Eastern 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 (MA) 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_232151_7.pdf

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

http://www.michigan.gov/documents/dnr/Management_Areas_for_the_Eastern_Upper_Peninsula_Ecoregion_271770_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_241968_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
	1. Administrative and Legal Factors	
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
	2. Accessibility Factors	
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

350 Parks/Golf Courses

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

4199 Other Mixed Upland Deciduous

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 Covertype Category	RAD Tools output IFMAP/OI Cross-Inventory Covertype
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	212	Non-tilled Herbaceous	G	Non-tilled Herbaceous	Cropland

	Agriculture		Agriculture		Agriculture	
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	**6129**	Mixed Coniferous	**Q**	Lowland Conifers	Lowland Conifers

	Forest		Lowland Forest			
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

IF GREATER THAN 10% of the land area is covered with man-made structures including parking lots and paved or gravel roads THEN

Urban (1)

IF URBAN and GREATER THAN >25% of the land area is solid impervious cover from man-made materials THEN

High Intensity Urban (12)

IF High Intensity Urban within airport grounds including runways THEN

Airport (121)

IF High Intensity Urban, NOT Airport, but IS road or parking lot THEN

Road/Parking Lot (122)

ELSE (is High Intensity Urban but not above)

Other High Intensity Urban (123)

ELSE (i.e. URBAN and LESS THAN 25% is solid impervious cover)

Low Intensity Urban (11)

ELSE IF land area has > 75% open water THEN

Water (5)

Water (50)

ELSE IF the vegetation is intensively managed for vegetation production excluding forestry THEN

Agriculture (2)

IF AGRICULTURE and LESS THAN 25% of the vegetation is woody THEN

Herbaceous Agriculture (21)

IF Herbaceous Agriculture is tilled for crop production THEN

Cropland (211)

IF Cropland and LESS THAN 25% of land area is vegetated THEN

Non-vegetated Farmland (2111)

IF Cropland and GREATER THAN 25% vegetated, and vegetation is annual crops planted in rows (e.g. corn, soybeans, etc) THEN

Row Crops (2112)

IF Cropland, not above, and vegetation is used for fodder production, alfalfa and hay, THEN

Forage Crops (2113)

ELSE **Other Cropland (2114)**

ELSE IF Herbaceous Agriculture and vegetation is not tilled (includes pasture) THEN

Non-tilled Herbaceous Agriculture (212)

ELSE (Agriculture and GREATER THAN 25% of the vegetation is woody) THEN

Non Herbaceous Agriculture (22)

IF woody trees are grown for Christmas tree production THEN

Christmas trees (221)

ELSE **Orchards/Vineyards/Nursery (222)**

ELSE IF the ground area is LESS THAN 25% vegetated THEN

Bare / Sparsely Vegetated (7)

IF formed from sand or bare soil THEN

Sand, Soil (710)

ELSE IF formed from solid rock THEN

Exposed Rock (720)

ELSE IF periodically flooded THEN

Mud Flats (730)

ELSE **Other Bare/Sparsely Vegetated (790)**

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

Upland Openland (3)

IF maintained for recreational purposes THEN

Parks and Golf Courses (350)

ELSE IF GREATER THAN 15% of the ground is covered by tree canopy then

Low-Density Trees (330)

IF AT LEAST 60% tree canopy is in Deciduous species THEN

Low Density Deciduous Trees (3301)

ELSE IF AT LEAST 60% tree canopy is in Coniferous species then

Low Density Coniferous Trees (3302)

ELSE IF low density trees but not above THEN

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 (*Sorgastrum 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% Northen 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)
EISE 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 Criterial 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 Criterial	
		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 Crtieria 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 be 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 (ft^2) 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.

