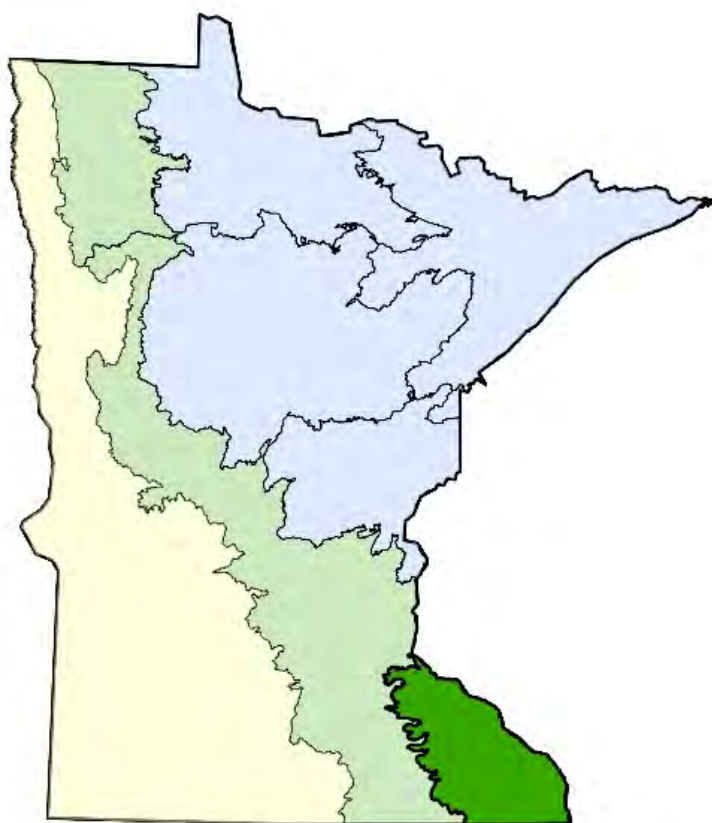


Paleozoic Plateau

Section Forest Resource Management Plan

Section Assessment and Conditions

Prepared 2021



DRAFT

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Chapter 1. Purpose and Planning Area

Purpose of the assessment

This document provides context for the Paleozoic Plateau ¹ Section Forest Resource Management Plan (PP SFRMP). While SFRMPs provide direction for forest resource management on state-administered land only, they are developed considering conditions across all ownerships. This assessment documents forest resource conditions and trends across all ownerships in the PP Section, followed by conditions and trends on state-administered land. This information helps planners to develop management guidance, land managers to understand the broader context they work within, and the public to understand the environment within which the DNR plans and carries out management.

Introduction to the planning area

The Paleozoic Plateau Section (PP) is a rugged region of bluffs and valleys that is quite different from the rest of the state. Although originally a plateau underlain by rather flat-lying sedimentary rocks of the Paleozoic Era, in the past 10,000 years, the landscape has been highly eroded and dissected by streams and rivers tributary to the Mississippi River, such as the Root, Whitewater, Zumbro, and Cannon rivers and their predecessors. It covers approximately 2.6 million acres in the south east corner of Minnesota. This section also contains a considerable amount of deciduous forest and woody wetlands(roughly 25.7% of the area). The diverse forests, rivers, and streams harbor numerous Species of Greatest Conservation Need (SGCN), including northern long-eared bats, Red-shouldered Hawks, and Blanding's turtles.

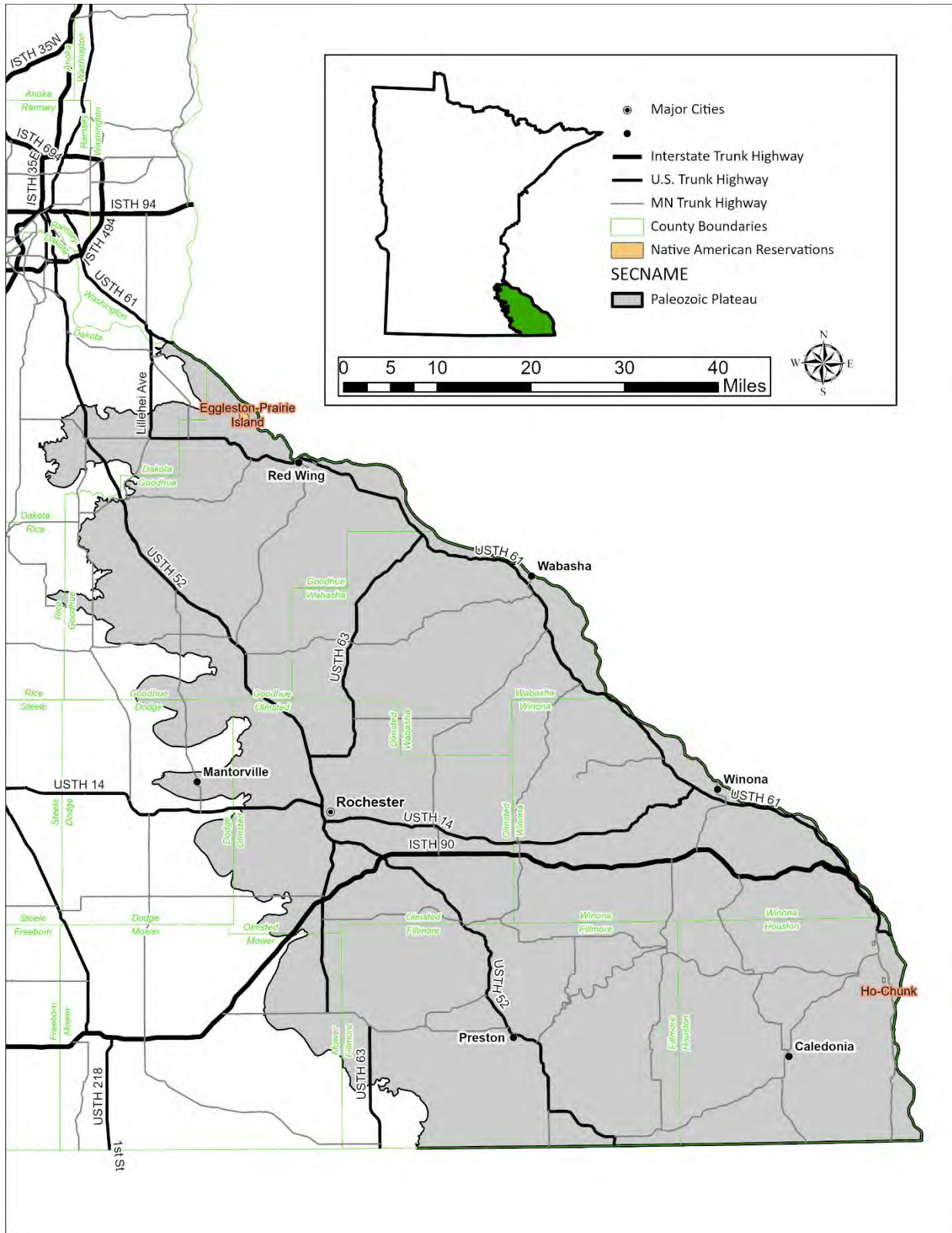
Timber production and sawmills are an important part of this Section, supplying a large amount of sawtimber and specialty log markets. There are over 24 portable and stationary sawmills within the Section and an additional 17 mills of various sizes located within 50 miles of the Section within MN.

Almost 95% of the land is in private ownership, with approximately 5.4% of the land in public ownership (federal, county, state). State ownership accounts for approximately 102,634 acres. The PP Section contains a small amount of land owned by two tribal nations: the Eggleston Prairie island Indian Community and the Ho-Chunk Nation located in the south east of the Section.

Much of the Section is rural, but the section does contain the cities of Rochester, Red Wing, and Caledonia. The primary land use within this section is agriculture, accounting for about 61% of the land use.

¹ Ecological sections are units defined in Minnesota's Ecological Classification System (ECS) by origin of glacial deposits, regional elevation, distribution of plants, and regional climate. For more information, visit [the DNR's ECS webpage](#).

Map 1- Location of Paleozoic Plateau Section



CHAPTER 2: Landscape Context

Land Cover Classification

The Paleozoic Plateau Section contains a variety of land cover classes. The most recent land cover information available, National land cover classification NLCD 2016, shows that the largest land use in PP is agriculture, with over 60% of the Section being covered by agricultural uses of hay, pasture, and cultivated crops. Forests and woody vegetation are the second largest land cover within the section covering 24% of the section. Table 1, Map 3, Map 4.

Table 1-National Land Cover Classes in the PP Section (NLCD 2016 data)

NLCD Land Cover Class	Acres	Percent
Open Water	53,436.6	2.0%
Developed, Open Space	89,317.1	3.4%
Developed, Low Intensity	54,724.9	2.1%
Developed, Medium Intensity	16,136.3	0.6%
Developed, High Intensity	5,114.3	0.2%
Barren Land	3,796.7	0.1%
Deciduous Forest	565,321.0	21.3%
Evergreen Forest	7,811.1	0.3%
Mixed Forest	62,214.3	2.3%
Shrub/Scrub	1,192.6	0.0%
Herbaceous	92,884.3	3.5%
Hay/Pasture	407,398.3	15.4%
Cultivated Crops	1,210,496.0	45.7%
Woody Wetlands	46,792.7	1.8%
Emergent Herbaceous Wetlands	32,898.0	1.2%
Total	2,649,534.2	100%

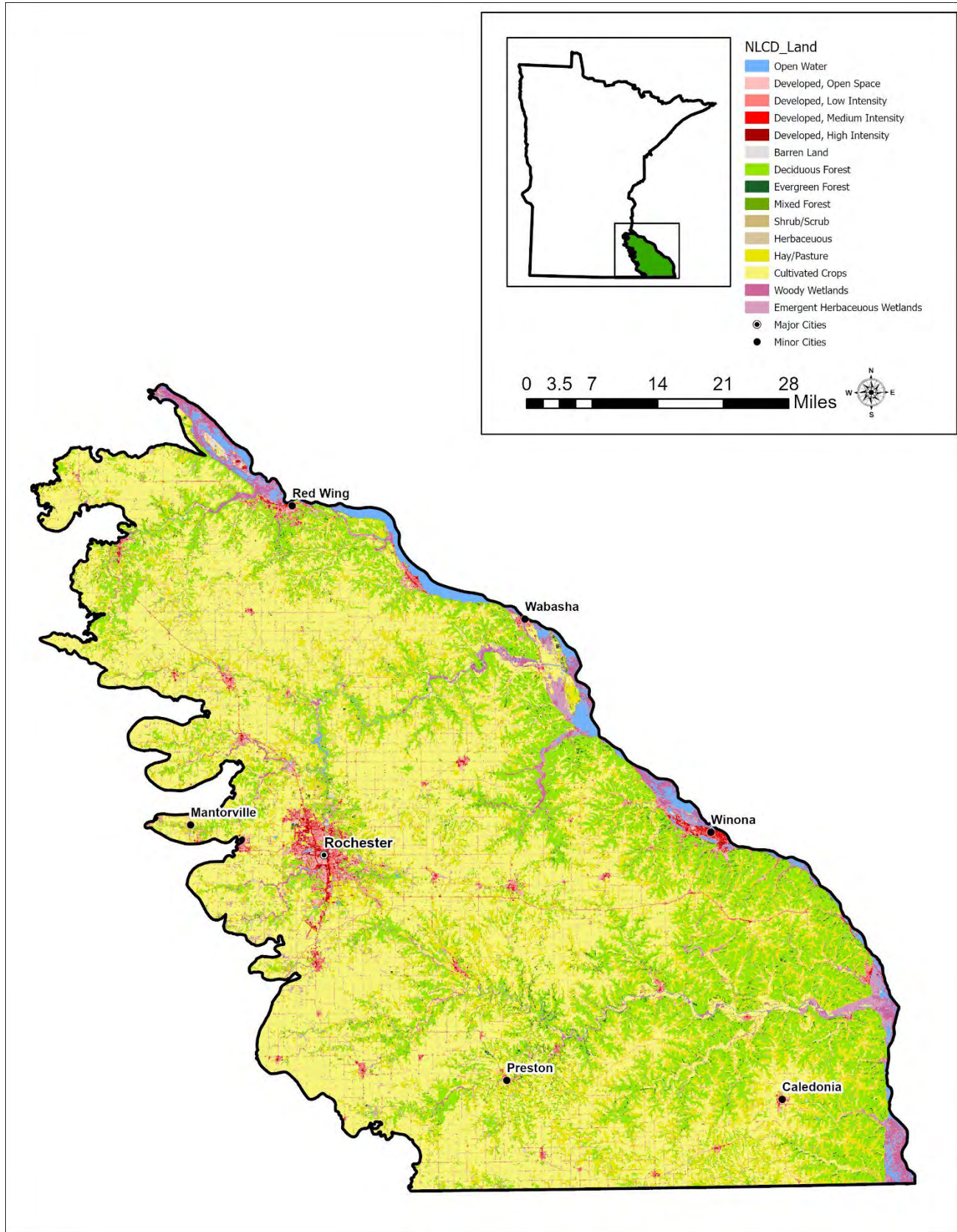
Land Ownership

The PP Section covers approximately 2.6 million acres. The majority of land (approximately 95%) is owned by private individuals (94.3% private land and 0.3 % private non-industry). Approximately 5.4% of the land in PP is public and administered by federal, county, or state government. With the State of Minnesota administering 3.9% of the land in the Section. Tribes and the Bureau of Indian Affairs own approximately <0.1% of the land in the PP Section. Table 2, Map 5, Map 6

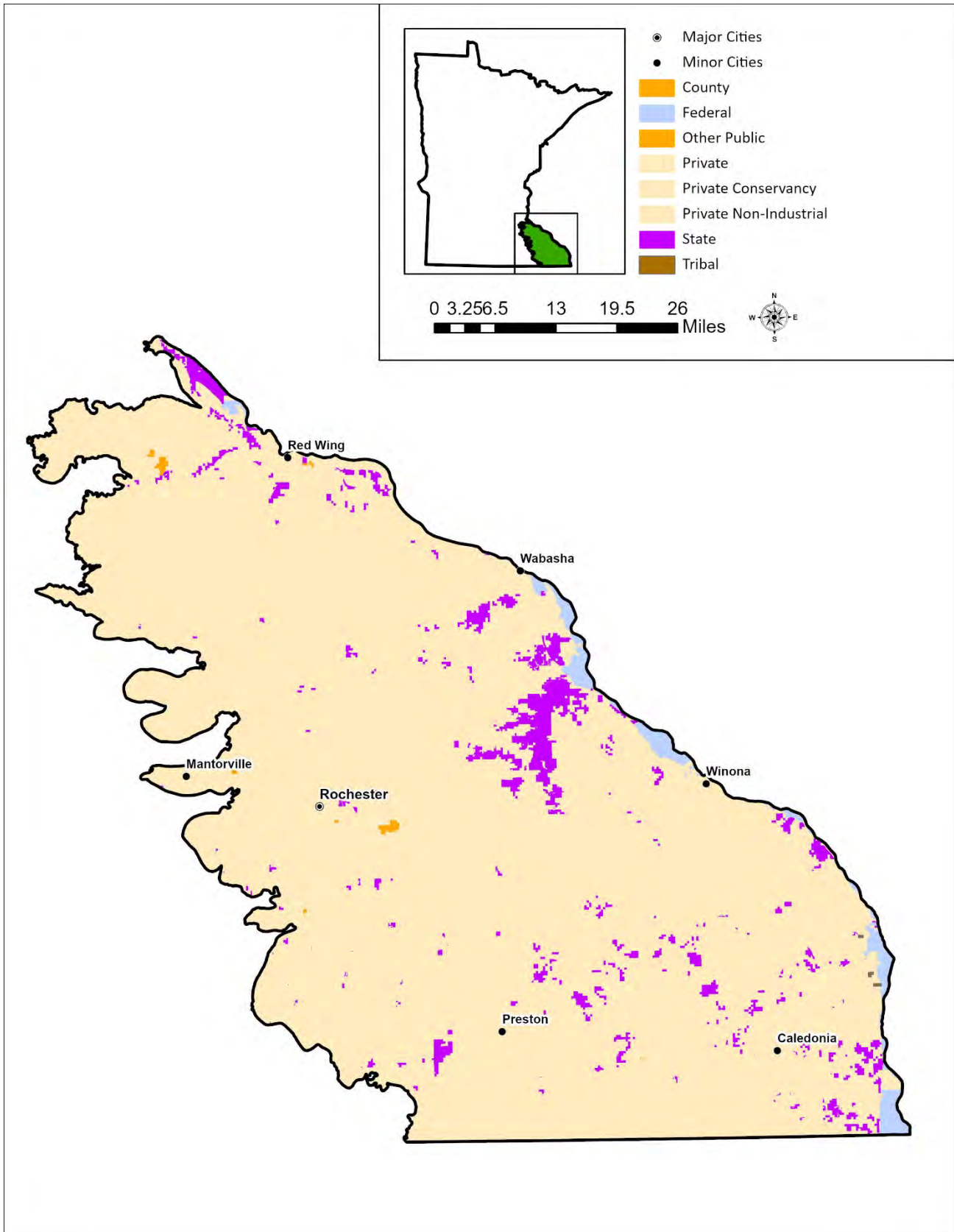
Table 2- Land ownership/administration in the PP Section in acres (2008 GAP Stewardship data for all ownerships)

Administrator Class	Acres	Percent
County/Other Public	3,528.4	0.1%
Federal	37,334.8	1.4%
Private	2,506,023.7	94.6%
State	102,634.8	3.9%
Tribal	329.7	<0.1%
Grand Total	2,649,534.2	100%

Map 2- PP Land Cover, 2016 National Land Cover Classification



Map 3 - PP – Land Ownership (GAP 2008)



Forest Cover Type Age Class Distributions

Estimates from USFS Forest Inventory Analysis (FIA) data show that the forest has grown older on average between the periods of 2009 and 2019. Across all ownerships, the acres of older forest increased compared to the acres of younger forest.

While, on average, the forest is getting older, there is still quite a bit of young forest on all lands within the PP section. With some cover types having more young forests than others. Table 3 shows the percentage of forest that is below and above the standard DNR even-aged rotation age applied to DNR forest lands managed under the SFRMP. Figure 1 to Figure 10 show the difference in 10-year age class distributions for forest cover types from 2009 and 2019 FIA data.

Table 3 - Percent of even age cover type above and below the youngest stand rotation age applied to SFRMP managed lands (2019 FIA data).

Species (lowest rotation age applied on SFRMP managed lands in even-aged management)	Percent Below rotation age	Percent Above rotation age
Aspen (RA 40)	33	67
Birch (RA 60)	53.2	46.8
Jack pine (RA 60)	40.7	59.3
Tamarack (RA 85)	100	0
Red pine plantation (RA 60)	100	0
Natural origin red pine (RA 115)	100	0
White pine plantation (RA 60)	94.3	5.7
Oak (RA 80)	30.4	69.6

Figure 1-Number of Acres of all species by 10-year age class. 2009 and 2019 FIA data.

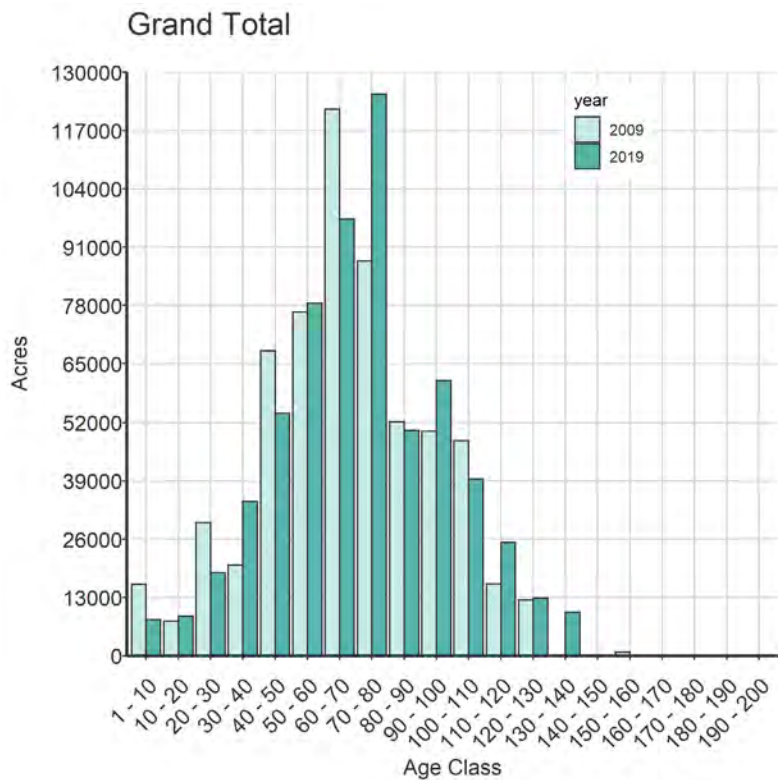


Figure 2- Number of Acres of Ash by 10-year age class. 2009 and 2019 FIA data.

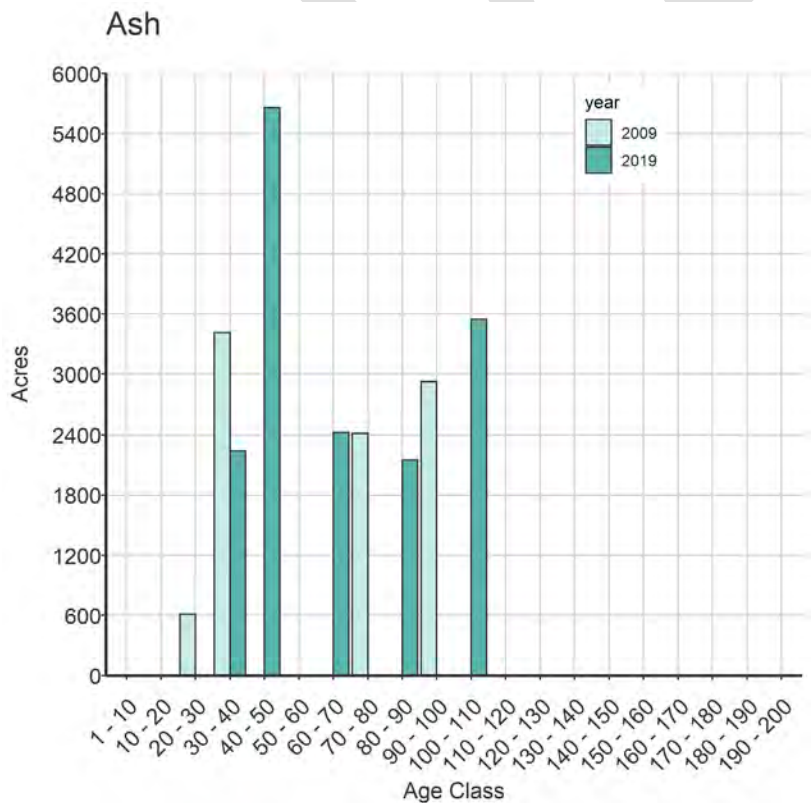


Figure 3-Number of Acres of Aspen by 10-year age class. 2009 and 2019 FIA data.

