IF AT LEAST 20% is Yellow Birch + Hemlock THEN

Yellow Birch, Hemlock (4115)

ELSE IF AT LEAST 50% is Red Maple AND AT LEAST 20% is Conifer THEN

Red Maple, Conifer (4113)

ELSE IF AT LEAST 20% is Pine THEN

Mixed Northern Hardwood-Pine (4117)

ELSE IF AT LEAST 20% Aspen spp. THEN

Mixed Northern Hardwood-Aspen (4116)

ELSE **Mixed Northern Hardwoods (4119)**

ELSE IF AT LEAST 60% Oak THEN

Oak Type (412)

IF AT LEAST 15% Hickory THEN

Oak, Hickory (4120)

ELSE IF AT LEAST 30% Pine THEN

Oak, Pine (4122)

ELSE IF AT LEAST 30% Aspen spp. THEN

Oak, Aspen (4121)

ELSE IF AT LEAST 40% Red Oak THEN Red Oak types

IF AT LEAST 20% White Oak THEN

Red with White Oak (4124)

ELSE

Red Oak (4123)

ELSE IF AT LEAST 40% Northern Pin Oak + White Oak + Black Oak THEN
Other Oaks

IF AT LEAST 20% White Oak THEN

White, Black, Northern Pin Oak (4126)

ELSE

Black, Northern Pin Oak (4125)

ELSE **Mixed Oak (4129)**

ELSE IF AT LEAST 40% Aspen Species THEN

Aspen Type (413)

IF AT LEAST 20% Conifer THEN Aspen, Conifer

IF AT LEAST 20% Cedar THEN

Aspen, Cedar (4135)

ELSE IF AT LEAST 20% Spruce or Fir THEN

Aspen, Spruce/Fir (4134)

ELSE IF AT LEAST 20% Pine THEN Aspen, Pine
 IF Jack Pine IS GREATER THAN OR EQUAL TO
 White Pine + Red Pine THEN
 Aspen, Jack Pine (4132)
 ELSE
 Aspen, Mixed Pine (4133)
 ELSE
 Aspen, Mixed Conifer (4136)
 ELSE IF AT LEAST 20% Oak THEN
 Aspen, Mixed Oak (4131)
 ELSE IF AT LEAST 60% Aspen THEN
 Aspen (4130)
 ELSE IF AT LEAST 20% Birch spp. THEN
 Aspen, Birch (4137)
 ELSE
 Aspen, Mixed Deciduous (4139)

ELSE IF AT LEAST 60% any other single species (like paper birch) THEN
 Other Upland Deciduous (4140)
 ELSE
 Mixed Upland Deciduous (419)
 ELSE IF AT LEAST 20% Northern White Cedar THEN
 Mixed Upland Deciduous with Cedar (4190)
 ELSE IF AT LEAST 20% Coniferous THEN
 Mixed Upland Deciduous with Conifer (4191)
 ELSE IF primarily southern michigan species THEN
 Mixed Southern Upland Deciduous (4192)
 ELSE IF AT LEAST 60% aspen spp. and paper birch THEN
 Birch, Aspen (4193)
 ELSE
 Other Mixed Upland Deciduous (4199)

ELSE IF AT LEAST 60% of the tree canopy is coniferous THEN
 Upland Coniferous Forest (42)
 IF AT LEAST 60% of the tree canopy is Pine THEN Pines
 IF Plantation THEN
 Planted Pine (421)
 IF AT LEAST 60% is White Pine THEN
 Planted White Pine
 IF AT LEAST 20% Deciduous THEN
 Planted White Pine, Mixed Deciduous (42101)
 ELSE
 Planted White Pine (42100)
 ELSE IF AT LEAST 60% Red Pine THEN
 Planted Red Pine
 IF AT LEAST 20% Deciduous THEN
 Planted Red Pine, Mixed Deciduous (42111)
 ELSE
 Planted Red Pine (42110)
 ELSE IF AT LEAST 60% Jack Pine THEN
 Planted Jack Pine
 IF AT LEAST 20% Deciduous THEN
 Planted Jack Pine, Mixed Deciduous (42121)
 ELSE
 Planted Jack Pine (42120)
 ELSE IF AT LEAST 60% Scotch Pine THEN
 Planted Scotch Pine (42130)
 IF AT LEAST 20% Deciduous THEN
 Planted Mixed Pine, Mixed Deciduous (42141)
 ELSE
 Planted Mixed Pine (42140)

ELSE non-planted THEN
 Natural Pine (422)
 IF AT LEAST 30% Oak THEN
 Pine-Oak (42250)
 ELSE IF AT LEAST 60% White Pine THEN
 Natural White Pine
 IF AT LEAST 30% Deciduous THEN
 Natural White Pine, Mixed Deciduous (42201)
 ELSE
 Natural White Pine (42200)
 ELSE IF AT LEAST 60% Red Pine THEN
 Natural Red Pine

IF AT LEAST 30% Deciduous THEN
Natural Red Pine, Mixed Deciduous (42211)
 ELSE **Natural Red Pine (42210)**
 ELSE IF AT LEAST 60% Jack Pine THEN
Natural Jack Pine
 IF AT LEAST 30% Deciduous THEN
Natural Jack Pine, Mixed Deciduous (42221)
 ELSE **Natural Jack Pine (42220)**
 IF AT LEAST 30% Deciduous THEN
Natural Mixed Pine, Mixed Deciduous (42260)
 ELSE **Natural Mixed Pine (42290)**

ELSE IF AT LEAST 60% Non-Pine (Other) Upland Conifers THEN
Non-Pine (Other) Upland Conifers (423)
 IF Plantation THEN
 IF AT LEAST 60% Larch THEN
Planted Larch
 IF AT LEAST 20% Deciduous THEN
Planted Larch, Mixed Deciduous (42301)
 ELSE **Planted Larch (42300)**
 ELSE IF AT LEAST 60% Spruce THEN
Planted Spruce
 IF AT LEAST 20% Deciduous THEN
Planted Spruce Mixed Deciduous (42311)
 ELSE **Planted Spruce (42310)**

ELSE non-planted THEN
 IF AT LEAST 50% Hemlock THEN
Upland Hemlock (42350)
 ELSE IF AT LEAST 60% Spruce THEN
Upland Spruce (42320)
 ELSE IF AT LEAST 60% Fir THEN
Upland Fir (42330)
 ELSE IF AT LEAST 60% Spruce + Fir THEN
Upland Spruce/Fir (42340)
 ELSE IF AT LEAST 60% Cedar THEN UPLAND CEDAR
 IF AT LEAST 20% Aspen spp. THEN
Upland Cedar, Aspen (42370)
 ELSE **Upland Cedar (42360)**
 ELSE IF AT LEAST 30% Deciduous THEN
Non-Pine Upland Conifer, Mxd Deciduous (42380)
 ELSE **Mixed Non-Pine Upland Conifers (42390)**

ELSE **Mixed Upland Conifers (429)**

ELSE **Upland Mixed Forest (43)**
 ELSE IF AT LEASE 70% Pine and Oak species THEN
Pine, Oak Mix (4310)
 ELSE IF AT LEASE 70% Pine and Aspen species THEN
Pine, Aspen Mix (4311)
 ELSE IF AT LEASE 40% Hemlock THEN
Hemlock, Mixed Deciduous (4312)
 ELSE **Mixed Upland Forest (4319)**

ELSE IF evidence of flooding during the past 5 years OR supporting lowland indicator plants THEN

Lowland Forest (61)
 IF AT LEAST 60% of the tree canopy is deciduous THEN
Lowland Deciduous Forest (611)
 IF AT LEAST 20% Cedar THEN
Lowland Deciduous with Cedar (6118)
 ELSE IF AT LEAST 20% Coniferous THEN
Lowland Deciduous, Mixed Coniferous (6117)
 ELSE IF AT LEAST 60% Maple spp. THEN
Lowland Maple (6113)