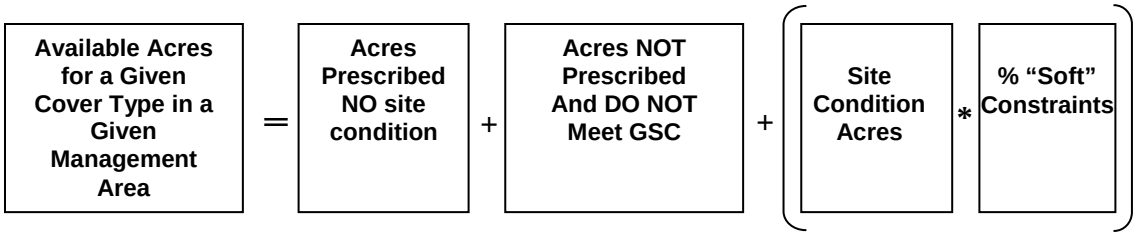
The operations inventory system had eight scenarios regarding site conditions, general silvicultural criteria (GSC) and prescribed harvests:

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).

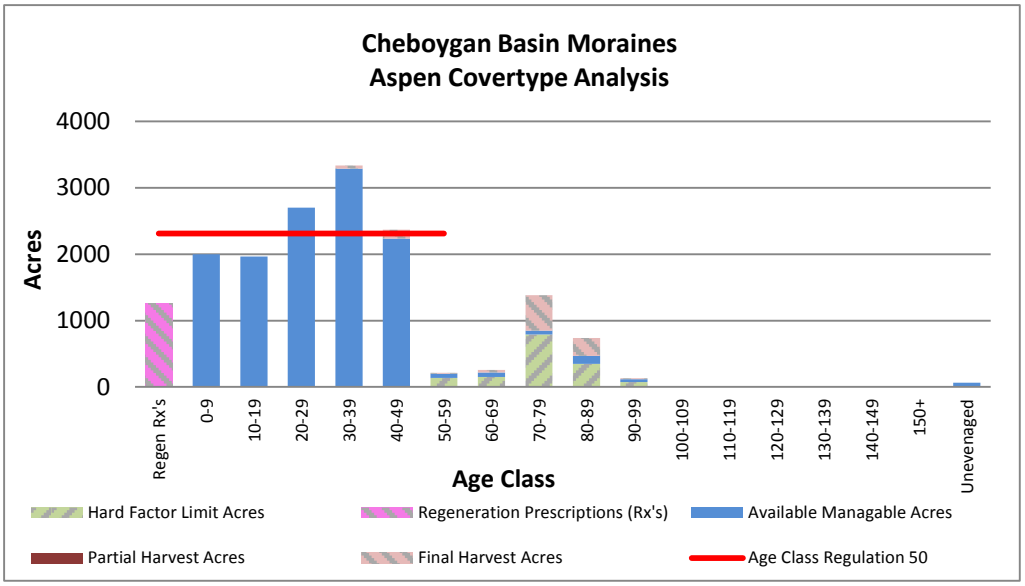


Figure 1. An example of the aspen age-class distribution graph generated by the model for the Cheboygan Basin Moraines management area.

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.

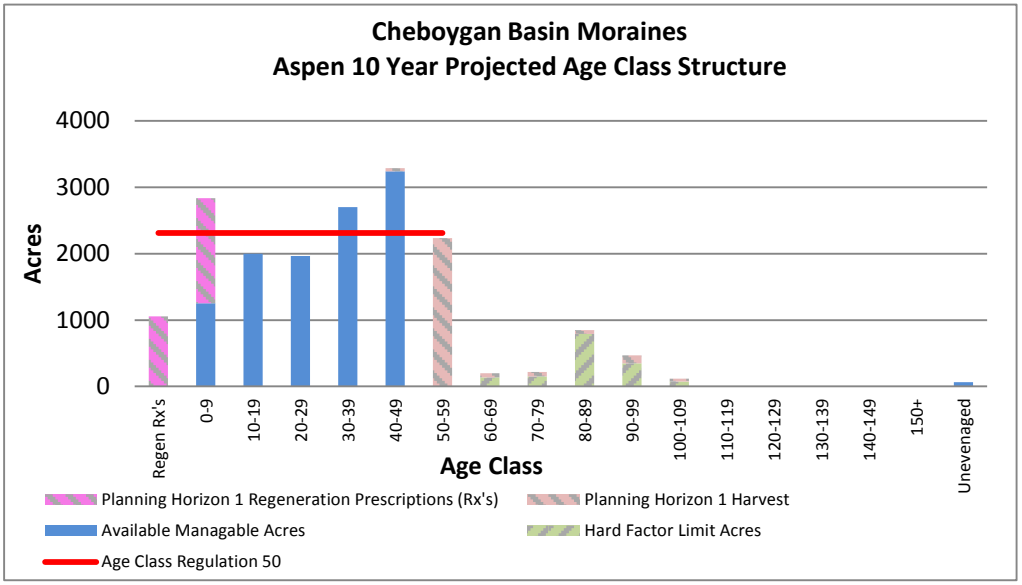


Figure 2. An example age class-structure graph for aspen in the Cheboygan Basin Moraines management area in 10 years.