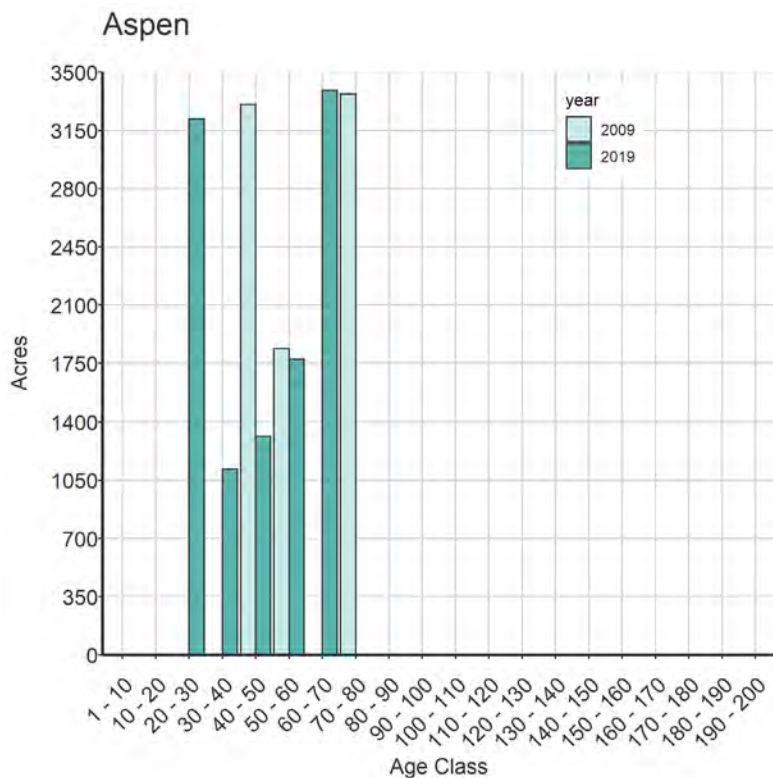


Figure 4-Number of Acres of Birch by 10-year age class. 2009 and 2019 FIA data.

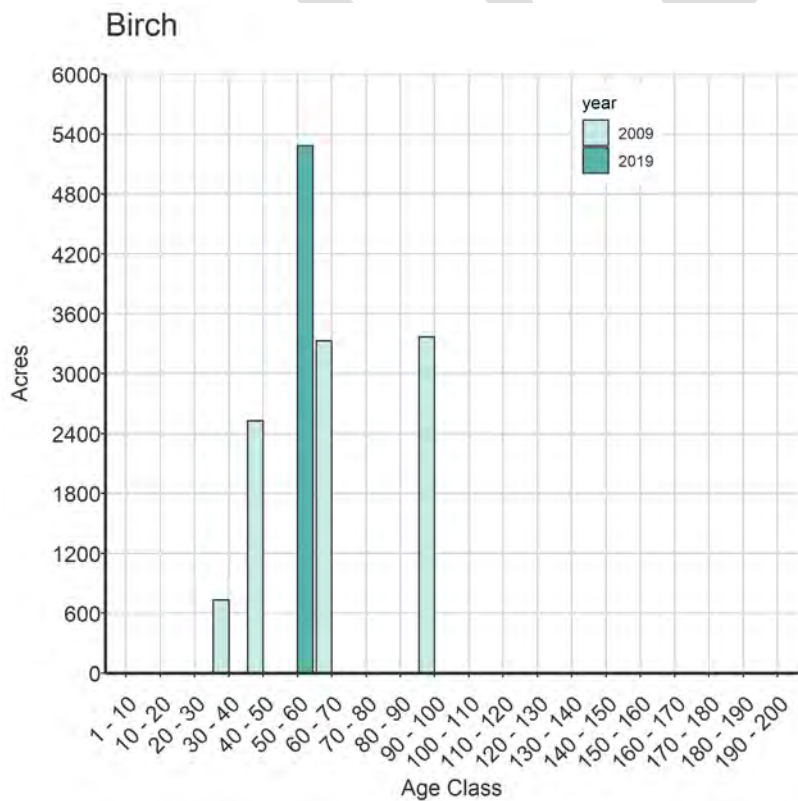


Figure 5-Number of Acres of Central Hardwoods by 10-year age class. 2009 and 2019 FIA data.

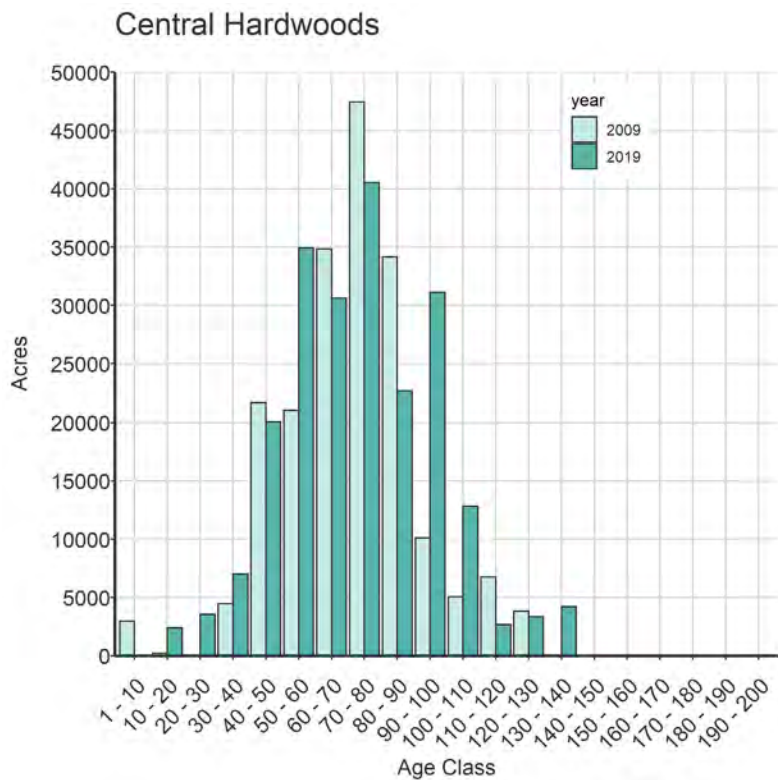


Figure 6-Number of Acres of Northern Hardwoods by 10-year age class. 2009 and 2019 FIA data.

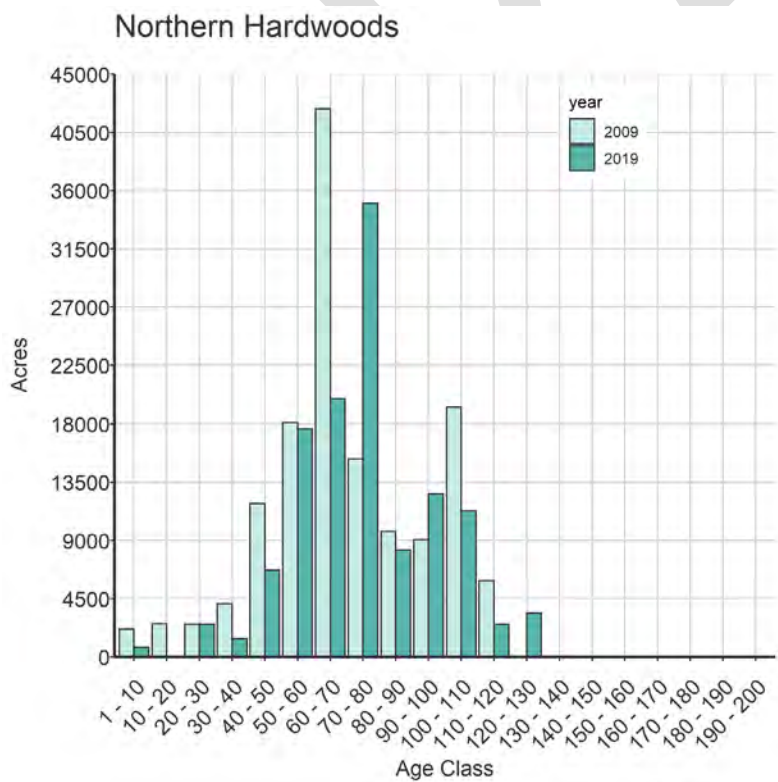


Figure 7-Number of Acres of Oak by 10-year age class. 2009 and 2019 FIA data.

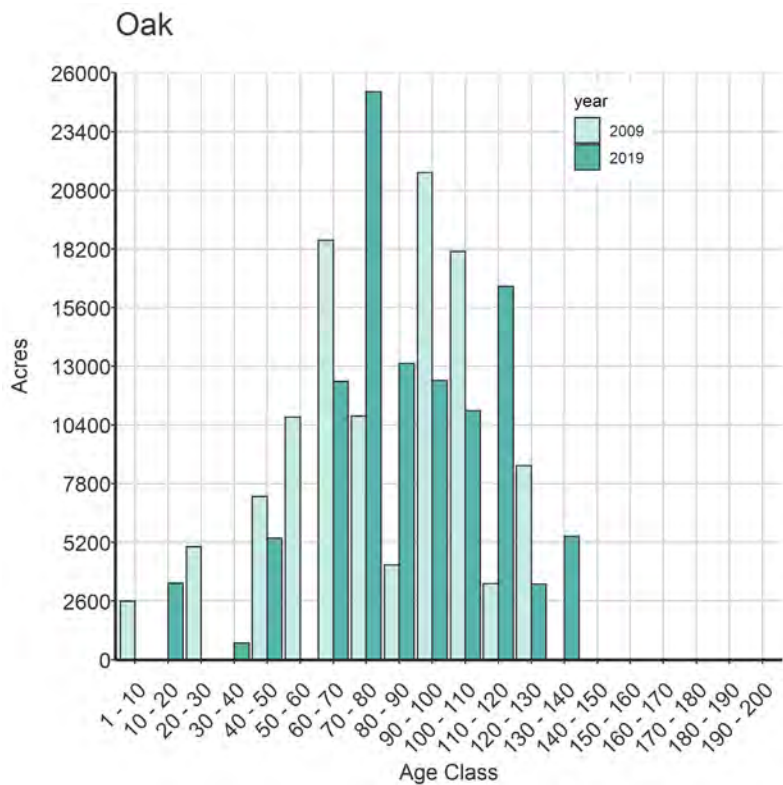


Figure 8-Number of Acres of Red Pine by 10-year age class. 2009 and 2019 FIA data

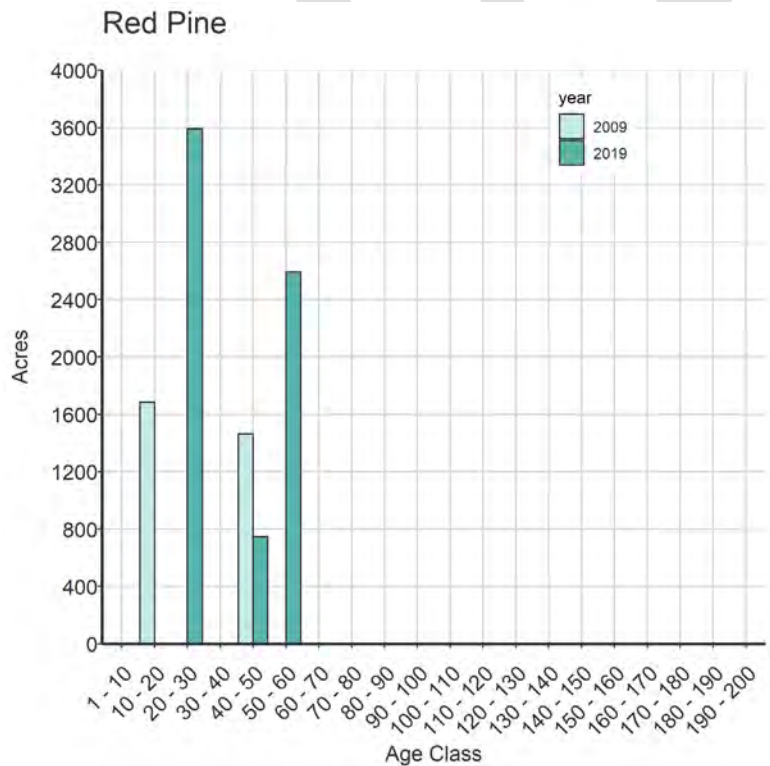


Figure 9-Number of Acres of Eastern Red Cedar by 10-year age class. 2009 and 2019 FIA data.

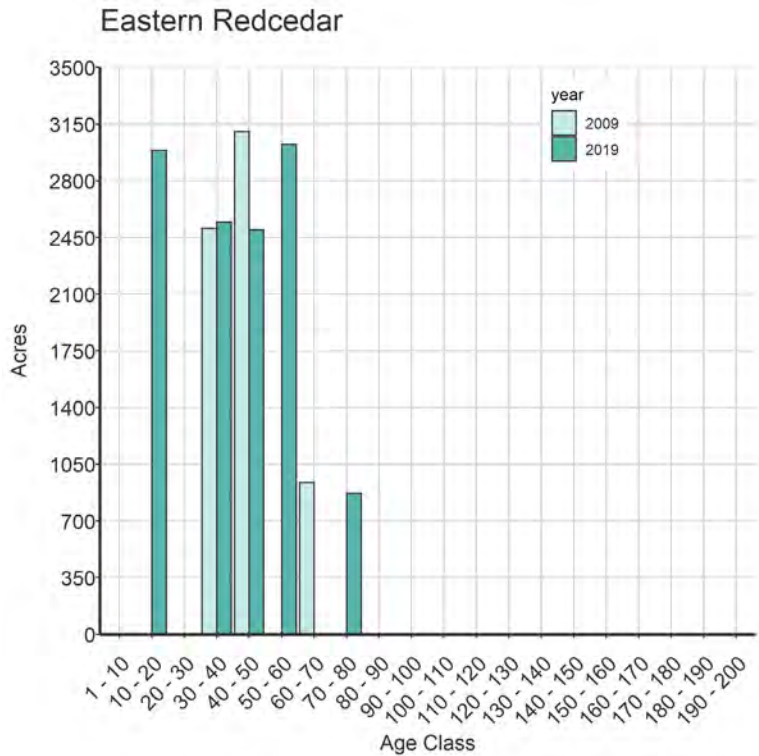


Figure 10-Number of Acres of Cottonwood by 10-year age class. 2009 and 2019 FIA data.

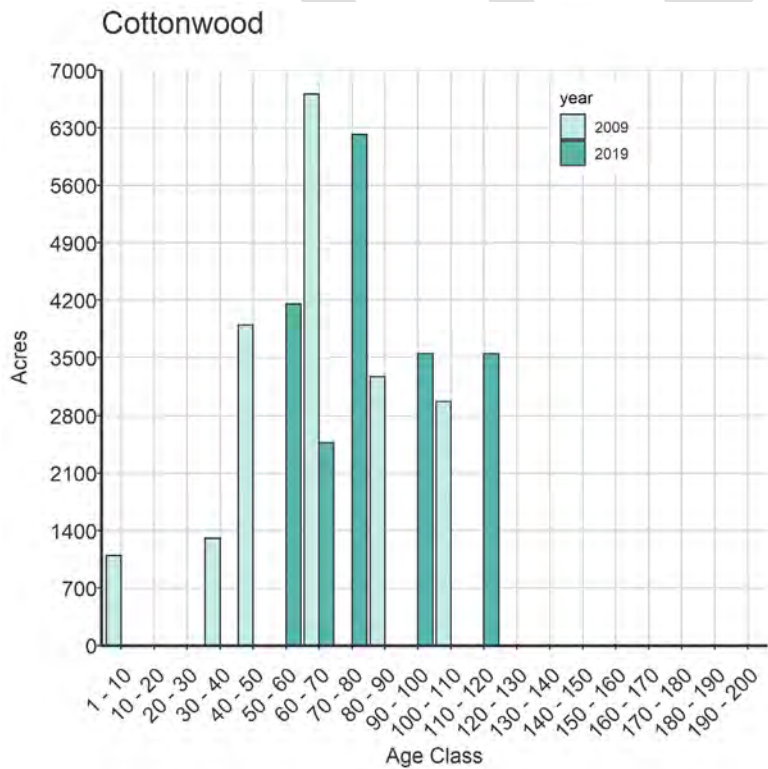


Figure 11-Number of Acres of Eastern White Pine by 10-year age class. 2009 and 2019 FIA data.

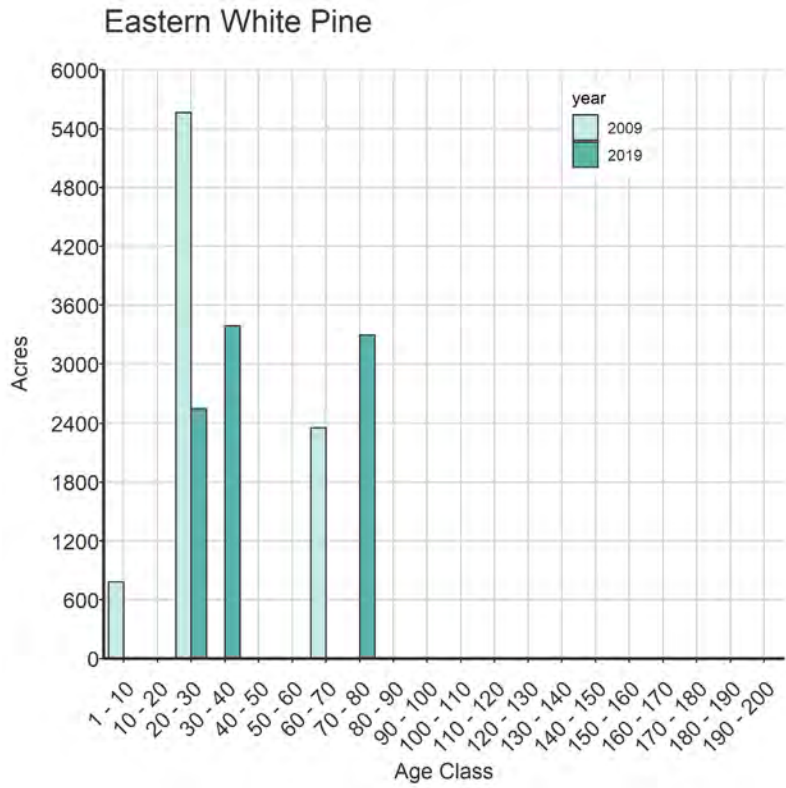


Figure 12-Number of Acres of Walnut by 10-year age class. 2009 and 2019 FIA data.

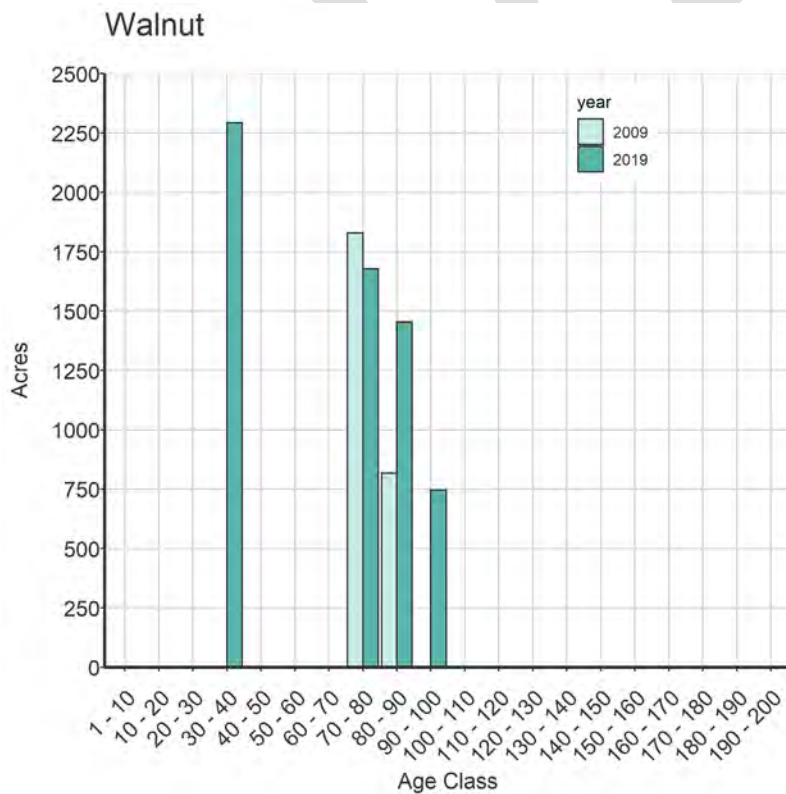


Figure 13-Number of Acres of Lowland Hardwoods by 10-year age class. 2009 and 2019 FIA data.