ELSE IF AT LEAST 60% Oak spp. THEN
Lowland Oak (6114)
 ELSE IF AT LEAST 60% Ash spp THEN
Lowland Ash (6115)
 ELSE IF AT LEAST 60% Cottonwood THEN
Cottonwood (6110)
 ELSE IF AT LEAST 60% Birch spp. THEN
Lowland Birch (6116)
 ELSE IF AT LEAST 40% Aspen + Balsam Poplar THEN
Lowland Aspen/Balsam Poplar
 IF Aspen spp % IS GREATER THAN Balsam Poplar % THEN
Lowland Aspen (6112)
 ELSE **Lowland Balsam Poplar (6111)**
 ELSE **Mixed Lowland Deciduous Forest (6119)**

ELSE IF AT LEAST 60% of the tree canopy is coniferous THEN
Lowland Coniferous Forest (612)
 IF AT LEAST 50% Cedar THEN
Lowland Cedar (6120)
 ELSE IF AT LEAST 50% Tamarack THEN
Tamarack (6121)
 ELSE IF AT LEAST 50% Black Spruce THEN
Black Spruce (6122)
 ELSE IF AT LEAST 50% Fir THEN
Lowland Fir (6123)
 ELSE IF AT LEAST 50% Spruce + Fir THEN
Lowland Spruce/Fir (6124)
 ELSE IF AT LEAST 50% Jack Pine THEN
Lowland Jack Pine (6126)
 ELSE IF AT LEAST 50% Black Spruce + Jack Pine THEN
Lowland Black Spruce, Jack Pine (6125)
 ELSE IF AT LEAST 50% Pine THEN
Lowland Pine (6127)
 ELSE IF AT LEAST 20% Deciduous THEN
Lowland Coniferous, Mixed Deciduous (6128)
 ELSE **Mixed Coniferous Lowland Forest (6129)**

ELSE **Lowland Mixed Forest (613)**
 IF AT LEAST 20% Cedar THEN
Mixed Lowland Forest with Cedar (6132)
 ELSE IF AT LEAST 60% Fir + Aspen +Balsam Poplar + Maple THEN
Fir, Aspen, Maple (6130)
 ELSE IF A LEAST 60% Hemlock + White Pine + Maple + Birch THEN
Hemlock, White Pine, Maple, Birch (6131)
 ELSE **Mixed Lowland Forest (6139)**

Stands exceeding the age and/or basal area (BA) ranges listed below for their appropriate cover type are considered as having met 'Generic Silvicultural Criteria'.

Cross-Inventory Cover Type	OI Cross-over code	Silvicultural Criteria threshold		
		age*	BA	
Aspen	A	50		
Paper Birch	B	50		
Cedar	C	150		
Lowland Deciduous	E	80		
Upland Spruce/Fir	F	54		
Hemlock	H	150		
Jack Pine	J	60		
Northern Hardwood	M	--	111-140	
Oak	O	80		
Lowland Aspen/Balsam Poplar	P	50		
Lowland Conifers	Q	80		
Red Pine	R	80	171-200	
Lowland Spruce/Fir	S	80		
Tamarack	T	60		
White Pine	W	100	171-200	
Local Name	I	n/a	n/a	
Level 3 / 4 Cover Type			Silvicultural Criteria	
code	description		age*	BA
Upland Conifers	MC	429 Mixed Upland Conifers	100	111-140
Planted Mixed Pines	MC	42130 Planted Scotch Pine	1	n/a
Planted Mixed Pines	MC	42140 Planted Mixed Pine	80	141-170
Planted Mixed Pines	MC	42141 Planted Mixed Pine, Mixed Deciduous	80	141-170
Natural Mixed Pines	MC	42250 Natural Pine, Oak	80	111-140
Natural Mixed Pines	MC	42260 Natural Mixed Pine, Mixed Deciduous	100	111-140
Natural Mixed Pines	MC	42290 Natural Mixed Pine	100	111-140
Upland Conifers	MC	42380 Non-Pine Upland Conifer, Mxd Deciduous	150	111-140
Upland Conifers	MC	42390 Mixed Non-Pine Upland Conifers	150	111-140
Mixed Upland Deciduous	MD	4190 Mixed Upland Deciduous with Cedar	150	111-140
Mixed Upland Deciduous	MD	4191 Mixed Upland Deciduous with Conifer	80	111-140
Mixed Upland Deciduous	MD	4199 Other Mixed Upland Deciduous	80	111-140
Upland Mixed Forest	UM	4310 Pine, Oak Mix	80	141-170
Upland Mixed Forest	UM	4311 Pine, Aspen Mix	60	n/a
Upland Mixed Forest	UM	4319 Mixed Upland Forest	80	111-140
Lowland Mixed Forest	LM	6127 Lowland Pine	100	111-140
Lowland Mixed Forest	LM	6130 Fir, Aspen, Maple	80	n/a
Lowland Mixed Forest	LM	6131 Hemlock, White Pine, Maple, Birch	100	111-140
Lowland Mixed Forest	LM	6132 Mixed Lowland Forest with Cedar	150	n/a
Lowland Mixed Forest	LM	6139 Mixed Lowland Forest	80	n/a

* During the Inventory process, stands that have an age equal to the Silvicultural Criteria threshold minus two (-2) will be identified as having met Generic Silvicultural Criteria. For example: Aspen types with a First Age of "48" will be flagged as having met 'Criteria'.

Appendix D

Qualitative Description of the Forest Model Used in the Management Area Analyses for the Regional State Forest Management Plans

Introduction

A model was developed to process the Department of Natural Resources (DNR) state forest inventory data contained in this plan to project harvest acres needed to achieve balanced age-class and/or basal area distributions for most forest cover types in each management area. Acres in each cover type are divided into 10-year age class groups and for those cover types managed by age, a target rotation age was assigned as determined by local forest managers for each management area (see the plan glossary for the definition of rotation age). Managers considered species growth habits, site productivity, forest health, economic timber value and the desired amount and type of habitat based on cover type age to assign a preferred rotation age. For example: big-tooth aspen on a moraine which has higher site productivity may be assigned a 60-year rotation compared to a 50-year rotation on a lake plain or outwash plain. Leaving it for the extra years may maximize timber value due to larger diameter trees and greater volume per acre. Also, the older stand may exhibit greater structure including snags, cavity trees, coarse woody debris and additional tree species and canopy layers. Aspen in other management areas is assigned a shorter rotation age because site productivity or forest health issues may make it necessary to harvest before mortality results in a decline in timber value. This will also ensure adequate regeneration before aspen begins to convert to another cover type that may not provide the desired timber or habitat value.

Rotation age and the total manageable acres are used to determine a balanced distribution of acres in each 10-year age class throughout the rotation. This equal distribution level is calculated by dividing the total acres by the number of ten-year age classes in the rotation. Only acres available for management (total acres minus acres that are unavailable for harvest due to management constraints, for example, hard factor limited and minus acres currently prescribed) for each cover type in a management area were factored into the model to calculate the targeted acres for each 10-year age class. For example: if there are 600 manageable acres of aspen and the rotation length is 50 years, there will be six age classes in the rotation (note that as these are 10-year age classes, some aspen will not actually be considered to have met the rotation age until it is 59 years old as at the inventory 10 years earlier it would not have met criteria for harvest at the age of 49). This would result in an equal distribution of 100 acres in each 10-year age class.

As most cover types may have one or more 10-year age classes with fewer acres than the age class regulation level, it is necessary to calculate the harvest level needed create 10-year age classes that have a surplus of acres that can be shifted to the 10-year age class with fewer acres than the age-class regulation level. This correction is accomplished by harvesting both age classes at the same time which will regenerate concurrently into a new regenerated age class which is at the age class regulation level. The projected acres needed to begin the process of balancing age-class distributions is calculated through the use of a model which uses data inputs from the DNR's forest inventory.