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.

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

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:

Acres Available for Partial Harvest = **Given % of acres < GSC using Basal Area Range** + (**100% of the acres > GSC (including not coded with Basal Area Range)** - **Acres currently prescribed for restart harvest**)

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%	0%	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

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.

					10 Year Projected Harvest (Acres)			Projected	Desired Future Harvest (Acres)	
Cover Type	Cover %	Current Acreage	Hard Factor Limited Acres	Manageable Acres	Final Harvest	Partial Harvest	Projected Net Change (Acres)	Acreage in 10 Years	Final Harvest	Partial Harvest
Aspen	37%	15,361	1,501	13,860	2,636			15,361	2,310	
Red Pine	11%	4,652	271	4381	1,310	1,427		4,652	487	2,216
Northern Hardwood	7%	2,816	50	2766		1,311		2,816		1,311
Lowland Conifers	6%	2,372	776	1596	177			2,372	177	
Oak	5%	1,915	878	1037	191	289		1,915	115	296
Cedar	4%	1,738	35	1703	106			1,738	106	
Lowland Aspen/Balsam Poplar	4%	1,695	865	830	264			1,695	139	
Jack Pine	4%	1,684	430	1254				1,684	179	
Lowland Deciduous	3%	1,097	274	823	91			1,097	91	
Upland Open/Semi-Open Lands	6%	2,579		2579				2,579		
Lowland Open/Semi-Open Lands	6%	2,464		2464				2,464		
Misc Other (Water, Local, Urban)	1%	313	0	313				313		
Others	7%	3,107	477	2630	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
Newberry	8 Mile Corner	85	Tahquamenon
Newberry	8 Mile Corner	86	Tahquamenon
Newberry	8 Mile Corner	90	Tahquamenon
Newberry	8 Mile Corner	102	Tahquamenon
Newberry	County Line Hardwoods	125	Tahquamenon
Newberry	Danaher Kingston Outwash	93	Tahquamenon & Manistique
Newberry	Danaher Kingston Outwash	94	Manistique
Newberry	Danaher Kingston Outwash	95	Manistique
Newberry	Danaher Kingston Outwash	96	Manistique
Newberry	Danaher Kingston Outwash	97	Manistique
Newberry	Deer Park	2	Sucker
Newberry	Deer Park	3	Two Hearted
Newberry	Deer Park	7	Two Hearted
Newberry	Deer Park	8	Two Hearted
Newberry	Deer Park	15	Two Hearted
Newberry	Deer Park	30	Two Hearted
Newberry	Deer Park	31	Two Hearted
Newberry	Deer Park	34	Two Hearted
Newberry	Deer Park	35	Two Hearted
Newberry	Deer Park	36	Two Hearted
Newberry	Deer Park	37	Two Hearted
Newberry	Deer Park	38	Undesignated
Newberry	Deer Park	39	Undesignated
Newberry	Deer Park	40	Undesignated
Newberry	Deer Park	41	Undesignated
Newberry	Deer Park	42	Undesignated
Newberry	Deer Park	45	Undesignated
Newberry	Fox River Complex	98	Manistique
Newberry	Fox River Complex	100	Manistique
Newberry	Sage Truck Trail	75	Tahquamenon
Newberry	Sage Truck Trail	76	Tahquamenon
Newberry	Sage Truck Trail	135	Tahquamenon
Newberry	Tahquamenon Basin Wetlands	70	Tahquamenon
Newberry	Tahquamenon Basin Wetlands	73	Tahquamenon
Newberry	Tahquamenon Basin Wetlands	99	Tahquamenon
Newberry	Tahquamenon Basin Wetlands	103	Tahquamenon
Newberry	Tahquamenon Basin Wetlands	104	Tahquamenon
Newberry	Tahquamenon Basin Wetlands	105	Tahquamenon
Newberry	Tahquamenon Basin Wetlands	118	Tahquamenon
Newberry	Tahquamenon Basin Wetlands	120	Tahquamenon
Newberry	Tahquamenon Basin Wetlands	121	Tahquamenon
Newberry	Tahquamenon Basin Wetlands	126	Tahquamenon
Newberry	Tahquamenon Basin Wetlands	128	Tahquamenon
Newberry	Tahquamenon Basin Wetlands	129	Tahquamenon
Newberry	Tahquamenon Basin Wetlands	130	Tahquamenon
Newberry	Tahquamenon Basin Wetlands	131	Tahquamenon
Newberry	Tahquamenon River Patterned Fens	28	Two Hearted
Newberry	Tahquamenon River Patterned Fens	84	Tahquamenon
Newberry	Two Hearted Headwaters	9	Two Hearted
Newberry	Two Hearted Headwaters	10	Two Hearted
Newberry	Two Hearted Headwaters	16	Two Hearted
Newberry	Two Hearted Headwaters	20	Two Hearted
Newberry	Two Hearted Headwaters	21	Two Hearted
Newberry	Two Hearted Headwaters	22	Two Hearted
Newberry	Whitefish Vermillion Point	53	Undesignated