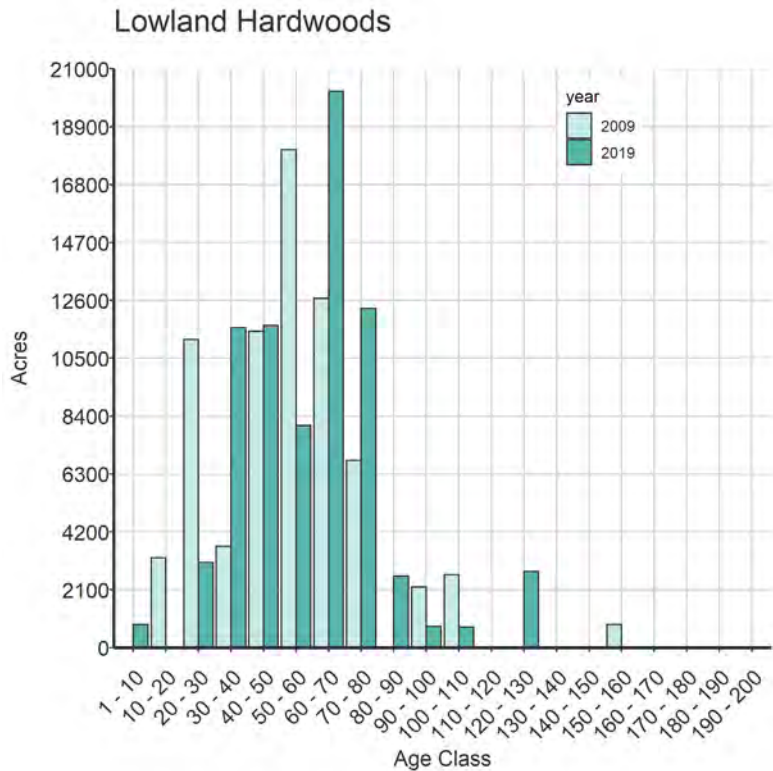
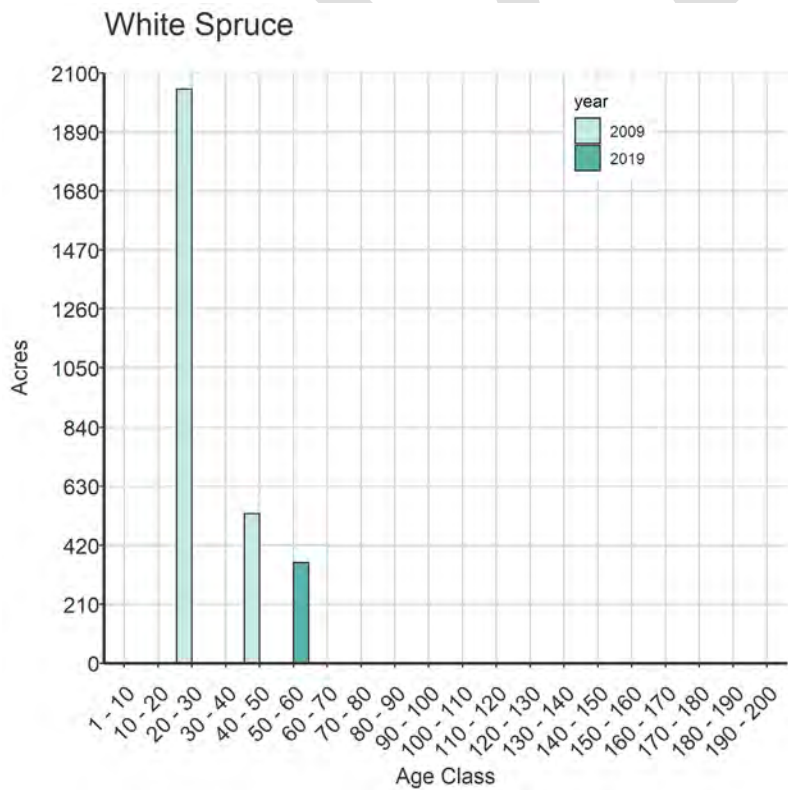


Figure 14-Number of Acres of White Spruce by 10-year age class. 2009 and 2019 FIA data.



Forest Biodiversity

Minnesota Biological Survey

The Minnesota Biological Survey (MBS) systematically collects, interprets, and delivers baseline data on the distribution and ecology of rare plants, rare animals, native plant communities, and functional landscapes needed to guide decision-making.

Currently, within the PP Section, there are 63,833 acres identified as MBS sites of outstanding significance and over 77,009 acres identified as high significance. These sites contain very good to the best occurrences of the rarest species and the most functional intact landscapes.

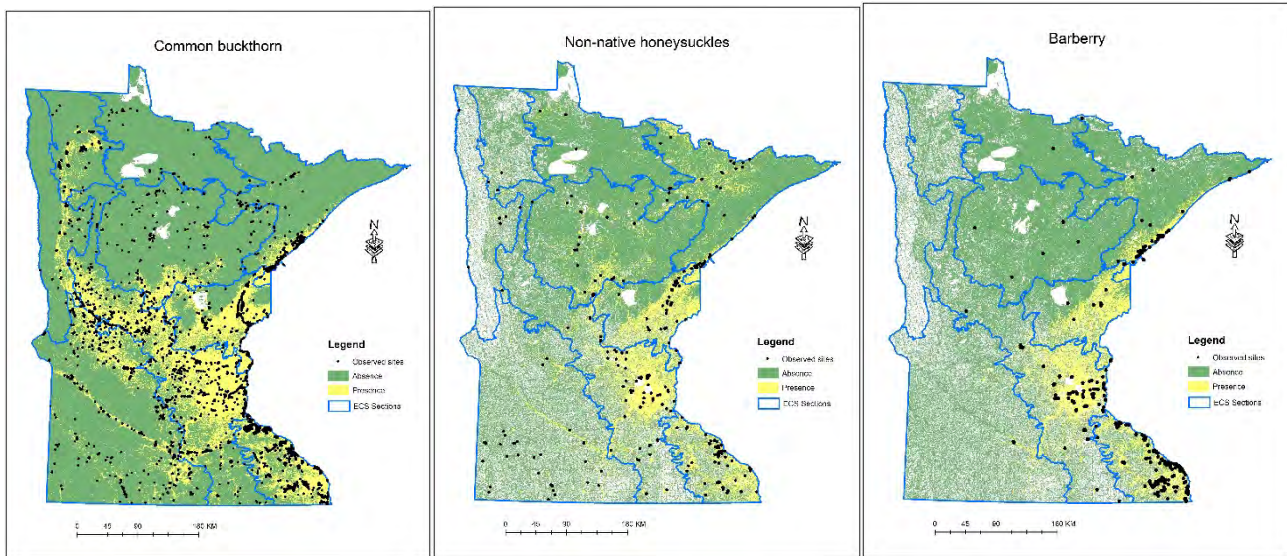
Table 4-Sites of biodiversity significance acres in the PP Section summarized by ranking, as of June 2020.

Rank	Number of Sites	Total Acres	Total state stand acres	Total state-managed acres
Outstanding	89	63,833	24,141	14,640
High	137	77,009	17,258	15,502
Moderate	420	200,504	30,278	28,049
Below	386	81,087	3,438	3,333

Invasive Species

Invasive species are species that are not native to Minnesota that causes economic or environmental harm or harm to human health or threaten natural resources or the use of natural resources in the state (Minnesota Statutes [84D.01](#)). Division of Forestry (DoF) manages invasive plants when they impact reforestation, wildlife habitat, recreation, and other values. Additionally, as landowners, DNR is required by law to eradicate or prevent the reproduction of certain invasive plants that are listed on the state [Noxious Weed list](#) (eradicate and control lists, respectively) wherever they are found on DNR property.

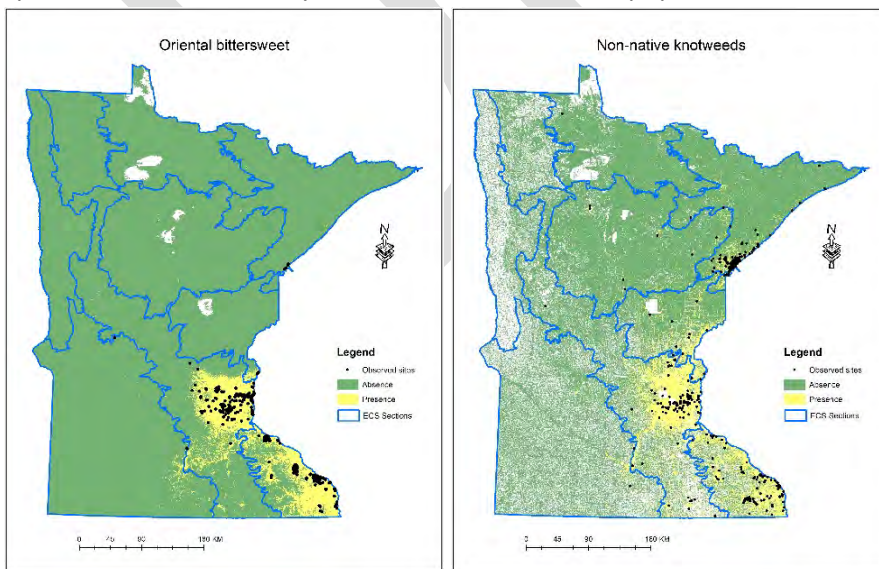
Many new invasives arrive in Minnesota and establish first in the southeastern part of the state, so the PP is often frontlines of new invasions. Detection and reporting of new invasive plants and action to rapidly respond to early-stage invasions are important to reduce the spread of new invaders further into the state and limit potential future problems. Due to its location, most of the invasive plants present in Minnesota can be found in the PP section. The most abundant species and those that are of greatest concern to Forestry are described below.



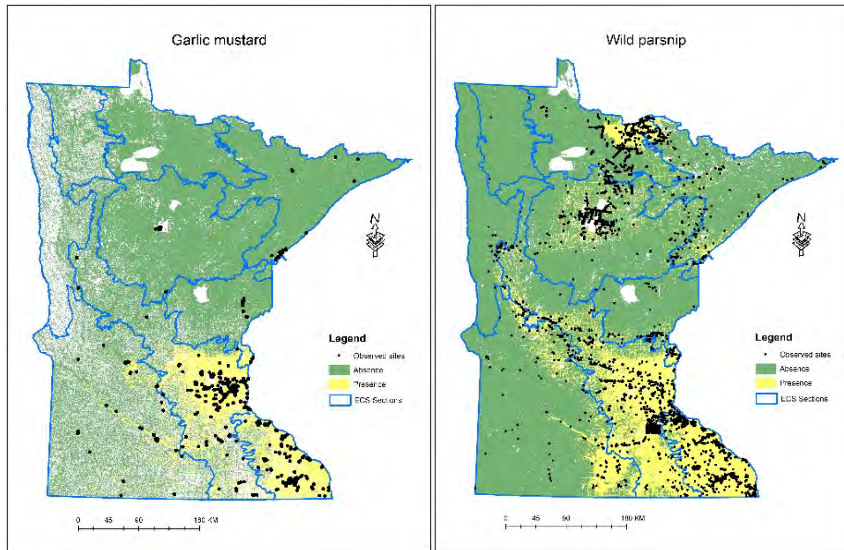
Common buckthorn is one of the most prevalent woody invasive plants in Minnesota. It grows in dense thickets, degrades habitat, and negatively impacts tree regeneration. It is expensive to manage buckthorn once it is established, so management by DoF is typically focused on stands listed for harvest in areas of dense buckthorn (because opening up the canopy can allow buckthorn to flourish and outcompete desirable tree seedlings). However, along the edges of buckthorn distribution, DoF treats scattered stems and isolated patches of buckthorn to prevent it from spreading and becoming a larger, more expensive problem locally. Buckthorn is widespread in the PP section.

Non-native bush honeysuckles and Japanese barberry are two other woody shrubs that are found growing densely in the PP section. These species are not as widespread as buckthorn, but they are species of concern to DoF and can cause issues with tree regenerations and require management.

Oriental bittersweet is a species of great concern to Forestry. It is currently found in isolated locations across the PP section, but some of these infestations are extensive, with large, established woody vines growing up trees – it can smother them and even pull them down. It is very difficult and costly to control. This species has the potential to spread much more widely across Minnesota if small populations are not contained.



Non-native knotweeds (giant, Japanese, and Bohemian knotweeds) are also of concern in the PP section. This bamboo-like plant forms dense stands and is very difficult and expensive to control. Multiple years of herbicide treatments are required, as the plant can resprout from even small pieces of the cut stem. There are many known populations scattered throughout the section. Knotweeds were planted in people's yards as ornamental plants and have since spread into nearby natural areas.



Herbaceous invasive plants, including wild parsnip and garlic mustard, are common in various parts of the PP section. DNR is required by the Noxious Weed Law to prevent reproduction and control the spread of wild parsnip, so DoF regularly mows and sprays herbicide along forest roads where these species proliferate. Wild parsnip is also a health hazard (its sap burns people's skin when exposed to sunlight), so management of this species is especially important along trails and recreation areas. Garlic mustard is an invader of shaded forest understories as well as sunny forest edges. It is found throughout the PP section, and research in other locations has shown it can decrease the growth and flowering of native wildflowers and other understory plants, with negative implications for wildlife and tourism. Current DoF practices focus on preventing the spread of garlic mustard's abundant, tiny seeds to other areas of the state through permit and contract language requiring vendors to arrive with clean equipment as well as PlayCleanGo outreach campaigns to the public to encourage cleaning footwear and gear of mud, seeds, and plant parts before heading to a new recreation location.

Reed canary grass is common in wet areas of the PP section. It can be found in wetlands, ditch banks, and floodplain forests. It can be especially problematic for foresters when it grows densely in floodplain forests because it inhibits tree regeneration and quickly overtop planted seedlings. Control of reed canary grass can be difficult and typically requires the use of chemicals.

More invasive plant populations keep being discovered, so in general, this issue appears to be getting worse. We also are aware of more populations of problematic invasive plants on DoF-administered lands than we have available funds and personnel or contractors to manage. Invasive species do not respect property boundaries, so working with neighboring landowners (private and public) and finding ways to fund management on lands adjacent to DNR forest lands is important to successful invasive plant management across the landscape.

Pathogens and insects

Included insects and diseases that can be managed at the site or landscape level or that have or will alter forest ecology across the landscape. We left out common tree health problems that are native and not manageable or not important for long-term forest health (e.g., forest tent caterpillar and bur oak blight).]

Health Problem	Within Paleozoic Plateau (PP)
Butternut Canker	X
Eastern Dwarf Mistletoe	
Eastern Larch Beetle	
Emerald ash borer	X
Heterobasidion root disease	X
Hickory bark beetle	X
<i>Ips</i> bark beetles of pine	X
Jack pine budworm	
Larch casebearer	
Oak decline	X
Oak wilt	X
Two lined Chestnut borer	X

Butternut canker

Butternut canker, caused by the non-native fungal pathogen *Ophiognomonia clavigignenti-juglandacearum*, has reduced butternut populations across Minnesota since the 1970s and was subsequently listed as a state endangered species. Butternut is not rare in southeast Minnesota, especially in narrow valleys along streams, and an occasional specimen can be found in upland forests. Almost every tree is diseased, though not always severely. Partial resistance *appears* to exist in a small percentage of butternuts, although research has not confirmed resistance. The pathogen that causes the canker cannot be managed, so the future of butternut depends on its ability to genetically evolve tolerance to the disease. The more flowers and fruit that butternut can make, the faster evolution occurs. One key to flowering in butternut is exposure to full sun. Butternut is intolerant of shade, so it is important for conservationists to expose butternut crowns at least partially to full sunlight by removing competing vegetation next to shaded butternut trees. Fortunately, many heavily cankered butternuts grown in full sunlight reach the nut-bearing age of approximately 20 years. Also, many healthy trees that resemble butternuts are hybrids of butternut (*Juglans cinerea*) and Japanese walnut (*Juglans ailantifolia*), introduced by settlers in the 1800s. It can be very difficult to distinguish pure, native butternuts from hybrid trees without genetic testing. These hybrids are not known to be invasive and may provide the canker resisting genes that butternuts need to thrive. Managers should stay informed of any restrictions or allowances that the DNR Division of Ecological and Water Resources creates to help protect and conserve the species.

Emerald ash borer

Emerald ash borer is a non-native cambium-feeding beetle discovered in Minnesota in 2009. It kills white, green, and black ash and is predicted to alter many black and green ash-dominated forests by the end of the 21st century in Minnesota, possibly converting wet forests to wet shrubland. As of 2022, most of the upland and lowland ash in southeast Minnesota has already been killed or is currently infested. The coldest areas of Minnesota will be impacted last. The water table in black ash stands will likely rise after emerald ash borer kills the majority of black ash trees, making tree regeneration of any species extremely challenging. Forest managers are encouraged to plant a diversity of tree species in ash-dominated stands before the borer's arrival in order to make the stand more resilient to infestation. Regeneration harvests of some black ash could encourage natural and artificial regeneration of other tree species. Updated occurrence maps can be seen at Minnesota Department of Agriculture's [Emerald Ash Borer Program website](#).

Heterobasidion root disease

Heterobasidion root disease was found once in Minnesota, in a red pine plantation in Winona County, where it was subsequently eradicated. It is found widely in Wisconsin, so forest managers need to be aware of the potential of Heterobasidion root disease being discovered again in Minnesota, where it could have devastating consequences in infected and nearby plantations if left untreated. Updated Heterobasidion maps and management strategies can be found at DNR forest health's [Heterobasidion root disease webpage](#).

Hickory bark beetle

The native hickory bark beetle (*Scolytus quadrispinosus*) has been associated with increasing numbers of dying hickories, particularly bitternut hickory, in southeast Minnesota and surrounding states for nearly two decades. Research has shown that beetle infestation is associated with a diffuse canker disease (i.e., a disease of bark and sapwood the tree is not able to compartmentalize) caused by the fungus *Ceratocystis smalleyi*. Symptoms appear no sooner than 12 months after infection or infestation, making it impossible to manage by controlling bark beetle populations. Hickory bark beetle does not attack hickory seedlings and small saplings. Researchers also noted that some hickories survived attack or infection near Rochester, and a six-state survey of professionals indicated that if hickory comprised less than 30% of trees in stand, hickory bark beetle would not reach devastating populations. Bitternut hickory's immediate future is not imperiled as long as it does not dominate the landscape, and it should be encouraged as a promising tree that adds diversity to the landscape in a future climate.

Pine bark beetles

Two common species of *Ips* bark beetles attack weakened pine trees or freshly cut logs or slash in Minnesota: *Ips pini* (pine engraver) and *I. grandicollis* (eastern fivespined ips). They prefer red and jack pine over white pine. Populations of these beetles have erupted into widespread outbreaks only during years of severe drought (e.g., 1988 in central Minnesota; 2021 in northwest Minnesota). They are easily managed during non-drought years by removing freshly cut logs when cut from late winter through the following August. Consult the Minnesota DNR's [pine bark beetle management](#) webpage for details.

Oak decline

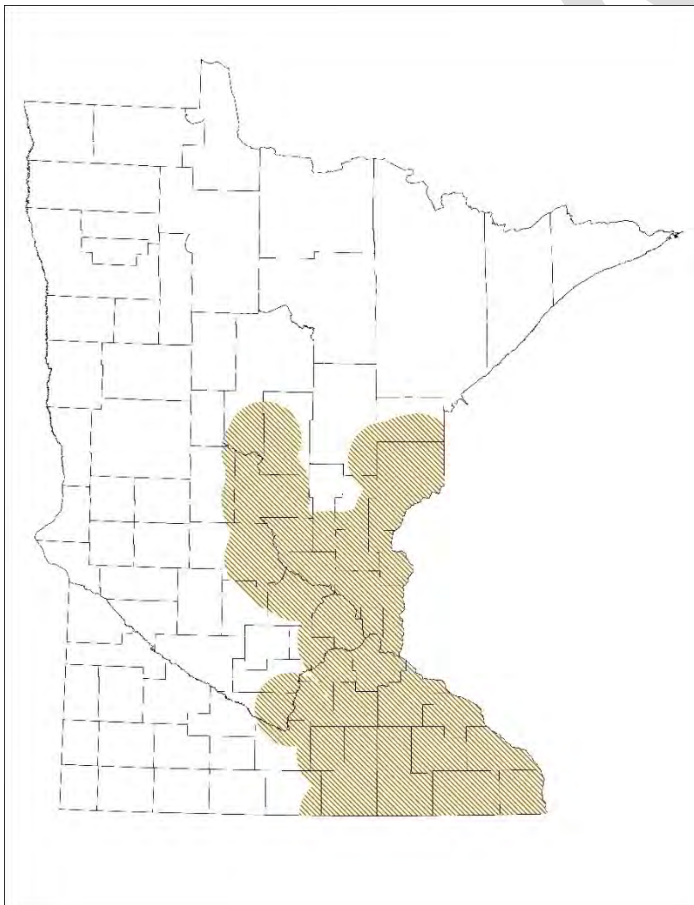
Older white and bur oaks across much of central and southern Minnesota, and older bur oaks in northwestern Minnesota, *may be* dying at higher rates than they once were. In some areas, decline is clearly associated with poorly drained zones in or near forests and recent wet growing seasons. As with aspen decline, oak decline is caused by

multiple factors. Declining oaks were predisposed to decline by old age along with poor site conditions and recent consecutive years of extreme precipitation or drought. Since age and climate induce decline, there is very little that can be done except to salvage timber and avoid intermediate stand treatments for a few years after weather stressors. The most concerning aspect of decline is difficulty regenerating oak. Frequently, in southeast and central Minnesota, affected declining forest understories are dominated by common buckthorn. Open the canopy to establish oak regeneration before final harvest by increasing prescribed burning along with successively thinning stands, in addition to controlling buckthorn.

Oak wilt

Oak wilt can infect and kill all species of oak, but those in the red oak group die about two months after infection. Oak wilt is widespread in the southern half of Minnesota and covers about 40% of the range of the red oak group (see map below, showing a 20-mile buffer around confirmed oak wilt disease centers). It continues to expand its range northward, and in 2021 was discovered in Cass and Crow Wing counties for the first time. For forests dominated by oak in oak wilt's range, oak wilt infections can be prevented by not wounding oaks in any way from early April through much of July. Find prevention and control details by consulting [oak wilt](#) and the [oak wilt guide](#).

Map 4- Oak Wilt Distribution



Twolined chestnut borer

Twolined chestnut borer is a native beetle that feeds on the inner bark of stressed oak trees. It can cause widespread dieback and mortality of oaks after prolonged droughts, windstorms, or severe and repeated defoliation events. Mortality from twolined chestnut borer can occur from one to three years after the stress event, with peak mortality occurring about two years after severe drought. Symptoms can resemble those of oak wilt; a distinctive difference is that dead leaves on oaks suffering from twolined chestnut borer hang on, but oak leaves rapidly fall from an oak branch infected with oak wilt. Damage from twolined chestnut borer outbreaks can be minimized by rotating oak stands at biological rotation ages and delaying intermediate silvicultural treatments for a few years after drought ends.