Data used in the model

State forest land is inventoried on a 10-year cycle, whereby about 10 percent of the state forest land is examined in each year - also referred to as a year-of-entry. The dataset used for the regional state forest plans includes forest inventory information ranging from a few weeks old to data collected a decade ago. The snapshot of this combined database was taken in 2012 for use as inputs into the model.

Beginning in 2003-2004, the DNR began to phase in a shift from collecting forest inventory data under the operations inventory system to a new system called Integrated Forest Monitoring Assessment and Prescriptions. The operations inventory system used basal area measurements to classify forest stand cover types with a single letter (up to 26 letters) representing the most prevalent trees in a stand. The current forest inventory system (Integrated Forest Monitoring Assessment and Prescriptions) now has 132 cover types (92 forested types and 40 non-forested types) and is based on canopy coverage to determine stand classification. A major difference between operations inventory and Integrated Forest Monitoring Assessment and Prescriptions is the inclusion of mixed stand types in the Integrated Forest Monitoring Assessment and Prescriptions classification. A crosswalk for core inventory values in both systems was built to enable a combined inventory database that could be used for purposes of analysis. It should be noted that some forest management units have completed the 10-year inventory cycle using Integrated Forest Monitoring Assessment and Prescriptions, while other forest management units are just beginning to use Integrated Forest Monitoring Assessment and Prescriptions for their inventory. This means that the data is a mixture of the two systems and will change as the transition to inventory using Integrated Forest Monitoring Assessment and Prescriptions continues. The cross-inventory dataset combines many of the Integrated Forest Monitoring Assessment and Prescriptions classifications into simplified cover types, but also includes many mixed types that were not present in the operations inventory list. The result is a

combined inventory classification list which contains 35 cover types (22 forested and 13 non-forested). This list can be found in Appendix C.

The core variables from the combined inventory database used in the analysis are:

1. Combined Inventory Adjusted Cover Type (see appendix D1)
2. Basal Area Range
3. Stand Age
4. Site Conditions (see Appendix C)
5. Generic Silvicultural Criteria (see Appendix C)

Basal Area Range

The basal area of a stand is a measurement of stem density in square feet (ft²) per acre and is often used as a general silvicultural criteria to determine the need for harvest in cover types where partial harvests occur (oak, planted red pine and white pine, some mixed types and northern hardwoods). Stands are grouped into a range of basal area values based on an average of three basal area measurement points which may indicate a need to harvest the stand. These partial harvests enable forest managers the ability to enhance volume production, maintain forest health, and improve stand quality. The statistical validity of three sample points is very low; however, the values are placed into basal area ranges which strategically fit into the cross-inventory system at logical breaks for forest management. These ranges are identified and used to determine whether or not a given stand meets general silvicultural criteria (Table 1).

Table 1. Relationship between basal area class and general silvicultural criteria.

Basal Area Class (Square Feet/Acre)	Relationship to General Silvicultural Criteria (GSC)
0-50	Does Not Meet GSC
51-80	Does Not Meet GSC
81-110	Does Not Meet GSC
111-140	Meets GSC - Northern Hardwood and some mixed cover types
141-170	Meets GSC - natural and planted mixed pine cover types
171-200	Meets GSC - planted Red Pine and White Pine
200+	

Stand Age

The stand age attribute in the combined inventory database is captured during the field inventory process and can be derived in several ways. In natural stands, the default method is based on current measurements of age by stand examiners. Selection of the tree(s) to age is left to the judgment of the examiner with the following guidance: “The tree(s) should appear to be representative of the most prevalent species in the canopy and in the co-dominant class of the canopy” as stated in Chapter 3 of the Integrated Forest Monitoring Assessment and Prescription manual. Other sources of stand age may include: planting record, treatment record, previous inventory or a remote estimate in cases of inaccessibility due to physical barriers or access issues.

Site Condition

Designation of site conditions (also known as limiting factors) to areas of state managed lands allows forest managers to identify areas that are available for management. In January 2012, the “Site Conditions Module” was added to Integrated Forest Monitoring Assessment and Prescription that provided a new approach to coding site conditions across the landscape. It provides the ability to efficiently analyze the inventory data (cover type/age/basal area), identify forest areas that meet general silvicultural criteria (that not already covered by a harvest prescription) and code any appropriate constraint without being restricted to a stand boundary. In the past, only areas that met generic silvicultural criteria and were determined to be unavailable for management were assigned a site condition. This resulted in site conditions not being designated for cover types with long generic silvicultural criteria thresholds, such as cedar which is usually well below the generic silvicultural criteria age of 150 years old, but may be on sites that are too wet for management. The new module has the ability to code site condition on areas in a compartment regardless of whether they meet general silvicultural criteria. This change in protocol requires all stand examiners to “inventory” site conditions across the landscape regardless of general silvicultural criteria. In addition to assigning a site condition regardless of whether a stand meets generic silvicultural criteria, the Integrated Forest Monitoring Assessment and Prescription system allows stand examiners to prescribe treatments for portions of stands. However, when a portion of a stand is not covered by a

treatment and that acreage still meets general silvicultural criteria, it must now be coded with a site condition. The new module will drastically improve the analysis of site conditions as inventory data are updated across the state forest in the next ten years.

The operations inventory system had eight scenarios regarding site conditions, general silvicultural criteria (GSC) and prescribed harvests:

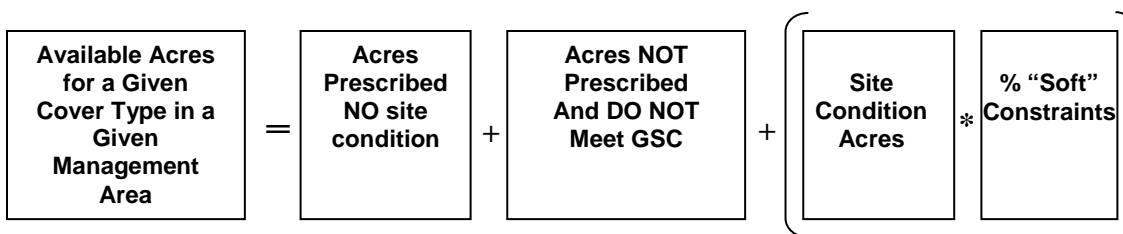
1. A stand meets GSC and it is not prescribed for a harvest - with a site condition
2. A stand meets GSC and it is not prescribed for a harvest - with no site condition
3. A stand meets GSC and is prescribed for a harvest - with no site condition
4. A stand meets GSC and is prescribed for a harvest - with a site condition.
5. A stand does not meet GSC - with a site condition
6. A stand does not meet GSC - with no site condition.
7. A stand does not meet GSC and is prescribed for harvest - with no site condition.
8. A stand does not meet GSC and is prescribed for harvest - with a site condition.

Due to the above-listed scenarios, complete data are not currently available to determine how many acres are “off the table” for active management in the context of forest planning and modeling. To account for this uncertainty in the data, the model considers acres that are unavailable (hard limited factor acres) for management by summing the acres that meet general silvicultural criteria and have no limiting factor with the acres that do not meet general silvicultural criteria and that do not have a limiting factor, and then subtracting that total from the total acres in the cover type as shown below:



A hard factor limited area is permanently unavailable for management due to reasons such as legislation, no access or management primarily for another value. However, some stands coded with a site condition should still be considered available for management, as the constraint affecting management may be able to be resolved. These are considered to be as soft factors which are not permanent given a high probability that there will be resources or means to address the constraint in the near future. Soft factors also include factors used to temporarily defer a treatment for one or two planning cycles due to specific structural characteristics of the stand or other technical reasons.

A trend analysis on the information collected through both forest inventory systems was used and the result is applied as a percentage of acres available for management (soft constraints) multiplied by acres that are captured in all site conditions. This analysis was done at the cover type level stratified by management area to help capture local trends relative to site conditions.