Management Unit	Management Area	Compartment	Stream Name
Newberry	Whitefish Vermillion Point	54	Undesignated
Newberry	Whitefish Vermillion Point	55	Undesignated
Newberry	Whitefish Vermillion Point	57	Undesignated
Newberry	Whitefish Vermillion Point	62	Undesignated
Newberry	Whitefish Vermillion Point	63	Undesignated
Sault Ste. Marie	Carp River Red Pine	102	Brevoort
Sault Ste. Marie	Carp River Red Pine	103	Brevoort
Sault Ste. Marie	Carp River Red Pine	104	Carp
Sault Ste. Marie	Carp River Red Pine	105	Carp
Sault Ste. Marie	Carp River Red Pine	106	Carp
Sault Ste. Marie	Carp River Red Pine	107	Carp
Sault Ste. Marie	Carp River Red Pine	108	Carp
Sault Ste. Marie	Carp River Red Pine	109	Carp
Sault Ste. Marie	Carp River Red Pine	116	Carp
Sault Ste. Marie	Carp River Red Pine	117	Brevoort & Undesignated
Sault Ste. Marie	Carp River Red Pine	118	Brevoort
Sault Ste. Marie	Huron Patterned Outcrop	20	Undesignated
Sault Ste. Marie	Lake Michigan Shoreline	101	Brevoort
Sault Ste. Marie	Lake Michigan Shoreline	143	Undesignated
Sault Ste. Marie	Lake Michigan Shoreline	161	Undesignated
Sault Ste. Marie	Lake Michigan Shoreline	162	Undesignated
Sault Ste. Marie	Mackinac Mix	111	Carp
Sault Ste. Marie	Mackinac Mix	112	Brevoort & Carp
Sault Ste. Marie	Mackinac Mix	113	Brevoort & Carp
Sault Ste. Marie	Mackinac Mix	114	Brevoort & Carp
Sault Ste. Marie	Mackinac Mix	115	Brevoort & Carp
Sault Ste. Marie	Mackinac Mix	119	Brevoort & Carp
Sault Ste. Marie	Mackinac Mix	122	Brevoort & Undesignated
Sault Ste. Marie	Mackinac Mix	123	Brevoort
Sault Ste. Marie	Mackinac Mix	124	Brevoort & Carp
Sault Ste. Marie	Mackinac Mix	125	Brevoort
Sault Ste. Marie	Mackinac Mix	135	Tahquamenon
Sault Ste. Marie	Mackinac Mix	150	Tahquamenon
Sault Ste. Marie	Mackinac Mix	157	Undesignated
Sault Ste. Marie	Mackinac Mix	163	Undesignated
Sault Ste. Marie	Mackinac Mix	164	Undesignated
Sault Ste. Marie	Mackinac Mix	165	Undesignated
Sault Ste. Marie	Mackinac Mix	167	Undesignated
Sault Ste. Marie	Mackinac Mix	171	Undesignated
Sault Ste. Marie	North Rudyard	46	Undesignated
Sault Ste. Marie	Sage Truck Trail	128	Tahquamenon
Sault Ste. Marie	Sage Truck Trail	130	Tahquamenon
Sault Ste. Marie	Sage Truck Trail	131	Tahquamenon
Sault Ste. Marie	Sage Truck Trail	132	Tahquamenon
Sault Ste. Marie	Sage Truck Trail	133	Tahquamenon
Sault Ste. Marie	Sage Truck Trail	151	Tahquamenon
Sault Ste. Marie	Sage Truck Trail	152	Tahquamenon
Sault Ste. Marie	Sage Truck Trail	153	Tahquamenon
Sault Ste. Marie	Strickler Aspen	137	Undesignated
Sault Ste. Marie	Strickler Aspen	138	Undesignated
Sault Ste. Marie	Strickler Aspen	144	Undesignated
Sault Ste. Marie	Strickler Aspen	145	Undesignated
Sault Ste. Marie	Strickler Aspen	146	Undesignated
Sault Ste. Marie	Strickler Aspen	147	Undesignated
Sault Ste. Marie	Strickler Aspen	159	Undesignated
Sault Ste. Marie	Strickler Aspen	160	Undesignated
Shingleton	Bullock Ranch	114	Manistique
Shingleton	Bullock Ranch	115	Manistique
Shingleton	Bullock Ranch	118	Manistique
Shingleton	Bullock Ranch	123	Manistique