DRAFT

Chapter 3: DNR-administered lands

DNR-administered land

The DNR administers roughly 102,313 acres of land distributed across the PP section, according to the 2008 GAP analysis. The majority of DNR-administered lands are within small groupings across the Section. The largest contiguous block of DNR-administered land is within and around the Whitewater Wildlife Management Area. The majority of the DNR lands within the section are administered by the Division of Forestry and the division of Fish and Wildlife, with slightly more acres being administered by the Division of Forestry.

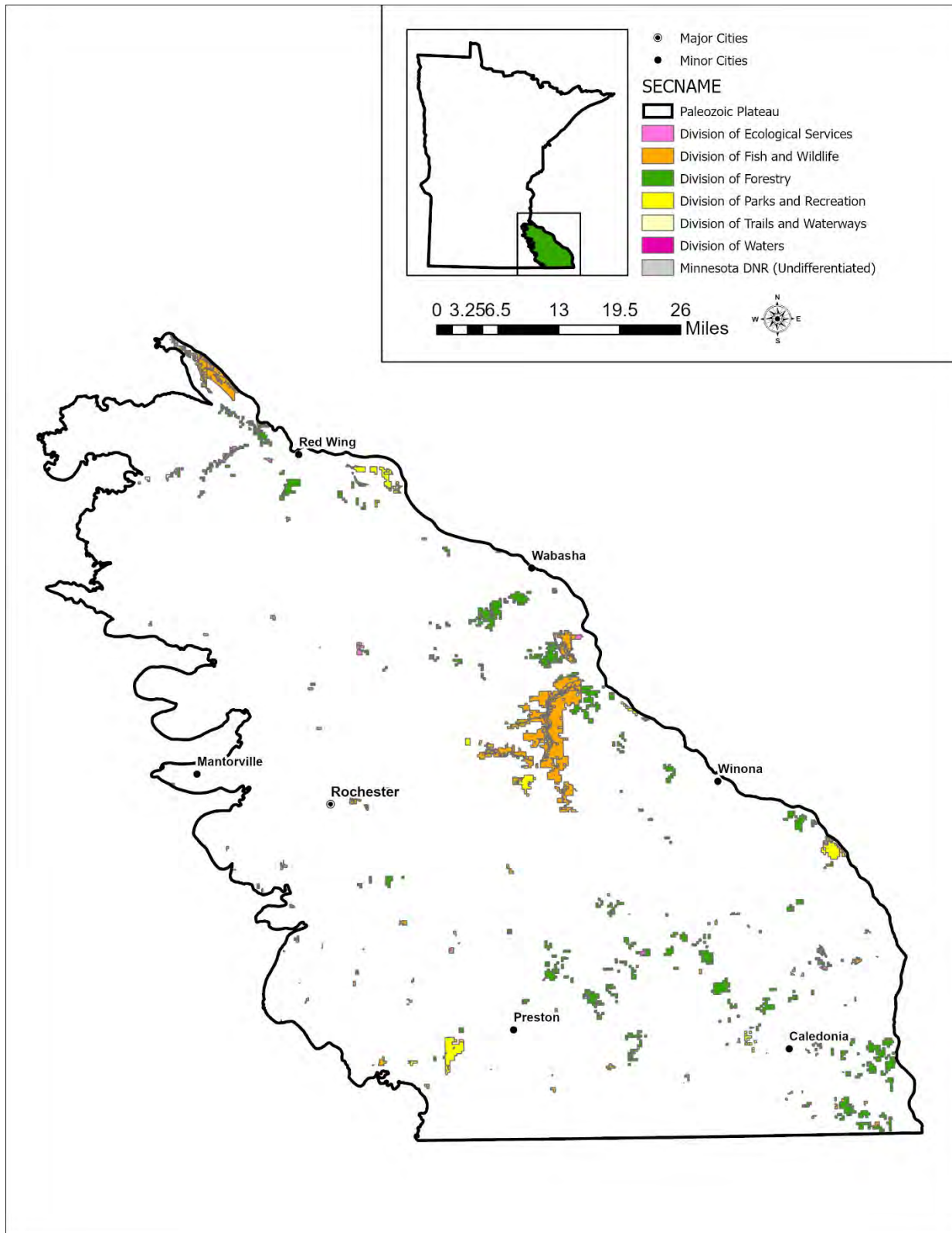
The SFRMP applies to approximately 89,466 acres of State land administered by the Divisions of Forestry and Fish and Wildlife that are in the management pool referred to as managed acres. Managed acres are timberland acres available for timber management (excluding timberlands reserved as old growth, state parks, and scientific and natural areas (SNAs), inoperable stands, etc.)

The following tables and maps show the location and number of acres that are administered by the DNR from the 2008 GAP assessment.

Table 5- DNR Administration of Land Within PP (2008 GAP)

DNR Administrator	Acres	Percent
Ecological and Water Resources	2,668	2.6%
Fisheries and Wildlife	43,351	42.4%
Forestry	46,116	45.1%
Parks and Trails	9,979	9.8%
other	199	.2%
Total	102,313	100%

Map 5- Location DNR administered lands within PP



Special Management Areas

Special management areas (SMA) are locations where alternative management is done to meet DNR policy or DNR landscape scale habitat objectives. The following table shows the number of acres within PP that are within special management areas.

Table 6 - Special Management Area Types

Special Management Area Type	Number	Acres
Old Forest Management Complex (OFMC)	3	611
Open Landscape Management Areas (OLMA)	1	1,632
Ruffed Grouse Management Area (RGMA)	9	4,122
Interior Forest (INT)	1	179
High Conservation Value Forests (HCVF)	80	20,375
Representative Sample Areas (RSA)	28	1,627

Forest Composition

Between 2010 and 2021, the total amount of land administered by the DNR, as represented within the Forest Inventory Module (FIM), increased by 7.9%. The two largest cover types, oak and northern hardwoods have also increased. Table 8 shows the change in acres for forest cover types within PP.

Table 7 - Change in Forest Cover (2010 and 2021 FIM)

Cover type	2010 total acres	2021 total acres	Trend
Ash/ lowland Hardwoods	9,017.2	9,700.7	7.5%
Willow	420.6	126.0	-70%
Aspen/bam	1,243.7	1,040.6	-16.3%
Birch	388.1	245.1	-36.8%
cottonwood	868.7	1,097.8	26.3%
Northern Hardwoods	9,058.3	11,707.6	29.2%
Walnut	2,270.5	2,712.4	19.4%
Oak	42,657.9	44,454.7	4.2%
Central Hardwoods	2,891.5	2,866.7	-0.8%
White Pine	2,198.8	2,269.9	3.2%
Red Pine	601.9	573.2	-4.7%
Jack Pine	6	5.6	-6.6%
White Spruce	107.9	107.7	-0.1%
Red Cedar	290.5	347.3	19.5%
Other forest types	389.1	184.1	-52.6%
Upland Brush	1,056.3	997.2	-5.5%
Upland Grass	4,266.3	5,226.4	22.5%
Other Non-Forest	17,124.8	18,744.1	9.4%
Total Acres	94,858.1	102,407.1	7.9%

State Land Cover Type Age Class Distributions

These charts show current age class distributions for cover types in the Paleozoic Plateau with acres planned on the 10-year stand exam list (FIM 2017). Acres under development at the time of plan writing are indicated in each chart, as are stand exam acres that are planned to be visited through 2030. Acres planned on the 10-year stand exam list are further broken out by generic preliminary prescriptions of Non-regeneration Harvest (e.g., thinning) or Regeneration Harvest (e.g., primarily clearcut with reserves for even-aged managed cover types and selection harvest for uneven-aged managed cover types). Note the y-axis on all charts is variable to be able to show certain cover types that have very small acreages within the Section.

Figure 15 – Ash/ Lowland Hardwoods 10-year age class distribution

Figure 16- Aspen 10-year age class distribution

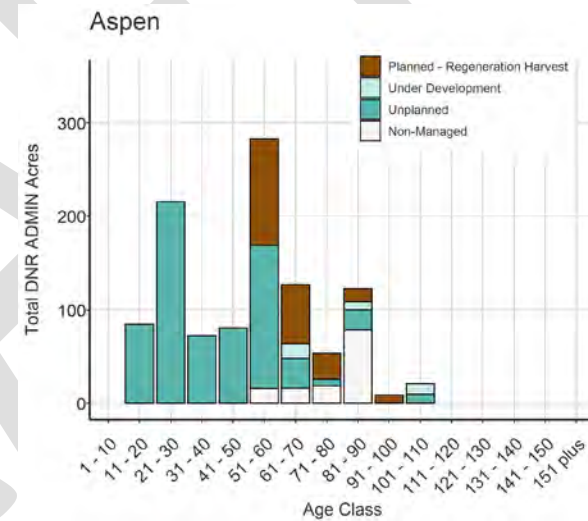
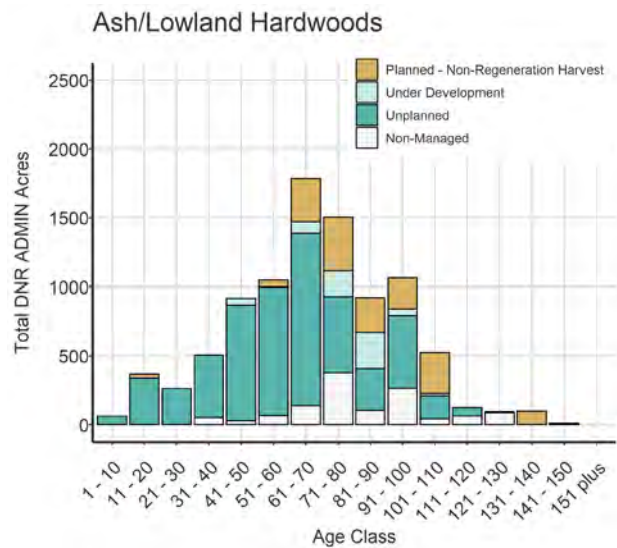


Figure 17 - Birch 10-year age class distribution

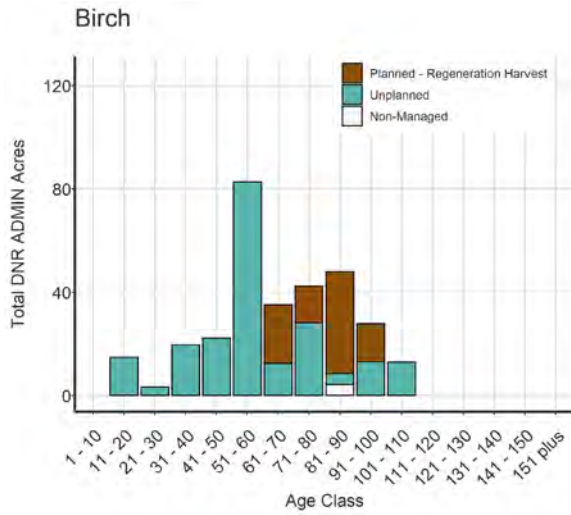


Figure 19- Northern Hardwoods 10-year age class distribution

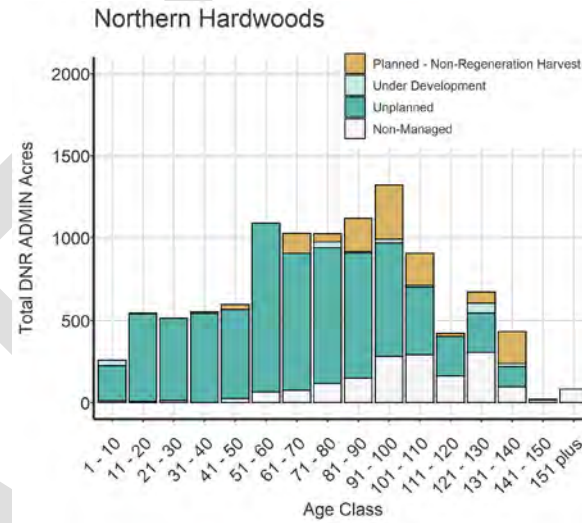


Figure 18- Jack Pine 10-year age class distribution

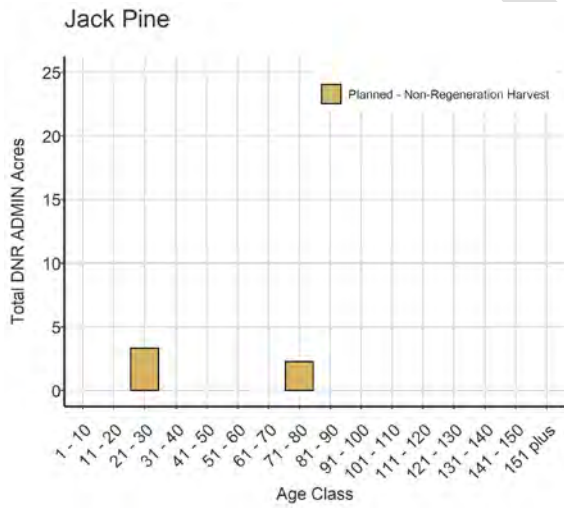


Figure 20- Oak 10-year age class distribution

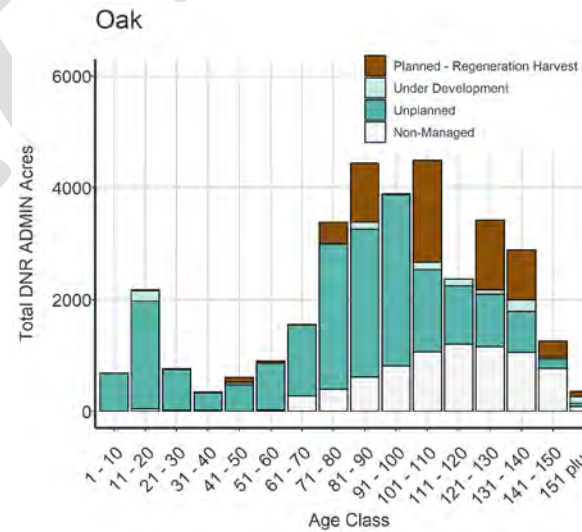


Figure 21- Red Pine Natural Origin 10-year age class distribution

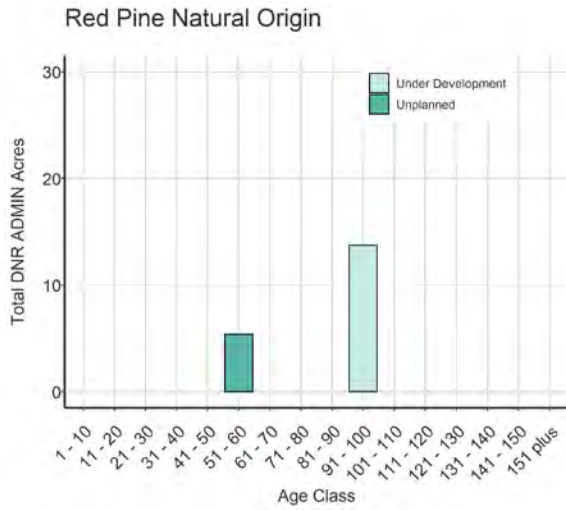


Figure 23 – White Pine 10-year age class distribution

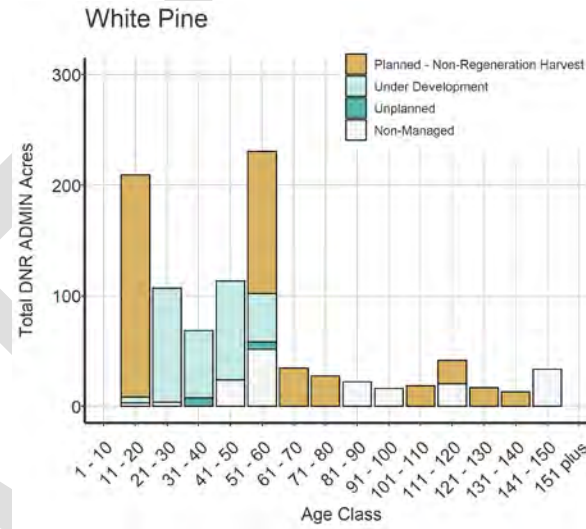


Figure 22- Red Pine Plantation 10-year age class distribution

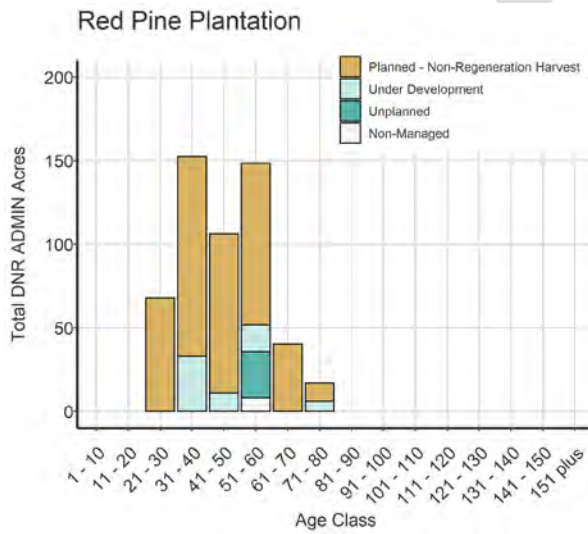


Figure 24 – White Spruce 10-year age class distribution

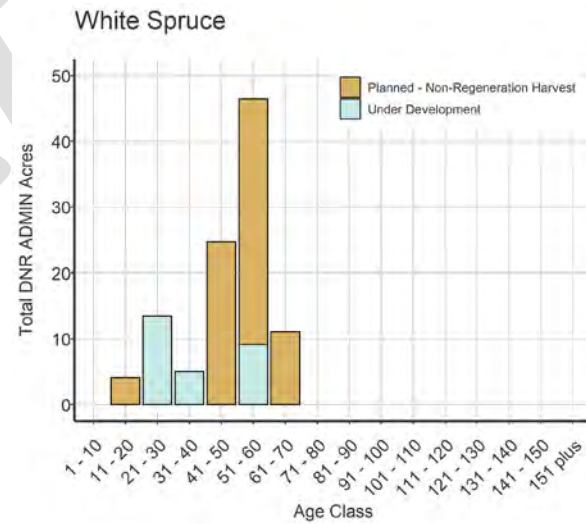


Figure 25 - Tamarack 10-year age class distribution

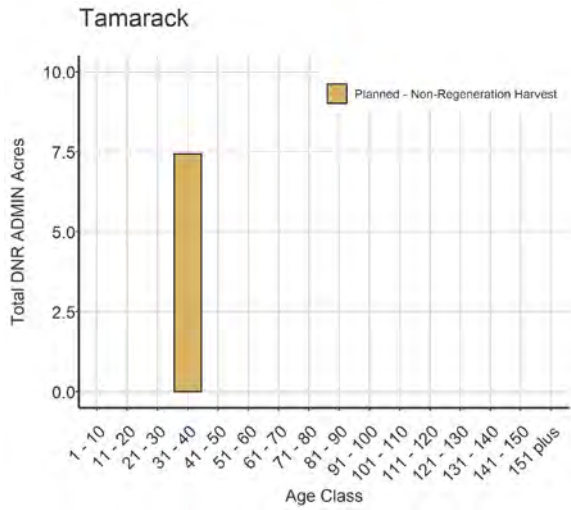


Figure 27- Misc. Conifers(including scotch pine and Norway spruce) 10-year age class distribution

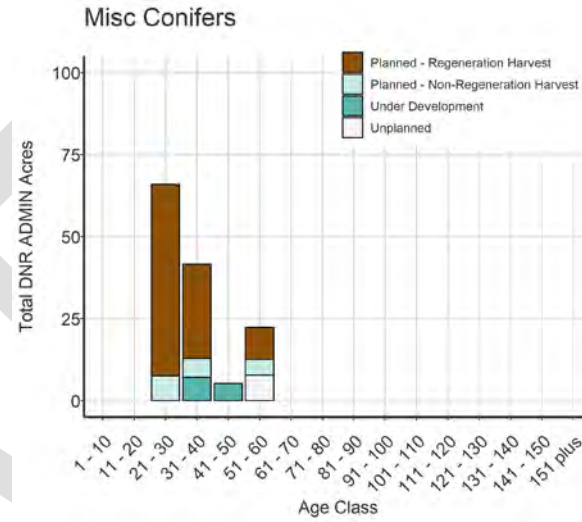


Figure 26- Walnut 10-year age class distribution

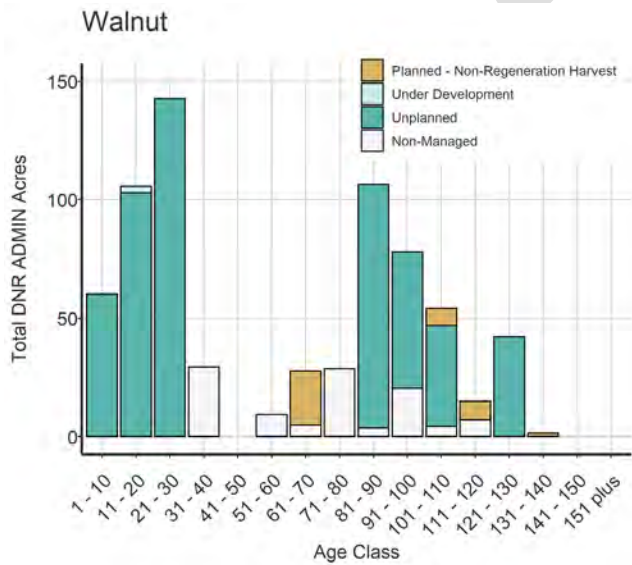


Figure 28- Red Cedar 10-year age class distribution

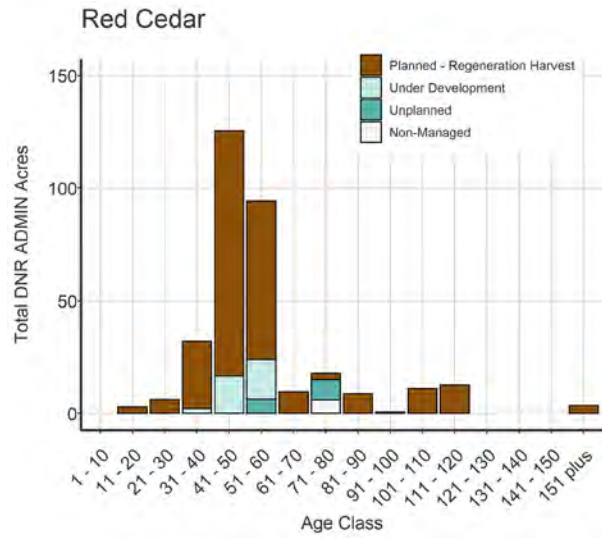
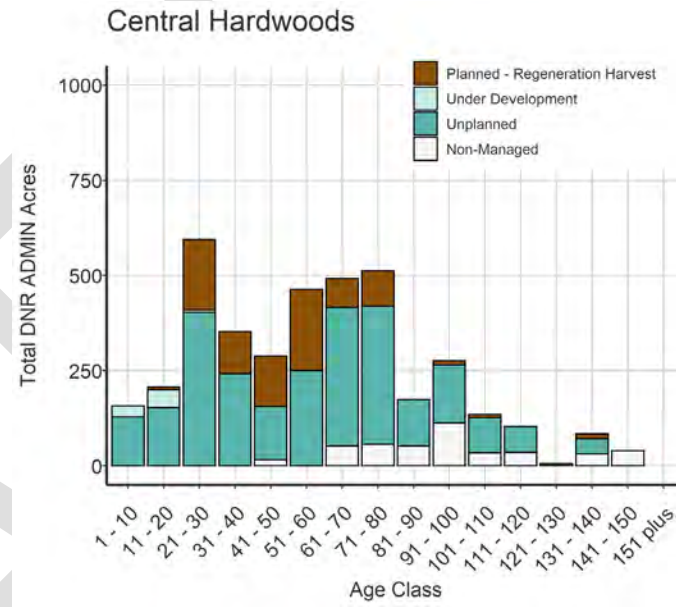


Figure 29- Central Hardwoods 10-year age class distribution



Forests Above and Below Rotation Age

The following table shows the percent by species group that is above and below the standard DNR even-aged rotation age within the 2017 FIM. Stand acres include all DNR-administered acres within this species group. Managed acres are the acres within the species group managed under the SFRMP.