Generic Silvicultural Criteria

Each major forest cover type used in the model has a statewide defined age and/or basal area range, based on the characteristics of that species, which indicates that a suitable threshold for harvest has been met. In general, this may be an age where economic returns are at their maximum or if managed by basal area, the density at which the rate of growth begins to diminish (Current Annual Increment < Mean Annual Increment).

Modeling Strategies for Cover Types Managed with Even-Aged Silvicultural Systems (Aspen, Jack Pine, Red Pine)

The model calculates the number of acres to final harvest or partial harvest over the next 10-year period to meet the following general objectives:

1. To balance the age-classes over a selected rotation age for a given cover type on the selected management area (calculated values by the model are overridden in the cases where balancing age-classes is not the primary objective, such as in cases as where there is another priority such as reducing older age class stands through immediate harvests to address a forest health issue).
2. To begin balancing the age-classes/basal area distribution over the next decade, rather than delaying for “x” number of years.

The products from the model can be demonstrated by considering an example of the aspen cover type in the Cheboygan Basin Moraines management area, where the cover type is being managed on an even-aged basis and no partial harvests are desirable. The model will first use the input for economic rotation age for the cover type (for aspen the economic rotation age is 50 years as shown in Table 2). The model will generate a red line on an age-class distribution graph (Figure 1) to show the age-class regulation acreage for a balanced age-class structure for aspen with a rotation age of 50 years. Note that the statewide default economic rotation age for each cover type is listed in Table 1. The actual height of the red line (that represents the balanced harvest area) is calculated by dividing the total available manageable acres by the number of 10-year age classes up to and including the upper age class in the rotation age. In this case, there are six age classes and the total acreage is roughly 13,860 acres. With a balanced age-class structure, the model calculates that there would be approximately 2,310 acres in each 10-year age class, as shown by the red line in Figure 1.

The model then projects the harvest acres needed based on the current acres in the regeneration class (those acres currently prescribed) as well as those acres in the 0-9 and 10-19 year age classes. Because these age classes are all below age-class regulation level, the projected harvest acres in this 10-year period will be greater than the age-class regulation level. The model will then project a final harvest of 2,636 acres over the next 10-year period to begin the process of balancing the aspen age-class distribution for the management area. This is greater than the current balanced age-class level of 2,310 acres.

The surplus acres above the age-class regulation level may be harvested later at the same time as those acres in the surrounding age classes that are below the balanced age-class level. The resulting concurrent regeneration will shift acres to bring the acres in these age classes to the level of the age-class regulation. Harvest acres will first be supplied from manageable acres in the oldest age classes above the rotation age that do not have a current prescription or a hard factor limit. Additional acres below the 50-year rotation age including those in the 30-39 year age class on better sites may be included to provide acres needed to begin balancing the age-class distribution.

Each graph displays data for the cover type in the management area as shown in the legend. The solid bars represent acres in each 10-year age class that are available for management. Acres currently prescribed with a final harvest in the combined inventory database are displayed in the age-class where they occur. These acres are also represented in the regeneration prescription class as regenerating acres (as they are derived from the results of regeneration harvests). Hard factor limit acres (restrictive site conditions) are also displayed and are shown in their respective age-classes representing the amount of aspen that is unavailable for active management. Partial harvests are not displayed in the example above, but would typically appear in the cover types managed based on basal area rather than age-class distribution (uneven-aged vs. even-aged management).

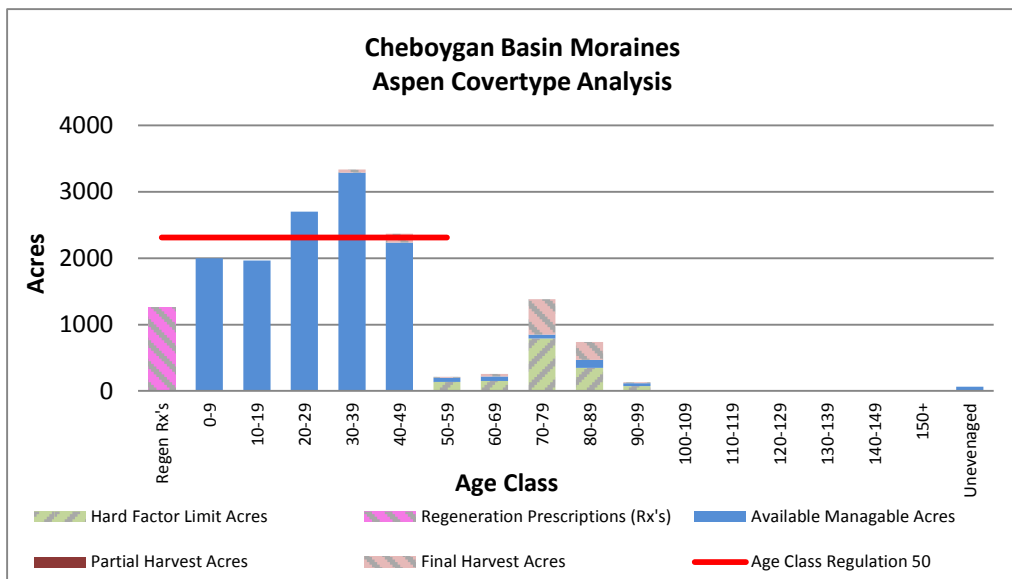


Figure 1. An example of the aspen age-class distribution graph generated by the model for the Cheboygan Basin Moraines management area.

Graphs that illustrate what the age-class distribution will look like in 10 years based on harvesting the projected acres in the current 10-year period are also produced by the model as shown in Figure 2. However, due to the uncertainty of the future data as a result of the continued transition to the Integrated Forest Monitoring Assessment and Prescription system of data collection and the continued refinement of the amount of manageable acres through the new site condition module these graphs have not been included in the plan.

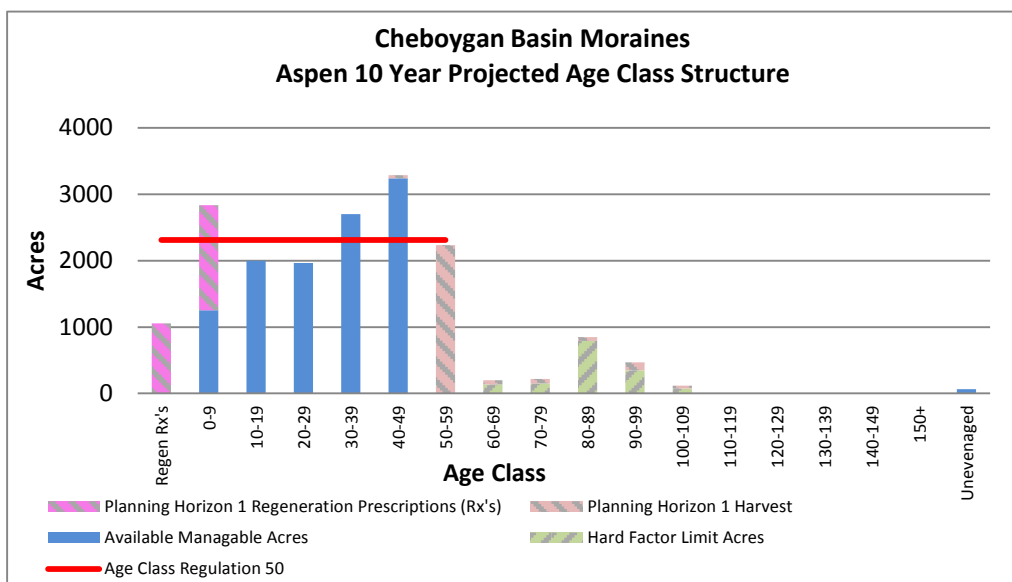


Figure 2. An example age class-structure graph for aspen in the Cheboygan Basin Moraines management area in 10 years.