Management Unit	Management Area	Compartment	Stream Name
Shingleton	Bullock Ranch	125	Manistique
Shingleton	Bullock Ranch	130	Manistique
Shingleton	Bullock Ranch	149	Manistique
Shingleton	Bullock Ranch	150	Manistique
Shingleton	Cusino Complex	145	Manistique
Shingleton	Cusino Complex	146	Manistique
Shingleton	Cusino Complex	147	Manistique
Shingleton	Cusino Complex	148	Manistique
Shingleton	Cusino Complex	166	Manistique
Shingleton	Danaher Kingston Outwash	105	Manistique
Shingleton	Danaher Kingston Outwash	106	Manistique
Shingleton	Danaher Kingston Outwash	107	Manistique
Shingleton	Danaher Kingston Outwash	108	Manistique
Shingleton	Danaher Kingston Outwash	109	Manistique
Shingleton	Danaher Kingston Outwash	111	Manistique
Shingleton	Danaher Kingston Outwash	128	Manistique
Shingleton	Danaher Kingston Outwash	129	Manistique
Shingleton	Danaher Kingston Outwash	131	Manistique
Shingleton	Danaher Kingston Outwash	139	Manistique
Shingleton	Danaher Kingston Outwash	140	Manistique
Shingleton	Danaher Kingston Outwash	141	Manistique
Shingleton	Danaher Kingston Outwash	143	Manistique
Shingleton	Danaher Kingston Outwash	144	Manistique
Shingleton	Deer Park	102	Sucker
Shingleton	Deer Park	103	Sucker
Shingleton	Deer Park	104	Sucker
Shingleton	Fox River Complex	2	Manistique
Shingleton	Fox River Complex	3	Manistique
Shingleton	Fox River Complex	4	Manistique
Shingleton	Fox River Complex	5	Manistique
Shingleton	Fox River Complex	6	Manistique
Shingleton	Fox River Complex	110	Manistique
Shingleton	Fox River Complex	112	Manistique
Shingleton	Fox River Complex	113	Manistique
Shingleton	Fox River Complex	124	Manistique
Shingleton	Garden Thompson Plains	86	Fishdam
Shingleton	Garden Thompson Plains	87	Fishdam
Shingleton	Pictured Rocks Buffer	132	Undesignated
Shingleton	Pictured Rocks Buffer	168	Undesignated
Shingleton	Pictured Rocks Buffer	169	Undesignated
Shingleton	Pictured Rocks Buffer	174	Undesignated
Shingleton	Pictured Rocks Buffer	175	Undesignated
Shingleton	Pictured Rocks Buffer	176	Undesignated
Shingleton	Seney Manistique Swamp	151	Manistique
Shingleton	Seney Manistique Swamp	152	Manistique