Table 8 - Percent Forest Above and Below Rotation Age (2017 FIM)

Cover type	Percent Below Rotation Age (Stand Acres)	Percent Above Rotation Age (Stand Acres)	Percent Below Rotation Age (Managed Acres)	Percent Above Rotation Age (Managed Acres)	Total Stand Acres	Total Managed Acres
Aspen / Balm of Gilead	41.2%	58.8%	46.2%	53.8%	1,040.6	911.3
Birch	52.2%	47.8%	53.2%	46.8%	245.1	240.6
Jack Pine	58.9%	41.1%	59.3%	40.7%	5.6	5.6
White Spruce	46.8%	53.2%	46.8%	53.2%	107.7	107.7
Black Spruce Lowland	32.6%	67.4%	35%	65%	4,011.1	3,647.6
Tamarack	100%	0%	100%	0%	2.5	2.5
Red pine	100%	0%	100%	0%	246.9	211.3
White Pine plantation	94.3%	5.7%	94.3%	5.7%	658	656.5
Oak	27%	73%	31.2%	68.8%	41,354.1	35,203.6

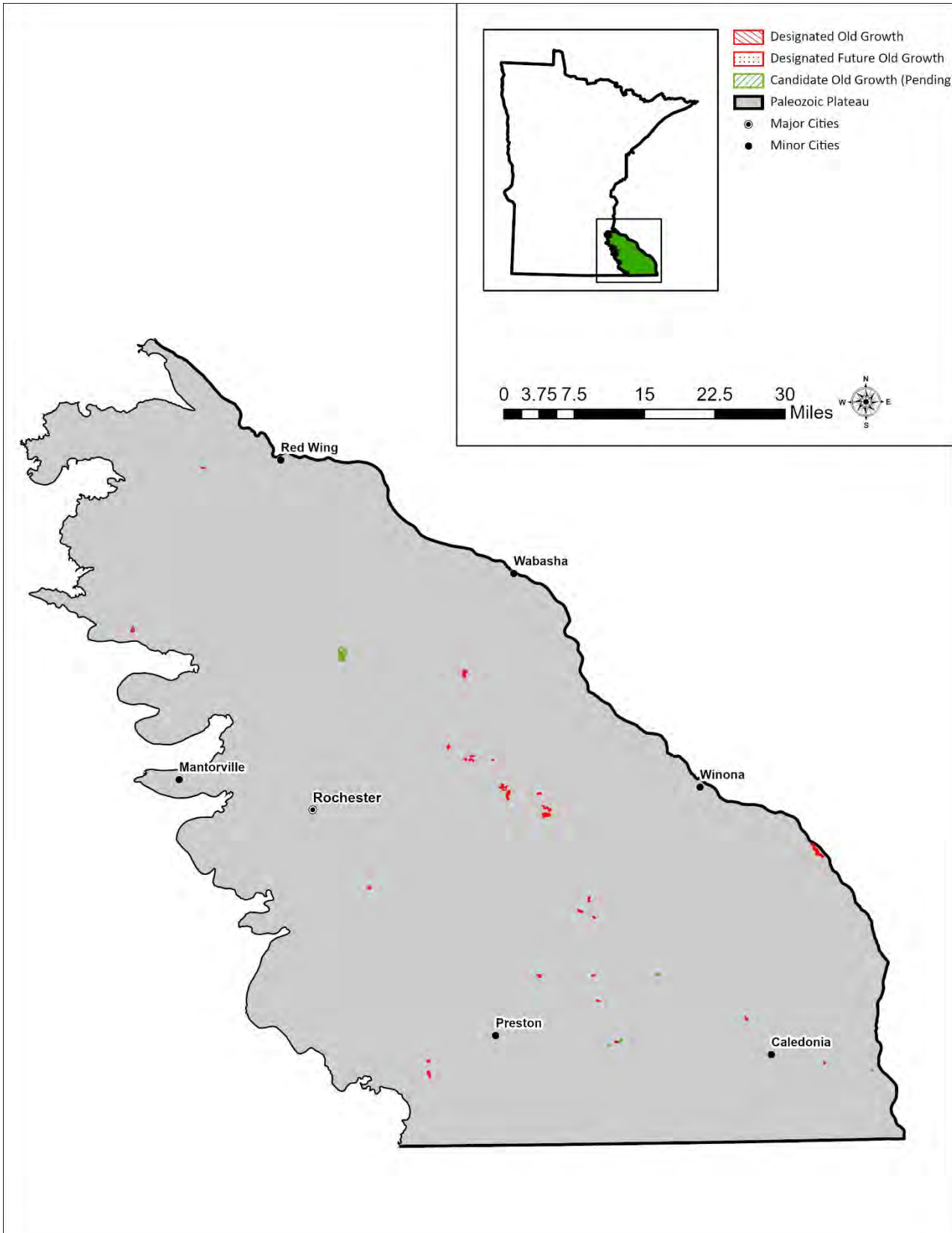
Old-Growth Forests

Old-growth forests represent the latter stages of succession in forested ecosystems. Remaining old-growth forests provide scientific and educational values and habitat for native plants and wildlife. Because old-growth ecosystems developed for a long time without large-scale disturbance, the study of plants, animals, soils, and ecosystem processes in old-growth stands provides important insights into the function of forest ecosystems. Such insights can inform future forest management for the maintenance of biological diversity.

Table 9- Designated Old Growth and Future Old Growth by Forest Type in PP

Row Labels	Designated	Designated Future Old Growth	Candidate Old Growth	Total
Aspen			11.6	11.6
Lowland Hardwood	98.3			98.3
Northern Hardwood	605.7		18.7	624.4
Oak	544.6		436.1	980.7
White Pine	107.7	33.5	17.2	158.4
Grand Total	1,356.3	33.5	483.6	1,873.4

Map 6- Designate Old growth



Acres of Timber Sold on DNR Lands

On average, the DNR offered 6,076 cord equivalents and sold 3,500 cord equivalents per year in fiscal years (FY) 2013-2022 in the PP Section. The following figures show the amount of volume offered and sold in total as well as for specific species within PP.

Figure 30 - Volume offered and Sold from DNR lands in the PP Section

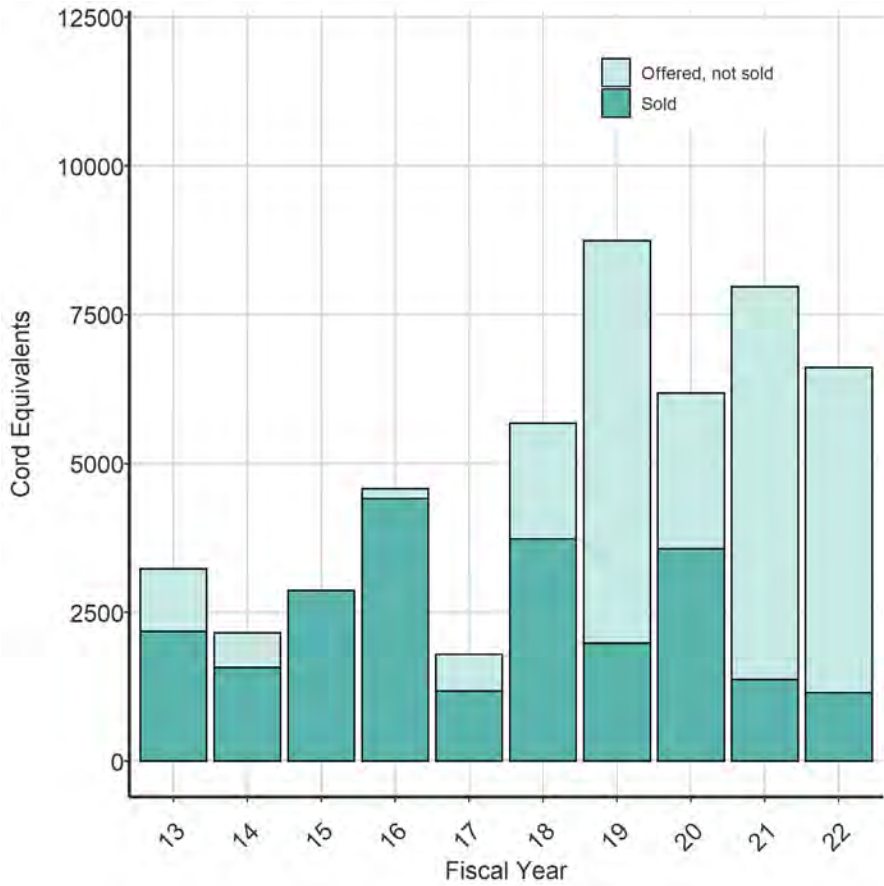


Figure 31- Average aspen and birch volume offered and sold form DNR lands in Cord equivalents

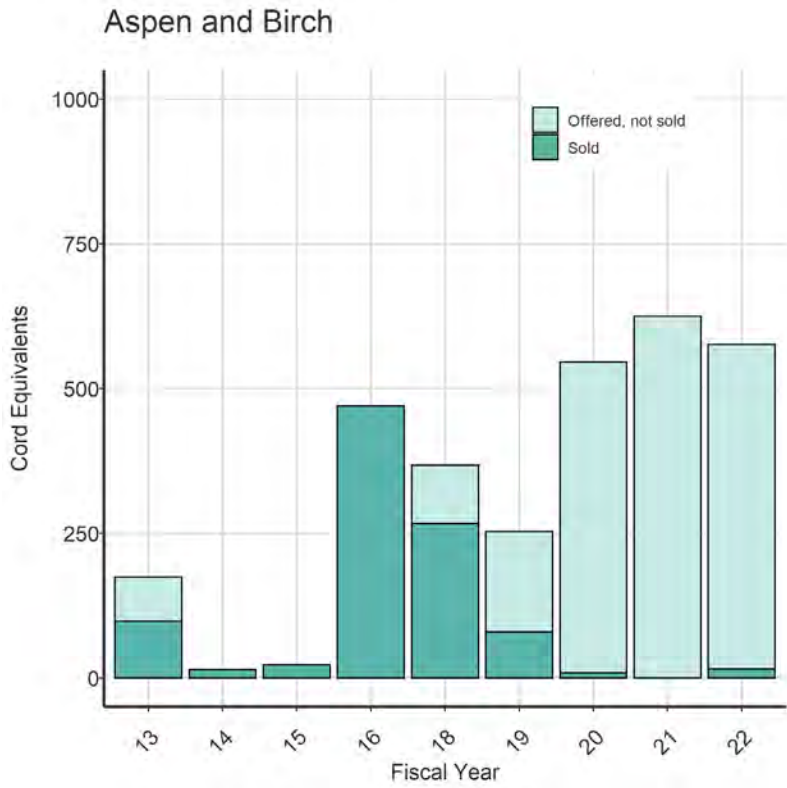


Figure 32 - Average Hardwood volume offered and sold form DNR lands in Cord equivalents

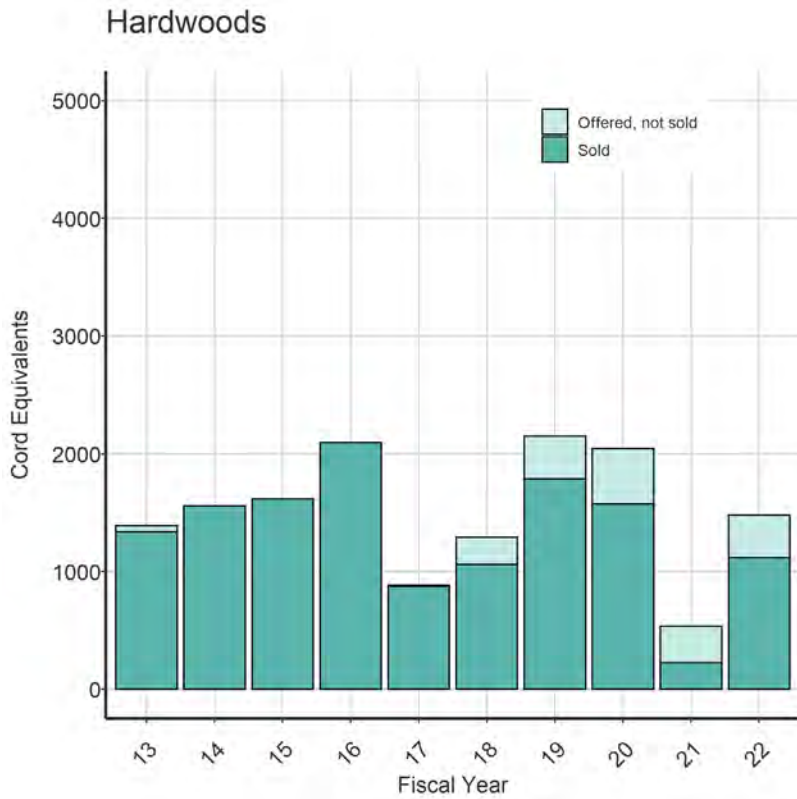


Figure 33 - Average Pine volume offered and sold form DNR lands in Cord equivalents

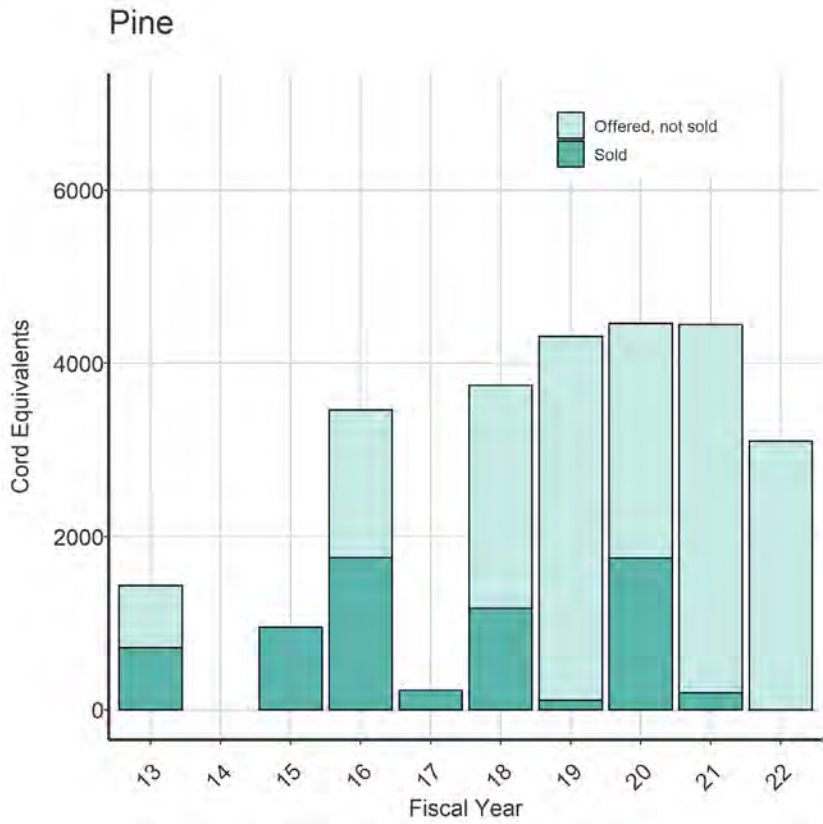


Figure 34 - Average spruce volume offered and sold form DNR lands in Cord equivalents

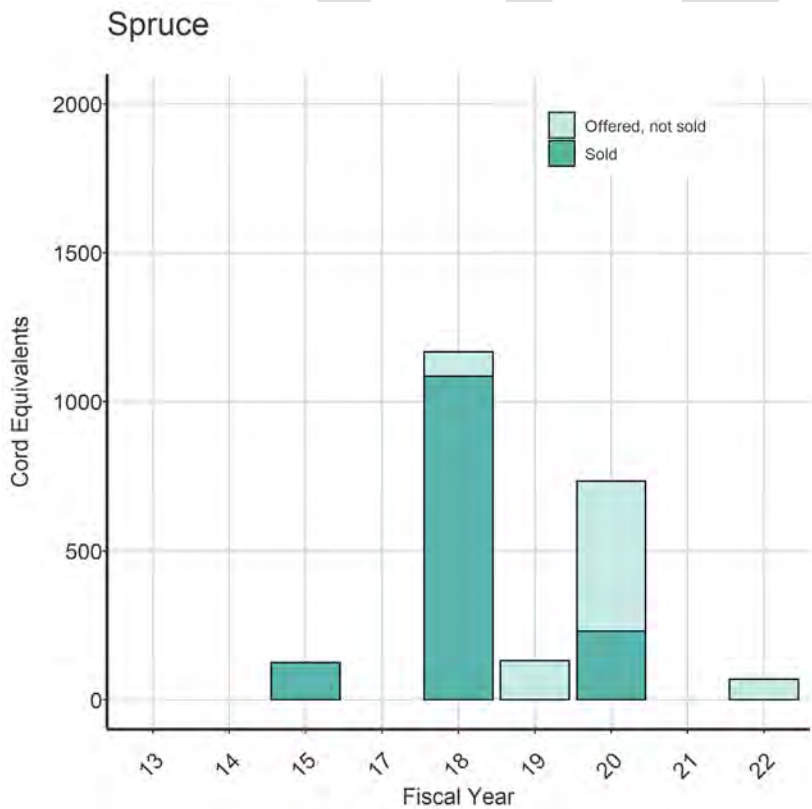


Figure 35 - Average tamarack volume offered and sold from DNR lands in Cord equivalents

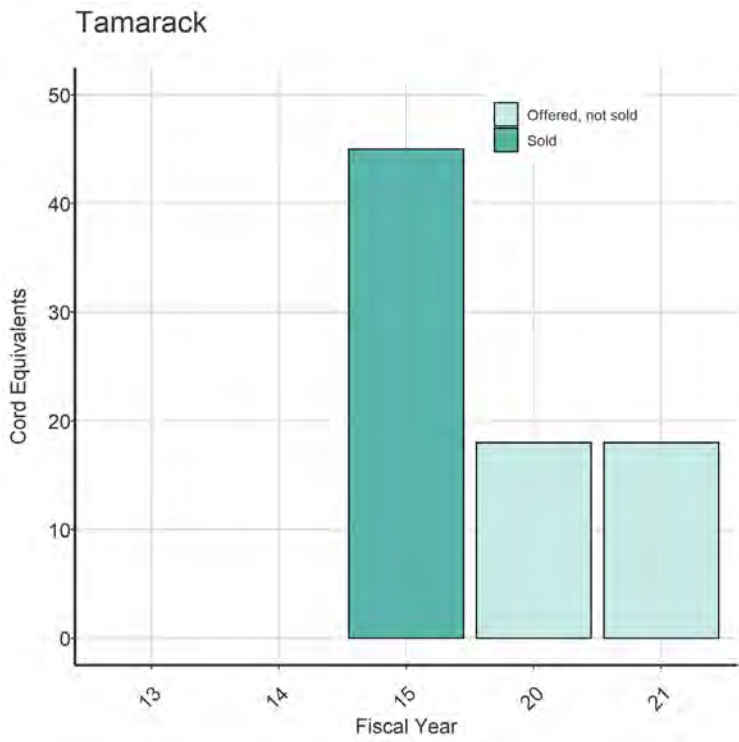
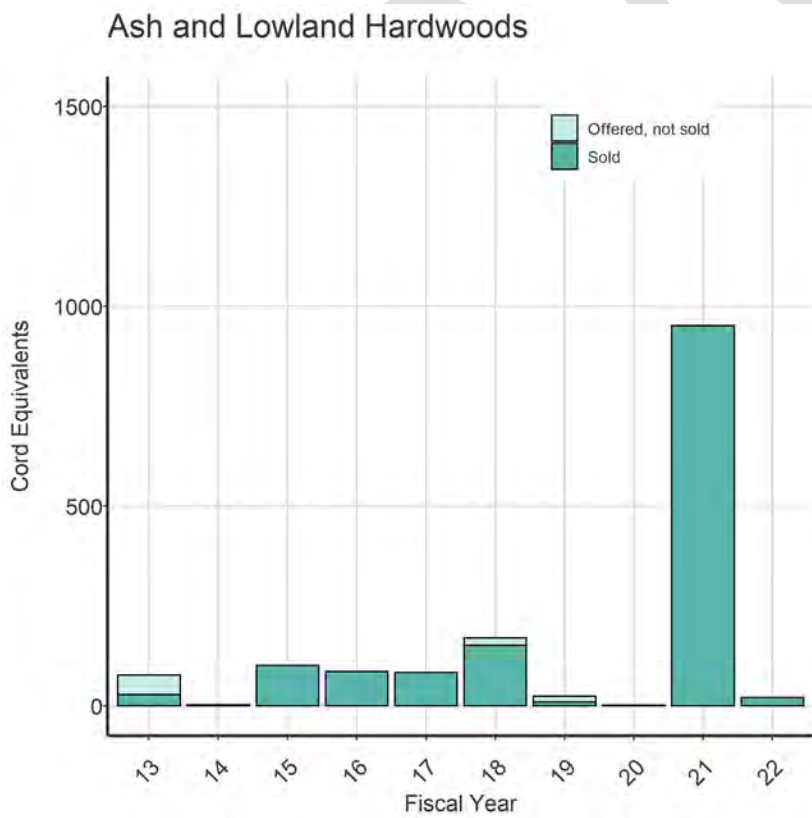