Model Overrides

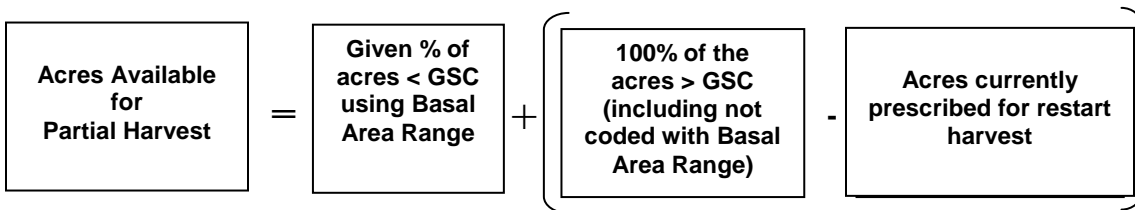
The model allows for a manual override from calculated values in response to alternative management strategies. The following examples are meant to illustrate examples of why the outputs from the model may need to be overridden:

Example 1: The model may project a final harvest of fewer than the age-class regulation acres of oak in the next ten years because of an excess of acres over the balanced age class level in the 0-10 age-class. However, the local staff report that the older oak resource may not survive for ten more years. Due to the management decision to maintain these areas as oak, an override value to harvest the acres in these older stands would be entered into the model and would be reflected in the management area plan.

Example 2: Red pine in the Emmet Moraines management area is a relatively minor component (8%) and the majority of the acreage is 20 years from rotational age. The model assumes that the objective is to begin balancing the age class now. However, local forest managers determine that it is managerially desirable to hold the red pine until it reaches the rotation age at economic maturity in 20 years. The calculated value in the model is overridden to reflect the desire to delay harvest of the acres until they reach economic maturity.

Model Strategies for Cover Types Managed with Uneven - Aged Silvicultural Systems (Oak, White Pine, Northern Hardwoods, Upland Conifers, Hemlock and some mixed types)

In stands where partial harvests are desirable prior to final harvests, the basal area range is the key attribute controlling acres recommended for treatment. The model calculates acres available for partial harvest with the following strategy:



Because the planning period is ten years and the stand basal area will increase as the stands grow over this period, it is assumed that some percentage of the stands that do not currently meet general silvicultural criteria will grow into a basal area range that meets general silvicultural criteria during the planning period. Due to coding errors, some stands which should have a basal area assigned do not; and these acres are considered as having met general silvicultural criteria.

Table 3 identifies the percentage of all acres in a given basal area range and cover type to be considered available for partial harvest treatment when attempting to balance the basal area distribution. The model also includes an override field in each pertinent cell if the local management unit deems it necessary to deviate from the standard statewide values shown below.

Table 3. Percentage of acres in a basal area class considered available for partial harvest treatment when trying to balance the basal area distribution by cover type.

Cover Type	1-50	51-80	81-110	111-140	141-170	171-200	200+	not coded	Entry Period
Red Pine		A	A	50%	100%	100%	100%	100%	15
Oak	25%	33%	100%	100%	100%	100%	100%	100%	20
Mixed Upland Deciduous				50%	100%	100%	100%	0%	20
Upland Mixed Forest				50%	100%	100%	100%	0%	20
Upland Conifers				50%	100%	100%	100%	100%	20
Natural Mixed Pines				50%	100%	100%	100%	100%	20
Planted Mixed Pines				50%	100%	100%	100%	100%	20
Hemlock				50%	100%	100%	100%	100%	50
White Pine		A	A	50%	100%	100%	100%	100%	20
Northern Hardwood		0%	33%	100%	100%	100%	100%	100%	20

Table 2. Statewide economic rotational age of cover types if managed by age criteria.

Cover Type	Age
Aspen	50
Cedar	150
Hemlock	150
Jack Pine	60
Lowland Aspen/Balsam P	50
Lowland Conifers	80
Lowland Deciduous	80
Lowland Mixed Forest	80
Lowland Spruce/Fir	80
Mixed Upland Deciduous	60
Natural Mixed Pines	100
Northern Hardwood	NA
Oak	80
Paper Birch	50
Planted Mixed Pines	80
Red Pine	80
Tamarack	60
Upland Conifers	80
Upland Mixed Forest	80
Upland Spruce/Fir	60
White Pine	100

Incorporating Model Outputs into the Management Area Plans

Table 4 is a summary table produced by the model and is inserted directly into the management area plans. The table shows a summary of forest inventory data from the combined inventory database and outputs generated from the model as the example below shows.

Table 4. Summary of current acreage, hard factor limited acreage, manageable acreage, projected harvest acreage and desired future harvest acreage by cover type for a management area generated by the model.

Cover Type	Cover %	Current Acreage	Hard Factor Limited Acres	Manageable Acres	10 Year Projected Harvest (Acres)		Projected Net Change (Acres)	Projected Acreage in 10 Years	Desired Future Harvest (Acres)	
					Final Harvest	Partial Harvest			Final Harvest	Partial Harvest
Aspen	37%	15,361	1,501	13,860	2,636			15,361	2,310	
Red Pine	11%	4,652	271	4,381	1,310	1,427		4,652	487	2,216
Northern Hardwood	7%	2,816	50	2,766		1,311		2,816		1,311
Lowland Conifers	6%	2,372	776	1,596	177			2,372	177	
Oak	5%	1,915	878	1,037	191	289		1,915	115	296
Cedar	4%	1,738	35	1,703	106			1,738	106	
Lowland Aspen/Balsam Poplar	4%	1,695	865	830	264			1,695	139	
Jack Pine	4%	1,684	430	1,254				1,684	179	
Lowland Deciduous	3%	1,097	274	823	91			1,097	91	
Upland Open/Semi-Open Lands	6%	2,579		2,579				2,579		
Lowland Open/Semi-Open Lands	6%	2,464		2,464				2,464		
Misc Other (Water, Local, Urban)	1%	313	0	313				313		
Others	7%	3,107	477	2,630	451	278		3,107	302	567
Total		41,793	5,557	36,236	5,225	3,305		41,793	3,906	4,390

In Table 4, aspen acres total 15,361 of state forest in the management area or 37% of the total acreage in the management area. Of that acreage, 1,501 acres are considered to be unavailable for harvest due to site conditions (or hard factor limits) as mentioned above. This leaves the forest managers with 13,860 acres of aspen available and suggests a final harvest of 2,636 acres over the next decade to begin to balance the age class distribution. Harvesting is recommended to start with the oldest aspen and work back toward the younger age classes until the level needed to begin balancing the age-class distribution is reached. However, forest health or other local considerations may result in acres being taken from age classes other than the oldest. Because there are no conversions to other forest cover types prescribed in this management area the Projected Net Change column in Table 4 is blank. The projected acres of aspen in ten years is based on the management objective of treatments coded in the database and likewise is not projected to change. The last columns display the desired future harvest levels per 10-year planning period after this initial planning period has been implemented.

Appendix E

Forest Habitat Type (Kotar) Classifications Systems

Classification systems are needed to effectively manage forest resources. Traditionally, resource classifications have been developed only for specific uses. Forest cover types, for example, traditionally a standard unit for forest management, have serious limitations as an ecological basis for developing management prescriptions. They are based entirely on current dominant and most often successional tree species. Thus, stands of a given cover type encompass a wide range of environmental conditions and therefore have different productivity potentials and respond differently to the same management techniques. Similarly, systems that classify or map landscapes based entirely on physical factors (e.g., physiographic maps or soil surveys) are inadequate for management if they do not include ecological interpretations of communities (e.g., composition, growth, dynamics) that are associated with individual physical landscape units.

A system that delineates and explains some basic ecological units is needed to place management on an ecological foundation. This habitat classification system uses natural vegetation (potential as well as current) to recognize ecologically equivalent vegetation communities and landscape units.

The Forest Habitat Type (Kotar) Classification System is a site classification system based on the identification of repeatable patterns in the composition of the understory vegetation. It is a system based on the study of floristic composition of vegetation that groups communities and their environments into categories useful for management interpretation. The habitat types are developed independently from the current tree species composition and condition and can be applied to most upland forest stands.

The Kotar classifications for each ecoregion are listed below.

Western Upper Peninsula Ecoregion Habitat Types

Habitat Type	Name	Primary Landform and Soils
PVCx/PVDC	White pine/Blueberry – Hairgrass and White pine/Blueberry - Sedge	Excessively drained sandy soils on outwash plains.
PQE	White pine – Red Oak/Trailing arbutus	Deep sandy soils on outwash and lacustrine deposits or shallow soils over bedrock.
PARV	White Pine – Red maple/Blueberry	Excessively well drained soils of lacustrine deposits.
PARV(w)	White Pine – Red maple/Blueberry (Wisconsin variant)	Sands and loamy sands on glacial outwash and moraines.
PARVAa	White pine – Red maple/Blueberry – Wild sarsaparilla	Excessively well drained soils of lacustrine deposits.
PARVAa(w)	White pine – Red maple/Blueberry – Wild sarsaparilla (Wisconsin variant)	Sand to sandy loam on glacial outwash and moraines.
PARV-Co	White pine – Red maple/Blueberry – Bunchberry variant	Excessively well drained sands on lacustrine deposits of sand and gravel.
AArAst	Sugar maple – Red maple/Large-leaved aster	Sandy soils formed in coarse till and shallow till over bedrock.
AArLy	Sugar maple – Red maple/Stiff club-moss	Loamy soils over deep sands on coarse till deposits and thin till over bedrock.
AVVb	Sugar maple/Blueberry – Maple-leaved viburnum	Well drained sandy loams on rolling moraines and glaciofluvial deposits.
AVb	Sugar maple/Maple-leaved viburnum	Sandy loams on medium textured end moraines.
TMC	Eastern hemlock/Wild lily-of-the-valley – Goldthread	Somewhat poorly drained soils on a variety of landforms.
ATM	Sugar maple-Eastern hemlock/Wild lily-of-the-valley	Loamy sand and sandy loam soils on end moraines and outwash covered moraines.
ATM-Sm	Sugar maple-Eastern	Loamy sand and sands on medium and

	hemlock/Wild lily-of-the-valley – False Solomon’s seal variant	coarse texture tills.
ATM-O	Sugar maple-Eastern hemlock/Wild lily-of-the-valley – Sweet cicely variant	Sandy loam soils over clay on clay and lacustrine deposits.
ATFAs	Sugar maple-Eastern hemlock-American beech/Jack-in-the-pulpit	Sandy soils with subsurface clayey, gravelly or cemented layers.
ATD	Sugar maple-Eastern hemlock/Spinulose shield fern	Loamy soils on coarse textured till and loess.
ATD-Hp	Sugar maple-Eastern hemlock/Spinulose shield fern-Sharp-lobed hepatica variant	Sandy soils with subsurface clayey, gravelly or cemented layers on medium textured glacial till.
ATD-Ca	Sugar maple-Eastern hemlock/Spinulose shield fern-Blue cohosh variant	Loamy cap soils on clay deposits
AOCa	Sugar maple/Sweet cicely - Blue cohosh	Well drained loamy till and loess

Eastern Upper Peninsula Ecoregion Habitat Types

Habitat Type	Name	Primary Landforms and Soils
PVE	White pine/Blueberry – Trailing arbutus	Excessively drained soils on lacustrine deposits of sand and gravel.
PARv	White pine - Red maple/Blueberry	Excessively drained to well drained soils on deep lacustrine deposits of sand and gravel.
PARv-Ao	White pine – Red maple/Blueberry – Spreading dogbane variant	Excessively drained to somewhat excessively drained soils on glacial outwash.
PARVAa	White pine – Red maple/Blueberry – Wild sarsaparilla	Excessively to well drained sandy soils on deep lacustrine deposits of sand and gravel.
ATFD	Sugar maple – Eastern hemlock – American beech/Spinulose shield fern	Well to moderately well drained deep sands and loamy sands on outwash, lacustrine deposits, glacial till and end moraines.
AFPo	Sugar maple – American beech/Hairy Solomon’s seal	Well to somewhat excessively drained deep sands and loamy sands on a variety of landforms. Gravelly, cemented and mottled layers are common.
AFOAs	Sugar maple – American beech/Sweet cicely – Jack-in-the-pulpit	Moderately well to somewhat excessively drained soils on end moraines and till plains. Gravelly, cemented and mottled layers are common. Also, thin till over bedrock.

Northern Lower Peninsula Ecoregion Habitat Types

Habitat Type	Name	Primary Landforms and Soils
PVCd	White pine/Blueberry – Reindeer lichen	Sandy outwash plains, very dry/very poor nutrient.
PARVHa	White pine – Red maple/Blueberry – Witch hazel	Level plains and gentle slopes, associated with glacial outwash plains, sandy beach ridges and coarse textured moraines, very dry to dry/poor nutrient.
PARVVb	White pine – Red maple/Blueberry – Maple-leaved viburnum	Beach ridges along Lake Huron, dry to dry-mesic/poor to medium nutrient.
AFO	Sugar maple – American	Coarse textured end moraines, ground moraines,

	beech/Sweet cicely	outwash plains, till plains and undifferentiated end moraine – ground moraine complexes. Mesic/medium to rich nutrient.
AFOCa	Sugar maple – American beech/Sweet cicely – Blue cohosh	End moraine, drumlins and ground moraines. Mesic/rich to very rich nutrient.
PArVCo	White pine – Red maple/Blueberry – Bunchberry	Poorly drained outwash sands. Mesic to wet-mesic/poor nutrient.

Appendix F

High Priority Trout Streams

Management Unit	Management Area	Compartment	Stream Name
Baraga	Baraga Plains	11	Sturgeon
Baraga	Central Houghton	31	Misery & Undesignated
Baraga	Central Houghton	32	Misery & Undesignated
Baraga	Central Houghton	43	Sturgeon
Baraga	Central Houghton	44	Sturgeon
Baraga	Central Houghton	50	Firesteel
Baraga	Central Houghton	51	Firesteel & Undesignated
Baraga	Central Houghton	54	Undesignated
Baraga	Central Houghton	55	Misery & Undesignated
Baraga	Central Houghton	62	Undesignated
Baraga	Central Houghton	63	Firesteel
Baraga	Central Houghton	64	Firesteel
Baraga	Central Houghton	65	Firesteel
Baraga	Central Houghton	66	Firesteel & Ontonagon
Baraga	Central Houghton	67	Firesteel & Undesignated
Baraga	Central Keweenaw	58	Portage
Baraga	Central Keweenaw	59	Undesignated
Baraga	Central Keweenaw	73	Undesignated
Baraga	Central Keweenaw	74	Portage & Undesignated
Baraga	Covington/Ned Lake	22	Sturgeon
Baraga	Fourteen Mile Point Lake Plain	68	Misery & Undesignated
Baraga	Fourteen Mile Point Lake Plain	69	Undesignated
Baraga	Huron Mountains	1	Undesignated
Baraga	Huron Mountains	2	Huron & Undesignated
Baraga	Huron Mountains	80	Huron & Undesignated
Baraga	Keweenaw Tip	75	Undesignated
Baraga	Keweenaw Tip	81	Undesignated
Baraga	Keweenaw Tip	82	Undesignated
Baraga	Menge Creek	4	Undesignated
Baraga	Menge Creek	5	Undesignated
Baraga	Menge Creek	6	Sturgeon & Undesignated
Baraga	Menge Creek	7	Undesignated
Baraga	Peshekee Highlands	15	Sturgeon & Undesignated
Baraga	Sturgeon Sloughs	3	Sturgeon & Undesignated
Baraga	Sturgeon Sloughs	57	Portage
Crystal Falls	Amasa Plains	118	Menominee
Crystal Falls	Amasa Plains	119	Menominee
Crystal Falls	Amasa Plains	120	Menominee
Crystal Falls	Amasa Plains	123	Menominee
Crystal Falls	Amasa Plains	124	Menominee
Crystal Falls	Amasa Plains	125	Menominee
Crystal Falls	Brule-Iron River Tracts	175	Menominee
Crystal Falls	Brule-Iron River Tracts	176	Menominee & Unknown
Crystal Falls	Brule-Iron River Tracts	195	Menominee
Crystal Falls	Cassidy Creek	95	Menominee
Crystal Falls	Cassidy Creek	104	Menominee
Crystal Falls	Cassidy Creek	105	Menominee
Crystal Falls	Chain Lakes Moraine	22	Escanaba
Crystal Falls	Floodwood Plains	6	Ford
Crystal Falls	Floodwood Plains	7	Ford
Crystal Falls	Floodwood Plains	8	Ford & Escanaba
Crystal Falls	Floodwood Plains	44	Ford
Crystal Falls	Floodwood Plains	45	Ford
Crystal Falls	Groveland	73	Menominee
Crystal Falls	Groveland	80	Menominee