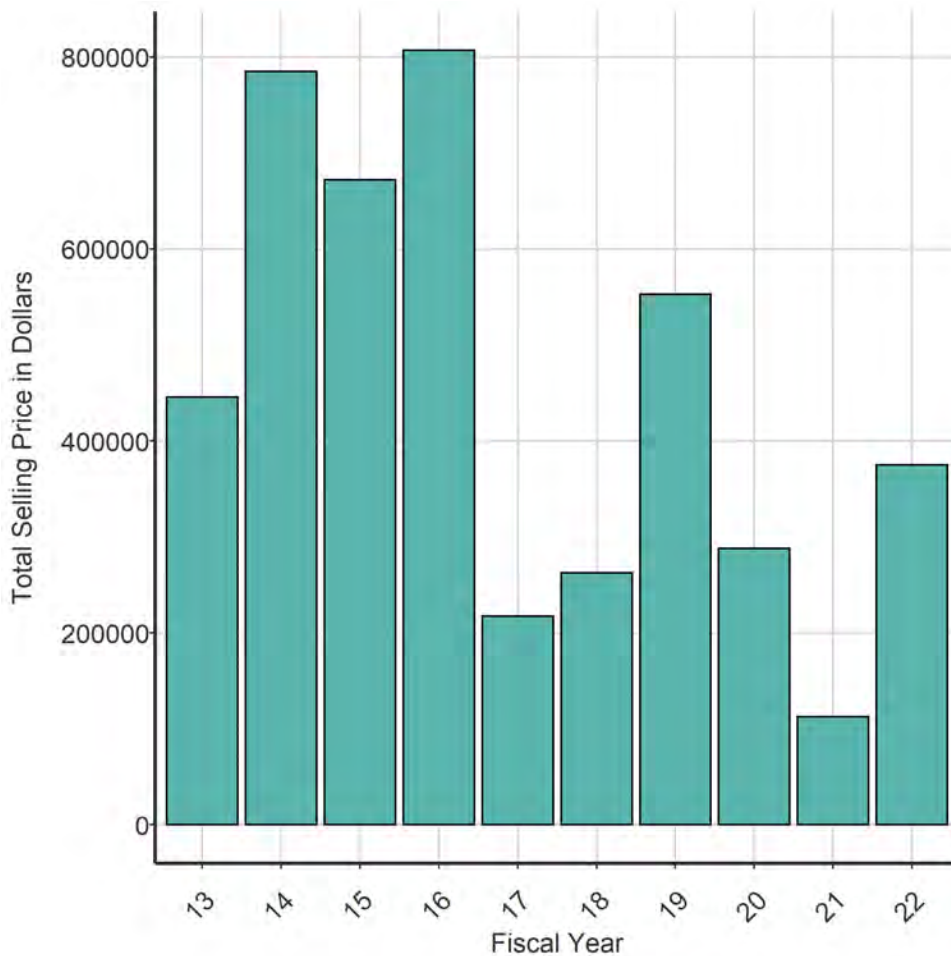
Figure 36- Average ash and lowland hardwood volume offered and sold from DNR lands in Cord equivalents



Value of Timber Sold from DNR Lands

Timber sales in the PP Section generated \$216,826.00 dollars on average per fiscal year from 2013-2021.

Figure 37 - Value of timber sold



CHAPTER 4: Resource Conditions

Ecological Description of Paleozoic Plateau Section (PP)

The Paleozoic Plateau Section (PPL) is a rugged region of bluffs and valleys that is quite different from the rest of the state. Although originally a plateau underlain by rather flat-lying sedimentary rocks of the Paleozoic Era, in the past 10,000 years, the landscape has been highly eroded and dissected by streams and rivers tributary to the Mississippi River, such as the Root, Whitewater, Zumbro, and Cannon rivers and their predecessors. The remains of the plateau are most evident on interfluvies along the western edge of the section; there is little evidence of the former plateau on the eastern edge of the section near the Mississippi River, where dissection is complete. Much of the section is blanketed with loess. The loess is thickest along the Mississippi River and thins to the west, where it becomes discontinuous, exposing eroded pre-Wisconsin till at the surface.

The most important factors influencing the pattern of vegetation in the historical landscape were slope, aspect, flooding, and the likelihood of burning; variation in the substrate was important only locally, with most of the section covered by rather uniform deposits of loess or alluvium. Prairies occupied the flat, fire-prone remnants of the plateau in the

western part of the section. Steep slopes in dissected areas were sufficiently protected from fire for woody vegetation to develop, although dry prairies were common at the tops of southwest-facing bluffs, with oak woodland developing downslope and northward and eastward along these slopes. Mesic forests were prevalent on the north and east-facing slopes, usually dominated by oak on the upper slopes, with basswood and then sugar maple increasing in importance downslope. Wet-mesic forests of basswood, sugar maple, black maple, elm, bur oak, black ash, and walnut were present on level, silty valley bottoms in dissected terrain. Sandy valley bottoms supported dry prairies, black oak woodlands, and, rarely, jack pine savannas and woodlands. The alluvial bottomlands of broad valleys such as that of the Mississippi River were covered with floodplain forests of silver maple and river birch and terrace forests of silver maple, elm, green ash, hackberry, cottonwood, basswood, and swamp white oak. River shore communities were present on sand bars and shorelines. Steep rock walls and rocky colluvium provided habitat for the development of cliff and talus communities. Peatlands were nearly absent in the section, mostly limited to local areas where seeps and springs maintained sufficiently saturated conditions for the accumulation of peat. (Source: [DNR Paleozoic Plateau](#))

Subsections are units within Sections that are defined using glacial deposition processes, surface bedrock formations, local climate, topographic relief, and the distribution of plants, especially trees. The Rochester Plateau and the Blufflands subsections comprise the PP section.

Water resources

There are numerous streams and rivers throughout the Section. These features are heavily impacted by the geology of the subsections within it. The drainage network is well-developed and dendritic in nature. Major rivers include the Mississippi (which forms the eastern boundary), root, white water, zumbro, and cannon.

The PP section contains part or the entirety of 8 of Minnesota’s 81 major watersheds (Table 9). The land management decisions made across this landscape can have important implications for the quality and quantity of water resources in the region. A suite of watershed health index scores has been calculated that represent many of the important ecological relationships within and between five different components (biology, connectivity, geomorphology, hydrology, and water quality). These scores are built on statewide GIS data that is compared consistently across Minnesota to provide a baseline health condition report for each of the major watersheds in the state. See the Watershed Health Assessment Framework website for more information [Watershed Health Assessment Framework](#).

Table 10 - HUC 8 Watersheds within PP

Watershed name	Acres	Square miles	Mean Health Score
Mississippi River – Lake Pepin	209,616	328	57
Cannon River	199,276	311	62
Mississippi River Winona	419,201	655	73
Zumbro River	622,238	972	64
Mississippi River- La Crescent	60,544	95	79
Root River	952,602	1,488	77
Mississippi River - Reno	117,447	184	82
Upper Iowa River	66,328	104	64

Minnesota’s List of Endangered, Threatened, and Special Concern Species Purpose, Scope, and Relationships to Federal Laws

Minnesota's Endangered Species Statute (Minnesota Statutes, Section 84.0895, [Revisor of statutes 84.0895 Protection of Threatened and Endangered Species](#)) requires the Minnesota DNR to adopt rules designating species meeting the statutory definitions of endangered, threatened, or species of special concern (ETS). The resulting List of Endangered, Threatened, and Special Concern Species ([Minnesota Rare Species Guide](#)) is codified as Minnesota Rules, Chapter 6134. The Endangered Species Statute also authorizes the DNR to adopt rules that regulate the treatment of species designated as endangered and threatened. These regulations are codified as Minnesota Rules, Parts 6212.1800 to 6212.2300 ([Revisor of statutes 6212.1800 General Restrictions for permits to possess threatened and endangered species](#), [Revisor of statutes 6212.2300 Emergency Taking](#)).

Minnesota's Endangered Species Statute and the associated rules impose a variety of restrictions, a permit program, and several exemptions pertaining to species designated as endangered or threatened. A person may not take, import, transport, or sell any portion of an endangered or threatened species. However, these acts 1) may be allowed by a permit issued by the DNR, 2) exempt plants on certain agricultural lands and plants destroyed in consequence of certain agricultural practices, and 3) exempt the accidental, unknowing destruction of designated plants. Minnesota's Endangered Species Statute or the associated rules do not protect species of special concern. Persons are advised to read the full text of the statute and rules in order to understand all regulations pertaining to species that are designated as endangered, threatened, or species of special concern.

Note that the federal Endangered Species Act of 1973, as amended (16 USC 1531 _ 1544; see [U.S. Fish & Wildlife Service - Endangered Species](#)), requires the U.S. Department of the Interior to identify species as endangered or threatened according to a separate set of definitions, and imposes a separate set of restrictions for those species. Within Minnesota, there are currently 21 species with federal designations of endangered, threatened, or experimental population.

Table 11 - Federal Listed Species within Minnesota²

Scientific Name	Common Name	Federal Status
<i>Bombus affinis</i>	Rusty patched bumble bee	Endangered
<i>Calidris canutus rufa</i>	Red knot	Threatened
<i>Canis lupus</i>	Gray wolf	Threatened
<i>Charadrius melodus</i>	Piping Plover	Endangered
<i>Cumberlandia monodonta</i>	Spectaclecase (mussel)	Endangered
<i>Epioblasma triquetra</i>	Snuffbox mussel	Endangered
<i>Erythronium propullans</i>	Minnesota dwarf trout lily	Endangered
<i>Grus americana</i>	Whooping crane	Experimental Population, Non-Essential

² 2022 April 14, U.S. Fish & Wildlife Midwest Region Endangered Species Minnesota. Retrieved from Environmental Conservation Online System (ECOS)

<https://ecos.fws.gov/ecp/report/species-listings-by-state?stateAbbrev=MN&stateName=Minnesota&statusCategory=Listed>

Scientific Name	Common Name	Federal Status
<i>Hesperia dactotae</i>	Dakota Skipper	Threatened
<i>Lampsilis higginsii</i>	Higgins eye (pearlymussel)	Endangered
<i>Lespedeza leptostachya</i>	Prairie bush-clover	Threatened
<i>Lycaeides melissa samuelis</i>	Karner blue butterfly	Endangered
<i>Lynx canadensis</i>	Canada Lynx	Threatened
<i>Myotis septentrionalis</i>	Northern Long-Eared Bat	Threatened
<i>Notropis topeka (=tristis)</i>	Topeka shiner	Endangered
<i>Platanthera leucophaea</i>	Eastern prairie fringed orchid	Threatened
<i>Platanthera praeclara</i>	Western prairie fringed Orchid	Threatened
<i>Plethobasus cyphus</i>	Sheepnose Mussel	Endangered
<i>Quadrula fragosa</i>	Winged Mapleleaf	Endangered
<i>Rhodiola integrifolia ssp. leedyi</i>	Leedy's roseroot	Threatened
<i>Sistrurus catenatus</i>	Eastern Massasauga (=rattlesnake)	Threatened

Minnesota Natural Heritage Information System

Records of known locations of listed species and other rare features are maintained in the Minnesota Natural Heritage Information System (NHIS). All DNR offices have this information available for review prior to forest management activities to determine if a known location of a rare species is in the vicinity of a stand. When reviewing forest stands for management activities during the planning process, this information will be available when assigning stand prescriptions. If an ETS species is known to exist or found on a site, management activities are modified to protect, promote, or enhance the ETS species on the site.

Survey Methods

Much of the information about rare features in the Minnesota Natural Heritage Information System is the result of rare features survey work done since the 1970s. While survey processes and protocols for plants, animals, and other features are necessarily different in some ways, methods common to both include:

- Review of existing information
- Selection of targeted species and survey sites
- Field survey using techniques appropriate to the species
- Information management

A more detailed description of rare plant and animal survey procedures can be found on the MBS page of the MN DNR website at [Minnesota Biological Survey](#).

Minnesota Listed Species

The rare feature products prepared for the PP section plan include information on species of plants and animals listed as endangered, threatened, and special concern. *Minnesota's List of Endangered, Threatened, and Special Concern Species* was created in 1984 and was last revised in 2013. The list, created under Minnesota's Endangered and Threatened Species Statute, draws attention to species that are at greatest risk of extinction within the state and applies special regulations to species listed as endangered or threatened. By alerting resource managers and the public to species in jeopardy, activities can be reviewed and prioritized to help preserve the diversity and abundance of Minnesota's flora and fauna.

Information on the ETS species documented within the PP section is presented below in Table 11. To understand the table it is useful to know what the state rankings of endangered, threatened, and special concern mean.

Rank Key for Tables 11.

END – Endangered. A species is considered **endangered** if the species is threatened with extinction throughout all or a significant portion of its range within Minnesota.

THR – Threatened. A species is considered **threatened** if the species is likely to become endangered within the foreseeable future throughout all or a significant portion of its range within Minnesota.

SPC – Special Concern. A species is considered a **species of special concern** if, although the species is not endangered or threatened, it is extremely uncommon in Minnesota or has unique or highly specific habitat requirements and deserves careful monitoring of its status. Species on the periphery of their range not listed as threatened may be included in this category, along with those species that were once threatened or endangered but now have increasing or protected, stable populations.

Additional information on the conservation status ranks (S-rank, G-rank) used in Table 11 can be found online at [NatureServe Conservation Status](#)

The following information on Minnesota’s ETS species is legally protected. Copyright (2014) State of Minnesota, Department of Natural Resources. Rare features data included here were current as of September 2013. These data are not based on an exhaustive inventory of the state. The lack of data for any geographic area shall not be construed to mean that no significant features are present. In addition, there may be inaccuracies in the data, of which the DNR is not aware and shall not be held responsible. Permission to use these data does not imply endorsement or approval by the DNR of any interpretations or products derived from the data.

Table 12 - Minnesota Listed Species in the PP section

Scientific Name	Common Name	Type	State Status	S-Rank	G-Rank
Acipenser fulvescens	Lake Sturgeon	Vertebrate Animal	SPC	S3	G3G4
Acris blanchardi	Blanchard's Cricket Frog	Vertebrate Animal	END	S1	G5
Actinonaias ligamentina	Mucket	Invertebrate Animal	THR	S2	G5
Agalinis gattingeri	Round-stemmed False Foxglove	Vascular Plant	END	S1	G4
Agrostis hyemalis	Winter Bentgrass	Vascular Plant	END	S1	G5
Alasmidonta marginata	Elktoe	Invertebrate Animal	THR	S2	G4
Allium cernuum	Nodding Wild Onion	Vascular Plant	SPC	S3	G5
Alosa chrysochloris	Skipjack Herring	Vertebrate Animal	END	S1	G5
Ammodramus henslowii	Henslow's Sparrow	Vertebrate Animal	END	S1B	G4
Anguilla rostrata	American Eel	Vertebrate Animal	SPC	S3	G4
Apalone mutica	Smooth Softshell	Vertebrate Animal	SPC	S3	G5
Aphredoderus sayanus	Pirate Perch	Vertebrate Animal	SPC	S3	G5

Scientific Name	Common Name	Type	State Status	S-Rank	G-Rank
<i>Arcidens confragosus</i>	Rock Pocketbook	Invertebrate Animal	END	S1	G4
<i>Argynnis idalia</i>	Regal Fritillary	Invertebrate Animal	SPC	S3	G3?
<i>Arisaema dracontium</i>	Green Dragon	Vascular Plant	SPC	S3	G5
<i>Aristida purpurea</i> var. <i>longiseta</i>	Red Three-awn	Vascular Plant	SPC	S3	G5T5?
<i>Aristida tuberculosa</i>	Seaside Three-awn	Vascular Plant	THR	S2	G5
<i>Arnoglossum plantagineum</i>	Tuberous Indian-plantain	Vascular Plant	THR	S2	G4G5
<i>Arnoglossum reniforme</i>	Great Indian Plantain	Vascular Plant	THR	S2	G4
<i>Asclepias amplexicaulis</i>	Clasping Milkweed	Vascular Plant	THR	S2	G5
<i>Asclepias stenophylla</i>	Narrow-leaved Milkweed	Vascular Plant	END	S1	G4G5
<i>Asclepias sullivantii</i>	Sullivant's Milkweed	Vascular Plant	THR	S2	G5
<i>Asplenium platyneuron</i>	Ebony Spleenwort	Vascular Plant	SPC	S3	G5
<i>Atrytone arogos iowa</i>	Iowa Skipper	Invertebrate Animal	SPC	S3	G2G3T2 T3
<i>Aureolaria pedicularia</i>	Fernleaf False Foxglove	Vascular Plant	THR	S2	G5
<i>Bacopa rotundifolia</i>	Waterhyssop	Vascular Plant	THR	S2	G5
<i>Baptisia bracteata</i> var. <i>glabrescens</i>	Plains Wild Indigo	Vascular Plant	SPC	S3	G4G5T4 T5
<i>Baptisia lactea</i> var. <i>lactea</i>	White Wild Indigo	Vascular Plant	SPC	S3	G5T4T5
<i>Berula erecta</i>	Stream Parsnip	Vascular Plant	THR	S2	G4G5
<i>Besseyia bullii</i>	Kitten-tails	Vascular Plant	THR	S2	G3
<i>Bidens discoidea</i>	Discoïd Beggarticks	Vascular Plant	SPC	S3	G5
<i>Borodinia laevigata</i>	Smooth Rock Cress	Vascular Plant	SPC	S3	G5
<i>Botrychium campestre</i>	Prairie Moonwort	Vascular Plant	SPC	S3	G3G4
<i>Botrychium oneidense</i>	Blunt-lobed Grapefern	Vascular Plant	THR	S2	G4
<i>Buellia nigra</i>	A Species of Lichen	Fungus	SPC	S3	G1G2
<i>Buteo lineatus</i>	Red-shouldered Hawk	Vertebrate Animal	SPC	S3B,SNRN	G5
<i>Caloplaca stellata</i>	A Species of Firedot Lichen	Fungus	SPC	S3	G3G5
<i>Carex annectens</i>	Yellow-fruit Sedge	Vascular Plant	SPC	S3	G5
<i>Carex careyana</i>	Carey's Sedge	Vascular Plant	END	S1	G4G5
<i>Carex davisii</i>	Davis' Sedge	Vascular Plant	THR	S2	G4
<i>Carex formosa</i>	Handsome Sedge	Vascular Plant	END	S1	G4
<i>Carex grayi</i>	Gray's Sedge	Vascular Plant	SPC	S3	G4G5
<i>Carex hookerana</i>	Hooker's Sedge	Vascular Plant	SPC	S3	G4?
<i>Carex jamesii</i>	James' Sedge	Vascular Plant	THR	S2	G5
<i>Carex laevivaginata</i>	Smooth-sheathed Sedge	Vascular Plant	THR	S2	G5
<i>Carex laxiculmis</i> var. <i>copulata</i>	Spreading Sedge	Vascular Plant	THR	S2	G5T4
<i>Carex muskingumensis</i>	Muskingum Sedge	Vascular Plant	SPC	S3	G4
<i>Carex plantaginea</i>	Plantain-leaved Sedge	Vascular Plant	END	S1	G5
<i>Carex sterilis</i>	Sterile Sedge	Vascular Plant	THR	S2	G4G5
<i>Carex typhina</i>	Cattail Sedge	Vascular Plant	SPC	S3	G5
<i>Catocala abbreviatella</i>	Abbreviated Underwing	Invertebrate Animal	SPC	S3	G3G4
<i>Chondestes grammacus</i>	Lark Sparrow	Vertebrate Animal	SPC	S3B	G5
<i>Chrysosplenium iowense</i>	Iowa Golden Saxifrage	Vascular Plant	END	S1	G4
<i>Cicindela lepida</i>	Ghost Tiger Beetle	Invertebrate Animal	THR	S2	G3G4
<i>Cicindela macra macra</i>	Sandy Stream Tiger Beetle	Invertebrate Animal	SPC	S3	G5T5