Management Unit	Management Area	Compartment	Stream Name
Crystal Falls	Groveland	82	Menominee
Crystal Falls	Groveland	83	Menominee
Crystal Falls	Groveland	98	Menominee
Crystal Falls	Groveland	99	Menominee
Crystal Falls	Groveland	100	Menominee
Crystal Falls	Groveland	101	Menominee
Crystal Falls	Groveland	103	Menominee
Crystal Falls	Groveland	113	Menominee
Crystal Falls	Michigamme Reservoir	117	Menominee
Crystal Falls	Michigamme Reservoir	126	Menominee
Crystal Falls	Michigamme Reservoir	181	Menominee
Crystal Falls	Michigamme Reservoir	182	Menominee
Crystal Falls	Michigamme Reservoir	183	Menominee
Crystal Falls	Michigamme Reservoir	186	Menominee
Crystal Falls	Michigamme Reservoir	187	Menominee
Crystal Falls	Michigamme Reservoir	189	Menominee
Crystal Falls	Michigamme Reservoir	192	Menominee
Crystal Falls	Michigamme Reservoir	194	Menominee
Crystal Falls	Net River	179	Menominee
Crystal Falls	Net River	180	Menominee
Crystal Falls	Panola Plains	161	Menominee
Crystal Falls	Panola Plains	162	Menominee
Crystal Falls	Peavy Moraine	81	Menominee
Crystal Falls	Peavy Moraine	102	Menominee
Crystal Falls	Ralph Ground Moraine	5	Ford
Crystal Falls	Ralph Ground Moraine	9	Escanaba
Crystal Falls	Ralph Ground Moraine	10	Ford
Crystal Falls	Ralph Ground Moraine	11	Ford & Escanaba
Crystal Falls	Ralph Ground Moraine	12	Ford
Crystal Falls	Ralph Ground Moraine	13	Ford & Escanaba
Crystal Falls	Ralph Ground Moraine	14	Escanaba
Crystal Falls	Ralph Ground Moraine	15	Escanaba
Crystal Falls	Ralph Ground Moraine	16	Escanaba
Crystal Falls	Ralph Ground Moraine	17	Escanaba
Crystal Falls	Ralph Ground Moraine	18	Escanaba
Crystal Falls	Ralph Ground Moraine	19	Escanaba
Crystal Falls	Ralph Ground Moraine	20	Escanaba
Crystal Falls	Ralph Ground Moraine	21	Escanaba
Crystal Falls	Ralph Ground Moraine	23	Escanaba
Crystal Falls	Ralph Ground Moraine	24	Escanaba
Crystal Falls	Ralph Ground Moraine	25	Escanaba
Crystal Falls	Ralph Ground Moraine	26	Ford
Crystal Falls	Ralph Ground Moraine	27	Ford
Crystal Falls	Ralph Ground Moraine	28	Ford
Crystal Falls	Ralph Ground Moraine	30	Ford
Crystal Falls	Ralph Ground Moraine	31	Ford
Crystal Falls	Ralph Ground Moraine	32	Ford & Escanaba
Crystal Falls	Ralph Ground Moraine	33	Ford & Escanaba
Crystal Falls	Ralph Ground Moraine	34	Ford & Escanaba
Crystal Falls	Ralph Ground Moraine	35	Ford
Crystal Falls	Ralph Ground Moraine	36	Ford
Crystal Falls	Ralph Ground Moraine	37	Ford
Crystal Falls	Ralph Ground Moraine	38	Ford
Crystal Falls	Ralph Ground Moraine	39	Ford
Crystal Falls	Ralph Ground Moraine	40	Ford
Crystal Falls	Ralph Ground Moraine	41	Ford
Crystal Falls	Ralph Ground Moraine	42	Ford
Crystal Falls	Ralph Ground Moraine	43	Ford
Crystal Falls	Ralph Ground Moraine	46	Ford
Crystal Falls	Ralph Ground Moraine	47	Ford

Management Unit	Management Area	Compartment	Stream Name
Crystal Falls	Ralph Ground Moraine	48	Ford & Menominee
Crystal Falls	Ralph Ground Moraine	50	Ford & Menominee
Crystal Falls	Ralph Ground Moraine	51	Menominee
Crystal Falls	Ralph Ground Moraine	52	Menominee
Crystal Falls	Ralph Ground Moraine	53	Menominee
Crystal Falls	Ralph Ground Moraine	55	Menominee
Crystal Falls	Ralph Ground Moraine	58	Menominee
Crystal Falls	Ralph Ground Moraine	61	Menominee
Crystal Falls	Ralph Ground Moraine	144	Ford
Crystal Falls	Ralph Ground Moraine	145	Ford
Escanaba	Brampton Lake Plain	105	Tacoosh
Escanaba	Brampton Lake Plain	106	Days
Escanaba	Brampton Lake Plain	107	Days
Escanaba	Dead Horse Moraines	88	Days
Escanaba	Dead Horse Moraines	89	Days
Escanaba	Dead Horse Moraines	90	Rapid
Escanaba	Dead Horse Moraines	91	Rapid
Escanaba	Dead Horse Moraines	92	Rapid
Escanaba	Dead Horse Moraines	94	Rapid
Escanaba	Dead Horse Moraines	95	Rapid
Escanaba	Dead Horse Moraines	96	Rapid
Escanaba	Dead Horse Moraines	97	Rapid
Escanaba	Dead Horse Moraines	99	Rapid
Escanaba	Dead Horse Moraines	103	Rapid
Escanaba	Green Bay Lake Plain	32	Big Cedar
Escanaba	Green Bay Lake Plain	33	Big Cedar
Escanaba	Green Bay Lake Plain	34	Big Cedar
Escanaba	Green Bay Lake Plain	112	Big Cedar
Escanaba	North Menominee Moraines	69	Ford
Escanaba	North Menominee Moraines	70	Big Cedar
Escanaba	North Menominee Moraines	85	Escanaba
Gwinn	Chain Lakes Moraine	33	Escanaba
Gwinn	Chain Lakes Moraine	34	Escanaba
Gwinn	Chain Lakes Moraine	35	Escanaba
Gwinn	Chain Lakes Moraine	36	Escanaba
Gwinn	Chain Lakes Moraine	38	Escanaba
Gwinn	Chain Lakes Moraine	39	Escanaba
Gwinn	Chain Lakes Moraine	43	Escanaba
Gwinn	Chain Lakes Moraine	44	Escanaba
Gwinn	Chain Lakes Moraine	45	Escanaba
Gwinn	Chain Lakes Moraine	46	Escanaba
Gwinn	Chain Lakes Moraine	47	Escanaba
Gwinn	Chain Lakes Moraine	49	Escanaba
Gwinn	Chain Lakes Moraine	50	Escanaba
Gwinn	Chain Lakes Moraine	54	Escanaba
Gwinn	Chain Lakes Moraine	55	Escanaba
Gwinn	Chain Lakes Moraine	56	Escanaba
Gwinn	Chain Lakes Moraine	223	Escanaba
Gwinn	Chain Lakes Moraine	226	Escanaba
Gwinn	Chain Lakes Moraine	230	Escanaba
Gwinn	Chain Lakes Moraine	231	Escanaba
Gwinn	Chain Lakes Moraine	232	Escanaba
Gwinn	Chain Lakes Moraine	236	Escanaba
Gwinn	Chain Lakes Moraine	237	Escanaba
Gwinn	Chain Lakes Moraine	238	Escanaba
Gwinn	Chain Lakes Moraine	239	Escanaba
Gwinn	Chain Lakes Moraine	240	Escanaba
Gwinn	Chain Lakes Moraine	241	Escanaba
Gwinn	Chain Lakes Moraine	242	Escanaba
Gwinn	Chain Lakes Moraine	243	Escanaba