Scientific Name	Common Name	Type	State Status	S-Rank	G-Rank
<i>Cicindela patruela patruela</i>	Northern Barrens Tiger Beetle	Invertebrate Animal	SPC	S3	G3T3
<i>Cicindela splendida</i>	Splendid Tiger Beetle	Invertebrate Animal	SLL-SPC	S3	G5
<i>Cicindela splendida cyanocephalata</i>	Splendid Tiger Beetle	Invertebrate Animal	SPC	S3	G5T5
<i>Cirsium pumilum</i> var. <i>hillii</i>	Hill's Thistle	Vascular Plant	SPC	S3	G3
<i>Clinostomus elongatus</i>	Redside Dace	Vertebrate Animal	SPC	S3	G3G4
<i>Coluber constrictor</i>	North American Racer	Vertebrate Animal	SPC	S3	G5
<i>Commelina erecta</i>	Slender Dayflower	Vascular Plant	END	S1	G5
<i>Crataegus calpodendron</i>	Late Hawthorn	Vascular Plant	SPC	S3	G5
<i>Crocianthemum canadense</i>	Canada Frostweed	Vascular Plant	SPC	S3	G5
<i>Crotalaria sagittalis</i>	Rattlebox	Vascular Plant	SPC	S3	G5
<i>Crotalus horridus</i>	Timber Rattlesnake	Vertebrate Animal	THR	S2	G4
<i>Crystallaria asprella</i>	Crystal Darter	Vertebrate Animal	END	S1	G3
<i>Cycleptus elongatus</i>	Blue Sucker	Vertebrate Animal	SPC	S3	G3G4
<i>Cyclonaias tuberculata</i>	Purple Wartyback	Invertebrate Animal	END	S1	G5
<i>Cygnus buccinator</i>	Trumpeter Swan	Vertebrate Animal	SPC	S3B,SNRN,S NRM	G4
<i>Cypripedium candidum</i>	Small White Lady's-slipper	Vascular Plant	SPC	S3	G4
<i>Deparia acrostichoides</i>	Silvery Spleenwort	Vascular Plant	SPC	S3	G5
<i>Desmodium cuspidatum</i> var. <i>longifolium</i>	Big Tick Trefoil	Vascular Plant	THR	S2	G5T5?
<i>Desmodium nudiflorum</i>	Stemless Tick Trefoil	Vascular Plant	THR	S2	G5
<i>Diarrhena obovata</i>	Obovate Beakgrain	Vascular Plant	END	S1	G4G5
<i>Dicentra canadensis</i>	Squirrel Corn	Vascular Plant	SPC	S3	G5
<i>Diplazium pycnocarpon</i>	Narrow-leaved Spleenwort	Vascular Plant	THR	S2	G5
<i>Draba arabisans</i>	Arabian Whitlow Grass	Vascular Plant	SPC	S3	G4G5
<i>Dryopteris goldiana</i>	Goldie's Fern	Vascular Plant	SPC	S3	G4G5
<i>Dryopteris marginalis</i>	Marginal Shield Fern	Vascular Plant	END	S1	G5
<i>Ellipsaria lineolata</i>	Butterfly	Invertebrate Animal	THR	S2	G4G5
<i>Elliptio crassidens</i>	Elephant-ear	Invertebrate Animal	END	S1	G5
<i>Empidonax virescens</i>	Acadian Flycatcher	Vertebrate Animal	SPC	S3B	G5
<i>Emydoidea blandingii</i>	Blanding's Turtle	Vertebrate Animal	THR	S2	G4
<i>Eptesicus fuscus</i>	Big Brown Bat	Vertebrate Animal	SPC	S3	G5
<i>Erimystax x-punctatus</i>	Gravel Chub	Vertebrate Animal	THR	S2	G4
<i>Eryngium yuccifolium</i>	Rattlesnake Master	Vascular Plant	SPC	S3	G5
<i>Erynnis persius</i>	Persius Duskywing	Invertebrate Animal	SLL-END	S1	G5
<i>Erynnis persius persius</i>	Persius Dusky Wing	Invertebrate Animal	END	S1	G5T1T3
<i>Erythronium propullans</i>	Dwarf Trout Lily	Vascular Plant	END	S1	G1

Scientific Name	Common Name	Type	State Status	S-Rank	G-Rank
<i>Etheostoma chlorosoma</i>	Bluntnose Darter	Vertebrate Animal	SPC	S3	G5
<i>Etheostoma microperca</i>	Least Darter	Vertebrate Animal	SPC	S3	G5
<i>Eupatorium sessilifolium</i>	Upland Boneset	Vascular Plant	THR	S2	G5
<i>Eurytnia dilatata</i>	Spike	Invertebrate Animal	THR	S2	G5
<i>Falco peregrinus</i>	Peregrine Falcon	Vertebrate Animal	SPC	S3B	G4
<i>Floerkea proserpinacoides</i>	False Mermaid	Vascular Plant	THR	S2	G5
<i>Gallinula galeata</i>	Common Gallinule	Vertebrate Animal	SPC	S3B	G5
<i>Gastrocopta rogersensis</i>	Rogers? Snaggletooth Snail	Invertebrate Animal	SPC	S3	G3G4
<i>Gaylussacia baccata</i>	Black Huckleberry	Vascular Plant	THR	S2	G5
<i>Glyptemys insculpta</i>	Wood Turtle	Vertebrate Animal	THR	S2	G3
<i>Gymnocarpium robertianum</i>	Northern Oak Fern	Vascular Plant	SPC	S3	G5
<i>Gymnocladus dioica</i>	Kentucky Coffee Tree	Vascular Plant	SPC	S3	G5
<i>Habronattus viridipes</i>	A Jumping Spider	Invertebrate Animal	SPC	S3	GNR
<i>Hamamelis virginiana</i>	Witch-hazel	Vascular Plant	THR	S2	G5
<i>Hasteola suaveolens</i>	Sweet-smelling Indian plantain	Vascular Plant	END	S1	G4
<i>Hesperia leonardus leonardus</i>	Leonard's Skipper	Invertebrate Animal	SPC	S3	G4T4
<i>Hesperia ottoe</i>	Ottoe Skipper	Invertebrate Animal	END	S1	G3
<i>Heterodon nasicus</i>	Plains Hog-nosed Snake	Vertebrate Animal	SPC	S3	G5
<i>Hudsonia tomentosa</i>	Beach Heather	Vascular Plant	THR	S2	G5
<i>Huperzia porophila</i>	Rock Fir Moss	Vascular Plant	THR	S2	G4
<i>Hybanthus concolor</i>	Eastern Green-violet	Vascular Plant	END	S1	G5
<i>Hybognathus nuchalis</i>	Mississippi Silvery Minnow	Vertebrate Animal	SPC	S3	G5
<i>Hybopsis amnis</i>	Pallid Shiner	Vertebrate Animal	END	S1	G4
<i>Hydrastis canadensis</i>	Goldenseal	Vascular Plant	END	S1	G3G4
<i>Ichthyomyzon fossor</i>	Northern Brook Lamprey	Vertebrate Animal	SPC	S3	G4
<i>Ictiobus niger</i>	Black Buffalo	Vertebrate Animal	THR	S2	G5
<i>Iodanthus pinnatifidus</i>	Purple Rocket	Vascular Plant	END	S1	G5
<i>Jeffersonia diphylla</i>	Twinleaf	Vascular Plant	SPC	S3	G5
<i>Juglans cinerea</i>	Butternut	Vascular Plant	END	S1	G3
<i>Juniperus horizontalis</i>	Creeping Juniper	Vascular Plant	SPC	S3	G5
<i>Lampsilis higginsii</i>	Higgins Eye	Invertebrate Animal	END	S1	G1G2
<i>Lampsilis teres</i>	Yellow Sandshell	Invertebrate Animal	END	S1	G5
<i>Lanius ludovicianus</i>	Loggerhead Shrike	Vertebrate Animal	END	S1B	G4
<i>Lasmigona compressa</i>	Creek Heelsplitter	Invertebrate Animal	SPC	S3	G5
<i>Lasmigona costata</i>	Fluted-shell	Invertebrate Animal	THR	S2	G5
<i>Lechea tenuifolia</i> var. <i>tenuifolia</i>	Narrow-leaved Pinweed	Vascular Plant	END	S1	G5TNR

Scientific Name	Common Name	Type	State Status	S-Rank	G-Rank
<i>Leersia lenticularis</i>	Catchfly Grass	Vascular Plant	THR	S2	G5
<i>Lepomis gulosus</i>	Warmouth	Vertebrate Animal	SPC	S3	G5
<i>Lespedeza leptostachya</i>	Prairie Bush Clover	Vascular Plant	THR	S2	G3
<i>Ligumia recta</i>	Black Sandshell	Invertebrate Animal	SPC	S3	G4G5
<i>Lythrurus umbratilis</i>	Redfin Shiner	Vertebrate Animal	SPC	S3	G5
<i>Megaloniaias nervosa</i>	Washboard	Invertebrate Animal	END	S1	G5
<i>Melica nitens</i>	Three-flowered Melic	Vascular Plant	THR	S2	G5
<i>Microtus ochrogaster</i>	Prairie Vole	Vertebrate Animal	SPC	S3	G5
<i>Microtus pinetorum</i>	Woodland Vole	Vertebrate Animal	SPC	S3	G5
<i>Minuartia dawsonensis</i>	Rock Sandwort	Vascular Plant	THR	S2	G5
<i>Montia chamissoi</i>	Montia	Vascular Plant	END	S1	G5
<i>Morone mississippiensis</i>	Yellow Bass	Vertebrate Animal	SPC	S3	G5
<i>Moxostoma duquesnei</i>	Black Redhorse	Vertebrate Animal	SPC	S3	G5
<i>Myotis lucifugus</i>	Little Brown Myotis	Vertebrate Animal	SPC	S3	G3G4
<i>Myotis septentrionalis</i>	Northern Long-eared Bat	Vertebrate Animal	SPC	S3	G2G3
<i>Napaea dioica</i>	Glade Mallow	Vascular Plant	THR	S2	G4
<i>Necturus maculosus</i>	Mudpuppy	Vertebrate Animal	SPC	S3	G5
<i>Notropis nubilus</i>	Ozark Minnow	Vertebrate Animal	SPC	S3	G5
<i>Nuttallanthus canadensis</i>	Old Field Toadflax	Vascular Plant	SPC	S3	G5
<i>Oenothera rhombipetala</i>	Rhombic Evening Primrose	Vascular Plant	SPC	S3	G4G5
<i>Orobanche fasciculata</i>	Clustered Broomrape	Vascular Plant	THR	S2	G4G5
<i>Orobanche uniflora</i>	One-flowered Broomrape	Vascular Plant	THR	S2	G5
<i>Panax quinquefolius</i>	American Ginseng	Vascular Plant	SPC	S3	G3G4
<i>Pantherophis obsoletus</i>	Western Ratsnake	Vertebrate Animal	THR	S2	G5
<i>Parkesia motacilla</i>	Louisiana Waterthrush	Vertebrate Animal	SPC	S3B	G5
<i>Paronychia canadensis</i>	Canada Forked Chickweed	Vascular Plant	END	S1	G5
<i>Parthenium integrifolium</i>	Wild Quinine	Vascular Plant	END	S1	G5
<i>Pelegrina arizonensis</i>	A Jumping Spider	Invertebrate Animal	SPC	S3	GNR
<i>Pellaea atropurpurea</i>	Purple Cliff Brake	Vascular Plant	SPC	S3	G5
<i>Perimyotis subflavus</i>	Tricolored Bat	Vertebrate Animal	SPC	S3	G3G4
<i>Perognathus flavescens</i>	Plains Pocket Mouse	Vertebrate Animal	SPC	S3	G5
<i>Phalaropus tricolor</i>	Wilson's Phalarope	Vertebrate Animal	THR	S2B	G5
<i>Phegopteris hexagonoptera</i>	Broad Beech Fern	Vascular Plant	END	S1	G5
<i>Phemeranthus rugospermus</i>	Rough-seeded Fameflower	Vascular Plant	THR	S2	G3G4
<i>Phenacobius mirabilis</i>	Suckermouth Minnow	Vertebrate Animal	SPC	S3	G5

Scientific Name	Common Name	Type	State Status	S-Rank	G-Rank
<i>Phidippus apacheanus</i>	A Jumping Spider	Invertebrate Animal	SPC	S3	GNR
<i>Phlox maculata</i>	Wild Sweetwilliam	Vascular Plant	SPC	S3	G5
<i>Physaria ludoviciana</i>	Bladderpod	Vascular Plant	END	S1	G5
<i>Pituophis catenifer</i>	Gophersnake	Vertebrate Animal	SPC	S3	G5
<i>Platanthera flava</i> var. <i>herbiola</i>	Tubercled Rein Orchid	Vascular Plant	THR	S2	G4?T4Q
<i>Platanthera praeclara</i>	Western Prairie Fringed Orchid	Vascular Plant	END	S1	G3
<i>Plebejus melissa samuelis</i>	Karner Blue	Invertebrate Animal	END	S1	G1G2
<i>Plestiodon fasciatus</i>	Common Five-lined Skink	Vertebrate Animal	SPC	S3	G5
<i>Plethobasus cyphus</i>	Sheepnose	Invertebrate Animal	END	S1	G3
<i>Pleurobema sintoxia</i>	Round Pigtoe	Invertebrate Animal	SPC	S3	G4G5
<i>Poa paludigena</i>	Bog Bluegrass	Vascular Plant	THR	S2	G3G4
<i>Poa wolfii</i>	Wolf's Bluegrass	Vascular Plant	SPC	S3	G4
<i>Polanisia jamesii</i>	James' Polanisia	Vascular Plant	END	S1	G5
<i>Polygala cruciata</i>	Cross-leaved Milkwort	Vascular Plant	END	S1	G5
<i>Polyodon spathula</i>	Paddlefish	Vertebrate Animal	THR	S2	G4
<i>Polystichum acrostichoides</i>	Christmas Fern	Vascular Plant	END	S1	G5
<i>Polytaenia nuttallii</i>	Prairie Parsley	Vascular Plant	SPC	SH	G5
<i>Progne subis</i>	Purple Martin	Vertebrate Animal	SPC	S3B	G5
<i>Psoralidium tenuiflorum</i>	Slender-leaved Scurfpea	Vascular Plant	END	S1	G5
<i>Quadrula fragosa</i>	Winged Mapleleaf	Invertebrate Animal	END	S1	G1
<i>Quadrula nodulata</i>	Wartyback	Invertebrate Animal	THR	S2	G4
<i>Quercus bicolor</i>	Swamp White Oak	Vascular Plant	SPC	S3	G5
<i>Rallus elegans</i>	King Rail	Vertebrate Animal	END	S1B,SNRM	G4
<i>Reginaia ebenus</i>	Ebonysnail	Invertebrate Animal	END	S1	G4G5
<i>Reithrodontomys megalotis</i>	Western Harvest Mouse	Vertebrate Animal	SPC	S3	G5
<i>Rhodiola integrifolia</i> ssp. <i>leedyi</i>	Leedy's Roseroot	Vascular Plant	END	S1	G5T1
<i>Rhynchospora capillacea</i>	Hair-like Beak Rush	Vascular Plant	THR	S2	G4G5
<i>Rorippa sessiliflora</i>	Sessile-flowered Yellow Cress	Vascular Plant	SPC	S3	G5
<i>Rudbeckia triloba</i> var. <i>triloba</i>	Three-leaved Coneflower	Vascular Plant	THR	S2	G5T4T5
<i>Sagittaria calycina</i> var. <i>calycina</i>	Hooded Arrowhead	Vascular Plant	THR	S2	G5T5?
<i>Sanicula trifoliata</i>	Beaked Snakeroot	Vascular Plant	SPC	S3	G4
<i>Sassacus papenhoei</i>	A Jumping Spider	Invertebrate Animal	SPC	S3	GNR
<i>Schinia lucens</i>	Leadplant Flower Moth	Invertebrate Animal	SPC	S3	G4
<i>Scleria verticillata</i>	Whorled Nutrush	Vascular Plant	THR	S2	G5
<i>Scutellaria ovata</i> var. <i>versicolor</i>	Ovate-leaved Skullcap	Vascular Plant	THR	S2	G5T5
<i>Setophaga cerulea</i>	Cerulean Warbler	Vertebrate Animal	SPC	S3B	G4
<i>Setophaga citrina</i>	Hooded Warbler	Vertebrate Animal	SPC	S3B	G5

Scientific Name	Common Name	Type	State Status	S-Rank	G-Rank
<i>Silene nivea</i>	Snowy Campion	Vascular Plant	THR	S2	G4?
<i>Sterna forsteri</i>	Forster's Tern	Vertebrate Animal	SPC	S3B	G5
<i>Sullivantia sullivantii</i>	Reniform Sullivantia	Vascular Plant	THR	S2	G4
<i>Symphotrichum shortii</i>	Short's Aster	Vascular Plant	SPC	S3	G5
<i>Taenidia integerrima</i>	Yellow Pimpernel	Vascular Plant	SPC	S3	G5
<i>Tephrosia virginiana</i>	Goat's Rue	Vascular Plant	SPC	S3	G5
<i>Theliderma metanevra</i>	Monkeyface	Invertebrate Animal	THR	S2	G4
<i>Trichophorum clintonii</i>	Clinton's Bulrush	Vascular Plant	THR	S2	G4
<i>Trillium nivale</i>	Snow Trillium	Vascular Plant	SPC	S3	G4
<i>Triplasis purpurea</i> var. <i>purpurea</i>	Purple Sandgrass	Vascular Plant	SPC	S3	G4G5TNR
<i>Tritogonia verrucosa</i>	Pistolgrip	Invertebrate Animal	END	S1	G4G5
<i>Truncilla donaciformis</i>	Fawnsfoot	Invertebrate Animal	THR	S2	G5
<i>Usnea mutabilis</i>	Bloody Beard Lichen	Fungus	THR	S2	G5
<i>Usnea rubicunda</i>	Red Beard Lichen	Fungus	SPC	S3	G4G5
<i>Utterbackiana suborbiculata</i>	Flat Floater	Invertebrate Animal	SPC	S3	G5
<i>Valeriana edulis</i> var. <i>ciliata</i>	Edible Valerian	Vascular Plant	THR	S2	G5T3
<i>Venustaconcha ellipsiformis</i>	Ellipse	Invertebrate Animal	THR	S2	G4
<i>Verbena simplex</i>	Narrow-leaved Vervain	Vascular Plant	SPC	S3	G5
<i>Vertigo meramecensis</i>	Bluff Vertigo	Invertebrate Animal	THR	S2	G2G3
<i>Viola lanceolata</i> var. <i>lanceolata</i>	Lance-leaf Violet	Vascular Plant	THR	S2	G5T5
<i>Vireo bellii</i>	Bell's Vireo	Vertebrate Animal	SPC	S3B	G5
<i>Vitis aestivalis</i> var. <i>argentifolia</i>	Silverleaf Grape	Vascular Plant	THR	S2	G5TNR
<i>Woodsia oregana</i> ssp. <i>cathcartiana</i>	Oregon Woodsia	Vascular Plant	SPC	S3	G5T5
<i>Zonitoides limatulus</i>	Dull Gloss	Invertebrate Animal	SPC	S3	G4G5

Additional Species Data

In addition to listed species, the PP section contains species labeled as 'Watchlist' and 'Species of Greatest Conservation Need' (SGCNs).

'**Watchlist**' species (previously referred to 'NON's) are defined as plant or animal species with no legal status but for which data are being compiled in the Natural Heritage Information System because the species falls into one of the following categories:

- The species is being considered for addition to the state list.
- The species was removed from the state list, but records for the species are still entered and maintained as a precautionary measure.
- The species has been recently discovered in the state.
- The species is presumed extirpated from the state.

Table 13 - Minnesota 'Watchlist' species in the PP Section

Scientific Name	Common Name	Type
Agastache nepetoides	Yellow Giant Hyssop	Vascular Plant
Antigone canadensis	Sandhill Crane	Vertebrate Animal
Bartramia longicauda	Upland Sandpiper	Vertebrate Animal
Bombus affinis	Rusty-patched Bumble Bee	Invertebrate Animal
Botaurus lentiginosus	American Bittern	Vertebrate Animal
Callirhoe triangulata	Clustered Poppy-mallow	Vascular Plant
Cardamine douglassii	Purple Cress	Vascular Plant
Carex crus-corvi	Raven's Foot Sedge	Vascular Plant
Carex trichocarpa	Hairy-fruited Sedge	Vascular Plant
Cystopteris laurentiana	Laurentian Bladder Fern	Vascular Plant
Dodecatheon amethystinum	Jeweled Shooting Star	Vascular Plant
Dryopteris filix-mas	Male Fern	Vascular Plant
Euphorbia hexagona	Six-angle Spurge	Vascular Plant
Galium circaezans var. hypomalacum	Licorice Bedstraw	Vascular Plant
Geum laciniatum	Rough avens	Vascular Plant
Gleditsia triacanthos	Honeylocust	Vascular Plant
Haliaeetus leucocephalus	Bald Eagle	Vertebrate Animal
Heterodon platirhinos	Eastern Hog-nosed Snake	Vertebrate Animal
Hieracium longipilum	Long-bearded Hawkweed	Vascular Plant
Lampropeltis triangulum	Milksnake	Vertebrate Animal
Lethenteron appendix	American Brook Lamprey	Vertebrate Animal
Lithobates catesbeianus	Bullfrog	Vertebrate Animal
Lithobates palustris	Pickerel Frog	Vertebrate Animal
Lupinus perennis	Wild Lupine	Vascular Plant
Lycopus virginicus	Virginia Water Horehound	Vascular Plant
Morus rubra	Red Mulberry	Vascular Plant
Obovaria olivaria	Hickorynut	Invertebrate Animal
Opsopoeodus emiliae	Pugnose Minnow	Vertebrate Animal
Oxypolis rigidior	Cowbane	Vascular Plant
Pantherophis ramspotti	Western Foxsnake	Vertebrate Animal
Parmotrema hypotropum	Parmotrema Lichen	Fungus
Parmotrema perlatum	Black Stone Flower	Fungus
Penstemon digitalis	Beard-tongue	Vascular Plant
Penstemon pallidus	Pale Beard-tongue	Vascular Plant
Poa sylvestris	Woodland Bluegrass	Vascular Plant
Polygonum hydropiperoides	Mild Water Pepper	Vascular Plant
Potentilla rivalis	Brook Cinquefoil	Vascular Plant
Rorippa sinuata	Spreading Yellow Cress	Vascular Plant
Scaphirhynchus platyrhynchus	Shovelnose Sturgeon	Vertebrate Animal
Usnea dasaea	A Species of Lichen	Fungus
Usnea entoviolata	A Species of Lichen	Fungus
Usnea perhispidella	A Species of Lichen	Fungus
Vertigo hubrichti	Hubricht's Vertigo	Invertebrate Animal
Woodsia obtusa ssp. obtusa	Blunt-lobed Woodsia	Vascular Plant

Species of Greatest Conservation Need (SGCNs)

The PP Section provides a variety of wildlife habitats ranging from prairie to open brush and forest, comprising primarily aspen, northern hardwoods, and oak. The Section also includes smaller amounts of conifers, including red pine, white

pine, and spruce. Other non-forest habitat includes rivers, lakes, rock outcrops, shoreline, wet meadow, and upland fields. Row crop agriculture is a significant portion of the land use within this Section.

Of the 346 species that are considered SGCN in Minnesota, 228 are found in the PP Section (Table 13); At least 119 SGCN are directly associated with forest habitats.

Table 14 - Species of Greatest Conservation Need found within the PP Section that are associated with Forests.