Management Unit	Management Area	Compartment	Stream Name
Gwinn	Chain Lakes Moraine	244	Escanaba
Gwinn	Chain Lakes Moraine	245	Escanaba
Gwinn	Chain Lakes Moraine	248	Escanaba
Gwinn	Chain Lakes Moraine	249	Escanaba
Gwinn	Chain Lakes Moraine	250	Escanaba
Gwinn	Chain Lakes Moraine	251	Escanaba
Gwinn	Chain Lakes Moraine	252	Escanaba
Gwinn	Chain Lakes Moraine	257	Escanaba
Gwinn	Chain Lakes Moraine	259	Escanaba
Gwinn	Chain Lakes Moraine	260	Escanaba
Gwinn	Chain Lakes Moraine	261	Escanaba
Gwinn	Chain Lakes Moraine	262	Escanaba
Gwinn	Chain Lakes Moraine	263	Escanaba
Gwinn	Chain Lakes Moraine	264	Escanaba
Gwinn	Chain Lakes Moraine	265	Escanaba
Gwinn	Chain Lakes Moraine	266	Escanaba
Gwinn	Chain Lakes Moraine	267	Escanaba
Gwinn	Chain Lakes Moraine	268	Escanaba
Gwinn	Chain Lakes Moraine	269	Escanaba
Gwinn	Chain Lakes Moraine	271	Escanaba
Gwinn	Chain Lakes Moraine	272	Escanaba
Gwinn	Chatham/Autrain Moraines	94	Whitefish
Gwinn	Chatham/Autrain Moraines	95	Whitefish
Gwinn	Chatham/Autrain Moraines	96	Whitefish
Gwinn	Chatham/Autrain Moraines	97	Au Train
Gwinn	Chatham/Autrain Moraines	98	Au Train
Gwinn	Chatham/Autrain Moraines	99	Au Train
Gwinn	Chatham/Autrain Moraines	100	Au Train
Gwinn	Chatham/Autrain Moraines	101	Whitefish
Gwinn	Chatham/Autrain Moraines	103	Whitefish
Gwinn	Chatham/Autrain Moraines	104	Whitefish
Gwinn	Cyr Swamp	20	Escanaba
Gwinn	Cyr Swamp	23	Escanaba
Gwinn	Dead Horse Moraines	1	Whitefish
Gwinn	Dead Horse Moraines	2	Whitefish
Gwinn	Dead Horse Moraines	3	Whitefish
Gwinn	Dead Horse Moraines	5	Whitefish
Gwinn	Dead Horse Moraines	6	Whitefish
Gwinn	Dead Horse Moraines	7	Whitefish
Gwinn	Dead Horse Moraines	8	Whitefish
Gwinn	Dead Horse Moraines	9	Whitefish
Gwinn	Dead Horse Moraines	10	Whitefish
Gwinn	Dead Horse Moraines	11	Whitefish
Gwinn	Dead Horse Moraines	12	Whitefish
Gwinn	Dead Horse Moraines	15	Chocolay
Gwinn	Dead Horse Moraines	17	Whitefish
Gwinn	Dead Horse Moraines	24	Escanaba
Gwinn	Dead Horse Moraines	25	Escanaba
Gwinn	Dead Horse Moraines	28	Rapid
Gwinn	Dead Horse Moraines	75	Escanaba
Gwinn	Dead Horse Moraines	76	Escanaba
Gwinn	Dead Horse Moraines	79	Escanaba
Gwinn	Dead Horse Moraines	80	Escanaba
Gwinn	Dead Horse Moraines	81	Escanaba
Gwinn	Dead Horse Moraines	90	Whitefish
Gwinn	Dead Horse Moraines	91	Whitefish
Gwinn	Dead Horse Moraines	92	Whitefish
Gwinn	Dead Horse Moraines	93	Whitefish
Gwinn	Dead Horse Moraines	281	Chocolay
Gwinn	Huron Mountains	201	Iron (Yellow Dog)

Management Unit	Management Area	Compartment	Stream Name
Gwinn	Huron Mountains	202	Iron (Yellow Dog) & Undesignated
Gwinn	Huron Mountains	203	Undesignated
Gwinn	Huron Mountains	204	Undesignated
Gwinn	Huron Mountains	298	Iron (Yellow Dog) & Undesignated
Gwinn	Michigamme Reservoir	247	Menominee
Gwinn	North Menominee Moraines	87	Escanaba
Gwinn	North Menominee Moraines	88	Escanaba
Gwinn	Palmer Moraine	30	Escanaba
Gwinn	Palmer Moraine	32	Escanaba
Gwinn	Palmer Moraine	277	Escanaba
Gwinn	Palmer Moraine	278	Escanaba
Gwinn	Palmer Moraine	279	Escanaba
Gwinn	Peshekee Highlands	215	Escanaba
Gwinn	Peshekee Highlands	304	Dead
Gwinn	Ralph Ground Moraine	51	Escanaba
Gwinn	Ralph Ground Moraine	52	Escanaba
Gwinn	Ralph Ground Moraine	53	Escanaba
Gwinn	Ralph Ground Moraine	57	Escanaba
Gwinn	Ralph Ground Moraine	58	Escanaba
Gwinn	Ralph Ground Moraine	60	Escanaba
Gwinn	Ralph Ground Moraine	61	Escanaba
Gwinn	Ralph Ground Moraine	63	Escanaba
Gwinn	Ralph Ground Moraine	64	Escanaba
Gwinn	Ralph Ground Moraine	65	Escanaba
Gwinn	Ralph Ground Moraine	66	Escanaba
Gwinn	Ralph Ground Moraine	67	Escanaba
Gwinn	Ralph Ground Moraine	72	Escanaba
Gwinn	Ralph Ground Moraine	73	Escanaba
Gwinn	Ralph Ground Moraine	74	Escanaba
Gwinn	Sand River Lake Plain	289	Undesignated
Gwinn	Sand River Lake Plain	290	Undesignated
Gwinn	Sand River Lake Plain	291	Undesignated
Gwinn	Sand River Lake Plain	292	Undesignated
Gwinn	Sands Plains	31	Escanaba
Gwinn	Sands Plains	273	Chocolay
Gwinn	Sands Plains	274	Chocolay
Gwinn	Voelker Plains	218	Escanaba
Gwinn	Voelker Plains	219	Escanaba
Gwinn	Voelker Plains	220	Escanaba
Gwinn	Voelker Plains	221	Escanaba
Gwinn	Voelker Plains	227	Escanaba
Gwinn	Voelker Plains	228	Escanaba
Gwinn	Voelker Plains	229	Escanaba
Gwinn	Voelker Plains	255	Escanaba
Gwinn	Yellowdog Plains	205	Undesignated
Gwinn	Yellowdog Plains	206	Iron (Yellow Dog)
Gwinn	Yellowdog Plains	207	Iron (Yellow Dog) & Undesignated