Common Name	Scientific Name	Key Habitat/ or Habitat used
Blanchard's Cricket Frog	Acris blanchardi	Flood plain forest
Round-stemmed False Foxglove	Agalinis gattingeri	Savanna
Winter Bentgrass	Agrostis hyemalis	Savanna
Nodding Wild Onion	Allium cernuum	Mesic hardwood
Green Dragon	Arisaema dracontium	Flood plain forest & wet forest
Seaside Three-awn	Aristida tuberculosa	Savanna
Great Indian Plantain	Arnoglossum reniforme	Flood plain forest
Clasping Milkweed	Asclepias amplexicaulis	Savanna
Ebony Spleenwort	Asplenium platyneuron	Mesic hardwood
Little Saw Moss	Atrichum tenellum	Wet forest
Differential Branched Crease Capsule Moss	Aulacomnium heterostichum	Fire dependent & mesic hardwood
Fernleaf False Foxglove	Aureolaria pedicularia	Mesic hardwood & savanna
Plains Wild Indigo	Baptisia bracteata var. glabrescens	Savanna
White Wild Indigo	Baptisia lactea var. lactea	Savanna
Kitten-tails	Besseyia bullii	Fire-dependent & savanna
Smooth Rock Cress	Borodinia laevigata	Mesic hardwood
Blunt-lobed Grapefern	Botrychium oneidense	Mesic hardwood

Common Name	Scientific Name	Key Habitat/ or Habitat used
Red-shouldered Hawk	Buteo lineatus	Fire-dependent & mesic hardwood & flood plain forest & wet forest
Bug-on-a-stick Moss	Buxbaumia aphylla	Fire-dependent & mesic hardwood
Yellow-fruit Sedge	Carex annectens	Savanna
Carey's Sedge	Carex careyana	Mesic hardwood
Davis' Sedge	Carex davisii	Flood plain forest
Handsome Sedge	Carex formosa	Fire-dependent & mesic hardwoods
Gray's Sedge	Carex grayi	Flood plain forest
Hooker's Sedge	Carex hookerana	Savanna
James' Sedge	Carex jamesii	Mesic hardwood
Smooth-sheathed Sedge	Carex laevivaginata	Wet forest
Muskingum Sedge	Carex muskingumensis	Flood plain forest
Plantain-leaved Sedge	Carex plantaginea	Mesic hardwood
Cattail Sedge	Carex typhina	Flood plain forest
Lark Sparrow	Chondestes grammacus	Fire dependent & savanna
Ghost Tiger Beetle	Cicindela lepida	Savanna
Northern Barrens Tiger Beetle	Cicindela patruela patruela	Savanna
Splendid Tiger Beetle	Cicindela splendida cyanocephalata	Mesic hardwood
Hair-pointed Feather Moss	Cirriphyllum piliferum	Forested rich peatland
Hill's Thistle	Cirsium pumilum var. hillii	Savanna
North American Racer	Coluber constrictor	Fire dependent & mesic hardwood & savanna
Slender Dayflower	Commelina erecta	Savanna
Late Hawthorn	Crataegus calpodendron	Mesic hardwood

Common Name	Scientific Name	Key Habitat/ or Habitat used
Canada Frostweed	Crocotanthemum canadense	Savanna
Rattlebox	Crotalaria sagittalis	Savanna
Timber Rattlesnake	Crotalus horridus	Fire dependent & mesic hardwood & savanna
Pygmy Plume Moss	Cyrtio-hypnum pygmaeum	Mesic hardwood
Silvery Spleenwort	Deparia acrostichoides	Mesic hardwood
Big Tick Trefoil	Desmodium cuspidatum var. longifolium	Mesic hardwood
Stemless Tick Trefoil	Desmodium nudiflorum	Mesic hardwood
Obovate Beakgrain	Diarrhena obovata	Mesic hardwood
Squirrel Corn	Dicentra canadensis	Mesic hardwood
Narrow-leaved Spleenwort	Diplazium pycnocarpon	Mesic hardwood
Goldie's Fern	Dryopteris goldiana	Mesic hardwood
Marginal Shield Fern	Dryopteris marginalis	Fire-dependent & savanna
Acadian Flycatcher	Empidonax virescens	Mesic hardwood
Blanding's Turtle	Emydoidea blandingii	Savanna & Flood plain forest & wet forest & forested rich peatland
Big Brown Bat	Eptesicus fuscus	Fire dependent & mesic hardwood & flood plain forest
Persius Dusky Wing	Erynnis persius persius	Savanna
Dwarf Trout Lily	Erythronium propullans	Mesic hardwood & flood plain forest
Upland Boneset	Eupatorium sessilifolium	Fire dependent & savanna
False Mermaid	Floerkea proserpinacoides	Wet forest
Black Huckleberry	Gaylussacia baccata	Fire dependent
Wood Turtle	Glyptemys insculpta	Fire-dependent & mesic hardwood & savanna & wet forest
Northern Oak Fern	Gymnocarpium robertianum	Forested rich peatland

Common Name	Scientific Name	Key Habitat/ or Habitat used
Kentucky Coffee Tree	Gymnocladus dioica	Mesic hardwood
Witch-hazel	Hamamelis virginiana	Mesic hardwood
Leonard's Skipper	Hesperia leonardus	Savanna
Plains Hog-nosed Snake	Heterodon nasicus	Savanna
Beach Heather	Hudsonia tomentosa	Savanna
Eastern Green-violet	Hybanthus concolor	Mesic hardwood
Goldenseal	Hydrastis canadensis	Mesic hardwood
Purple Rocket	Iodanthus pinnatifidus	Flood plain forest
Twinleaf	Jeffersonia diphylla	Mesic hardwood
Butternut	Juglans cinerea	Mesic hardwood
Creeping Juniper	Juniperus horizontalis	Savanna
Narrow-leaved Pinweed	Lechea tenuifolia var. tenuifolia	Savanna
Catchfly Grass	Leersia lenticularis	Flood plain forest
Three-flowered Melic	Melica nitens	Mesic hardwood
Prairie Vole	Microtus ochrogaster	Savanna
Woodland Vole	Microtus pinetorum	Mesic hardwood & flood plain forest & wet forest
Rock Sandwort	Minuartia dawsonensis	Savanna
Little Brown Myotis	Myotis lucifugus	Mesic hardwood & flood plain forest
Northern Long-eared Bat	Myotis septentrionalis	Fire-dependent & mesic hardwood & flood plain forest
Glade Mallow	Napaea dioica	Flood plain forest
Old Field Toadflax	Nuttallanthus canadensis	Savanna
Rhombic Evening Primrose	Oenothera rhombipetala	Savanna
Clustered Broomrape	Orobanche fasciculata	Savanna
One-flowered Broomrape	Orobanche uniflora	Fire-dependent & mesic hardwood & savanna

Common Name	Scientific Name	Key Habitat/ or Habitat used
American Ginseng	Panax quinquefolius	Mesic hardwood
Western Ratsnake	Pantherophis obsoletus	Fire-dependent & mesic hardwood
Louisiana Waterthrush	Parkesia motacilla	Mesic hardwood & flood plain forest & wet forest
Canada Forked Chickweed	Paronychia canadensis	Savanna
Wild Quinine	Parthenium integrifolium	Savanna
Tricolored Bat	Perimyotis subflavus	Fire-dependent & mesic hardwood
Plains Pocket Mouse	Perognathus flavescens	Savanna
Broad Beech Fern	Phegopteris hexagonoptera	Mesic hardwood
Rough-seeded Fameflower	Phemeranthus rugospermus	Savanna
Gophersnake	Pituophis catenifer	Savanna
Tuberclad Rein Orchid	Platanthera flava var. herbiola	Savanna
Karner Blue	Plebejus melissa samuelis	Savanna
Common Five-lined Skink	Plestiodon fasciatus	Savanna
Bog Bluegrass	Poa paludigena	Wet forest
James' Polanisia	Polanisia jamesii	Savanna
Christmas Fern	Polystichum acrostichoides	Mesic hardwood
Swamp White Oak	Quercus bicolor	Flood plain forest
Sessile-flowered Yellow Cress	Rorippa sessiliflora	Flood plain forest
Three-leaved Coneflower	Rudbeckia triloba var. triloba	Mesic hardwood & flood plain forest
Beaked Snakeroot	Sanicula trifoliata	Mesic hardwood
A Jumping Spider	Sassacus papenhoei	Savanna

Common Name	Scientific Name	Key Habitat/ or Habitat used
Leadplant Flower Moth	Schinia lucens	Savanna
Ovate-leaved Skullcap	Scutellaria ovata var. versicolor	Mesic hardwood & flood plain forest
Cerulean Warbler	Setophaga cerulea	Fire-dependent & mesic hardwood & flood plain forest
Hooded Warbler	Setophaga citrina	Mesic hardwood
Snowy Campion	Silene nivea	Flood plain forest
Short's Aster	Symphyotrichum shortii	Mesic hardwood
Yellow Pimpernel	Taenidia integerrima	Fire-dependent & mesic hardwood & savanna
Goat's Rue	Tephrosia virginiana	Savanna
Clinton's Bulrush	Trichophorum clintonii	Fire-dependent & savanna
Snow Trillium	Trillium nivale	Mesic hardwood & flood plain forest
Purple Sandgrass	Triplasis purpurea var. purpurea	Savanna
Red Beard Lichen	Usnea rubicunda	Forested rich peatland
Silverleaf Grape	Vitis aestivalis var. argentifolia	Mesic hardwood

Native plant communities

A native plant community is a group of native plants that interact with each other and with their environment in ways not greatly altered by modern human activity or by introduced organisms. These groups of native plant species form recognizable units, such as oak savannas, pine forests, or marshes, that tend to repeat over space and time. Native plant communities are classified and described by considering vegetation, hydrology, landforms, soils, and natural disturbance regimes. Examples of natural disturbances include wildfires, severe droughts, windstorms, and floods.

Following is a list of the native plant community classes known to occur in the PP Section (Table 14). Both the codes and their associated names are provided. Much more detailed information about each plant community in this section, including distribution maps, can be found in the Field Guide to the Native Plant Communities of Minnesota series of publications. These field guides are available through the Minnesota Bookstore at [Minnesota Bookstore](#). Additional information on Minnesota's native plant communities can be found online at [Minnesota's Native Plant Communities](#).

Table 15 - Native Plant Community Classes, Types, and Subtypes Documented in the PP Section, by sub section, with their Associated Conservation Rank

Native Plant Community Name	Community Code	Rochester Plateau Subsection	Blufflands Subsection	Conservation Status Rank ¹	# of Observations ²
Southern Dry Cliff	CTs12	x	x	(S1, S2, S4), (G4G5, GNR)	555
Dry Sandstone Cliff (Southern)	CTs12a		x	S2G4G5	3
Dry Limestone - Dolomite Cliff (Southern)	CTs12b	X	x	S4G4G5	87
Southern Open Talus	CTs23		x	(S3), (G4G5)	13
Mesic Limestone - Dolomite Talus (Southern)	CTs23b	X	x	S3,G4,G5	7
Southern Mesic Cliff	CTs33	X	x	(S2, S3),(G4G5)	73
Mesic Sandstone Cliff (Southern)	CTs33a		x	S2,G4,G5	10
Mesic Limestone - Dolomite Cliff (Southern)	CTs33b	x	x	S3,G4,G5	162
Moderate Cliff, Limestone Subtype	CTs43a1	x	x	S1,G3?	15
Moderate Cliff, Dolomite Subtype	CTs43a2	x	x	S1,G3?	7
Algific Talus, Limestone Subtype	CTs46a1	x	x	S1,G2	57
Algific Talus, Dolomite Subtype	CTs46a2	x	x	S1,G2	36
Southern Wet Cliff	CTs53		x	(S1, S2),(G4G5)	6

Native Plant Community Name	Community Code	Rochester Plateau Subsection	Blufflands Subsection	Conservation Status Rank ¹	# of Observations ²
Wet Limestone - Dolomite Cliff (Southern)	CTs53b		x	S2G4G5	1
Southern Dry-Mesic Pine-Oak Woodland	FDs27		x	(S1, S2),(G3, G4?)	3
Jack Pine - Oak Woodland (Sand)	FDs27a		x	S1G4?	1
White Pine - Oak Woodland (Sand)	FDs27b	x	x	S1G3	32
Black Oak - White Oak Woodland (Sand)	FDs27c	x	x	S2G4?	43
Southern Dry-Mesic Oak-Aspen Forest	FDs36	x	x	(S3S4),(GNRQ)	3
Bur Oak - Aspen Forest	FDs36a	x		S3S4GNRQ	2
Southern Dry-Mesic Oak (Maple) Woodland	FDs37	x		(S3, S4),(G3G4, G4?)	2
Pin Oak - Bur Oak Woodland	FDs37b	x		S3G4?	6
Southern Dry-Mesic Oak-Hickory Woodland	FDs38	x	x	(S3),(GNR)	79
Oak - Shagbark Hickory Woodland	FDs38a	x	x	S3GNR	503
Southern Terrace Forest	FFs59	x	x	(S1, S2, S3),(G2G3, G4?)	69
Silver Maple - Green Ash - Cottonwood Terrace Forest	FFs59a	x	x	S3G4?	224
Swamp White Oak Terrace Forest	FFs59b		x	S1G2G3	33
Elm - Ash - Basswood Terrace Forest	FFs59c	x	x	S2G4?	198

Native Plant Community Name	Community Code	Rochester Plateau Subsection	Blufflands Subsection	Conservation Status Rank ¹	# of Observations ²
Silver Maple - (Virginia Creeper) Floodplain Forest	FFs68a		x	S3G3G4	325
White Pine - Sugar Maple - Basswood Forest (Cold Slope)	MHc38a	x		S1G2?	14
Southern Dry-Mesic Oak Forest	MHs37	x	x	(S3, S4),(G4?)	257
Red Oak - White Oak Forest	MHs37a	x	x	S3G4?	245
Red Oak - White Oak - (Sugar Maple) Forest	MHs37b	x	x	S4G4?	654
Southern Mesic Oak-Basswood Forest	MHs38	x	x	(S3),(G2G3 or GNR, G3, G4?)	52
White Pine - Oak - Sugar Maple Forest	MHs38a	x	x	S3G2G3 or GNR	310
Basswood - Bur Oak - (Green Ash) Forest	MHs38b	x	x	S3G3	4
Red Oak - Sugar Maple - Basswood - (Bitternut Hickory) Forest	MHs38c	x	x	S3G4?	182
Southern Mesic Maple-Basswood Forest	MHs39	x	x	(S2, S3),(G3G4)	93
Sugar Maple - Basswood - (Bitternut Hickory) Forest	MHs39a	x	x	S2G3G4	83
Sugar Maple - Basswood - Red Oak - (Blue Beech) Forest	MHs39b	x	x	S3G3G4	350
Southern Wet-Mesic Hardwood Forest	MHs49	x	x	(S2, S3)(G3G4)	111
Elm - Basswood - Black Ash - (Hackberry) Forest	MHs49a	x	x	S3G3G4	18

Native Plant Community Name	Community Code	Rochester Plateau Subsection	Blufflands Subsection	Conservation Status Rank ¹	# of Observations ²
Elm - Basswood - Black Ash - (Blue Beech) Forest	MHs49b	x	x	S2G3G4	86
Green Ash - Bur Oak - Elm Forest	MHw36a		x	S2GNR	1
Northern Mixed Cattail Marsh	MRn83		x	(S2)(G4?, G5)	1
Cattail - Sedge Marsh (Northern)	MRn83a		x	S2G4?	11
Cattail Marsh (Northern)	MRn83b		x	S2G5	1
Northern Bulrush-Spikerush Marsh	MRn93	x	x	(S2, S3)(G3G4, G4 or G4G5)	425
Bulrush Marsh (Northern)	MRn93a		x	S3G3G4	11
Spikerush - Bur Reed Marsh (Northern)	MRn93b		x	S2G4 or G4G5	6
Calcareous Fen (Southeastern)	OPp93c	x	x	S1G2G3 or G3G4	14
Sand/Gravel/Cobble River Shore	RVx32		x	(S3, S4)(G4G5)	2
Willow Sandbar Shrubland (River)	RVx32a		x	S4G4G5	1
Sand Beach/Sandbar (River)	RVx32b		x	S3G4G5	35
Sand Beach/Sandbar (River), Permanent Stream Subtype	RVx32b2		x	S3G4G5	13
Gravel/Cobble Beach (River)	RVx32c		x	S3G4G5	1
Gravel/Cobble Beach (River), Permanent Stream Subtype	RVx32c2	x	x	S3G4G5	8

Native Plant Community Name	Community Code	Rochester Plateau Subsection	Blufflands Subsection	Conservation Status Rank ¹	# of Observations ²
Southern Dry Prairie	UPs13		x	(S1S2, S2, S3)(G2G3 or G3?, G2G3 or G3, G3G4)	12
Dry Barrens Prairie (Southern)	UPs13a	x	x	S1S2G2G3 or G3	41
Dry Sand - Gravel Prairie (Southern)	UPs13b	x	x	S2G2G3 or G3	32
Dry Bedrock Bluff Prairie (Southern)	UPs13c	x	x	S3G3G4	1409
Southern Dry Savanna	UPs14		x	(S1, S1S2)(G2 or G3, G3)	6
Dry Barrens Oak Savanna (Southern)	UPs14a		x	S1 or S1S2G2 or G3	1
Dry Barrens Oak Savanna (Southern), Jack Pine Subtype	UPs14a1		x	S1G3	5
Dry Barrens Oak Savanna (Southern), Oak Subtype	UPs14a2	x	x	S1S2G2 or G3	49
Dry Sand - Gravel Oak Savanna (Southern)	UPs14b	x	x	S1S2G3	18
Dry Hill Oak Savanna (Southern)	UPs14c	x		S1G3	1
Southern Mesic Prairie	UPs23	x	x	(S2)(G1G2 or G2G3)	4
Mesic Prairie (Southern)	UPs23a	x	x	S2G1G2 or G2G3	27
Mesic Oak Savanna (Southern)	UPs24a	x		S1G1 or G1G2	2
Black Ash - (Red Maple) Seepage Swamp	WFs57a	x		S1S2GNR	2
Black Ash - Sugar Maple - Basswood - (Blue Beech) Seepage Swamp	WFs57b	x	x	S1GNR	42

Native Plant Community Name	Community Code	Rochester Plateau Subsection	Blufflands Subsection	Conservation Status Rank ¹	# of Observations ²
Willow - Dogwood Shrub Swamp	WMn82a	x	x	S5G5	8
Sedge Meadow	WMn82b	x	x	S4 or S5G4? or G4G5	23
Seepage Meadow/Carr	WMs83a	x	x	S3G4? or G4G5	38
Seepage Meadow/Carr, Tussock Sedge Subtype	WMs83a1	x	x	S3G4?	11
Seepage Meadow/Carr, Impatiens Subtype	WMs83a3		x	S2G4?	2
Southern Wet Prairie	WPs54		x	(S1, S2)(G2G3, G2G3 or G3G4, G3?)	1
Wet Seepage Prairie (Southern)	WPs54a	x		S1G3?	3
Wet Prairie (Southern)	WPs54b	x		S2G2G3 or G3G4	2

¹ Conservation status ranks are assigned to NPC types and subtypes as follows:

² Number of occurrences based on data collected by MN DNR and collaborators. These occurrence numbers do not reflect a community's actual abundance within this section but offer a measure of how often they have been documented during field surveys by the time of this printing. NPC classes without documented occurrences have been included when corresponding types/subtypes have been observed.

The information listed in Table 14 is currently incomplete; however, as MBS surveys are completed, additional information on NPCs within the PP section will become available and be incorporated into management plans. For a complete list of Minnesota's native plant communities and more information on conservation status ranks, refer to [Minnesota's native plant communities - status and rankings](#)

Native Plant Community Heritage Conservation Status Ranks (state rank: S, global rank: G):	
S1 / G1	Critically imperiled
S2 / G2	Imperiled
S3 / G3	Vulnerable to extirpation
S4 / G4	Apparently secure, uncommon but not rare
S5 / G5	Secure, common, widespread, and abundant

Forest Patchiness

Areas of forest patchiness on DNR-administered lands were calculated for the PP Section. A patch within the table below contains stands of similar cover type and age contiguous to each other. Forest patchiness was determined using age grouping based on standard DNR even-age Management regimes within the PP section.

Patch Type	Cover Types	Young	Intermediate	Old
Aspen	Aspen and balsam of Gilead	1-30	31-49	50+
Upland Hardwoods	Northern hardwoods, Central Hardwoods, Oak, and Walnut	1-30	31-59	80+
Lowland Hardwoods	Ash and lowland hardwoods	1-30	31-79	80+
Pine	Norway pine and White pine	1-30	31-114	115+
Lowland Conifers	Lowland Black spruce and Tamarack	1-30	31-119	120+

Patch type	>640 acres		251–640 acres		101-250 acres		41-100 acres		<= 40 acres	
	Count	Total acres	Count	Total acres	Count	Total acres	Count	Total acres	Count	Total acres
Young Aspen 1-30 years	0	0	0	0	0	0	2	128	16	139
Intermediate Aspen 31-49 years	0	0	0	0	0	0	1	49	26	179
Old Aspen 50 + years	0	0	0	0	0	0	1	52	83	828
Young Upland Hardwoods 1-30 years	0	0	0	0	5	620	49	2,934	171	2,336
Intermediate Upland Hardwoods 31-59 years	0	0	3	1,192	22	3,082	70	4,160	375	5,219
Old Upland Hardwoods 60 + years	8	6,772	16	5,845	61	8,833	136	9,270	324	5,251
Young Lowland Hardwoods 1-30 years	0	0	0	0	1	160	2	139	32	351

Patch type	>640 acres		251–640 acres		101-250 acres		41-100 acres		<= 40 acres	
	Count	Total acres	Count	Total acres	Count	Total acres	Count	Total acres	Count	Total acres
Intermediate Lowland Hardwoods 31-79 years	0	0	0	0	14	2,007	23	1,469	158	2,138
Old Lowland Hardwoods 80 + years	0	0	0	0	5	784	17	1,110	77	1,005
Young Pine 1-30 years	0	0	0	0	0	0	1	53	54	556
Intermediate Pine 31-114 years	0	0	0	0	1	109	4	193	205	1,776
Old Pine 115 + years	0	0	0	0	0	0	0	0	6	84
Young Lowland conifers 1-30 years	0	0	0	0	0	0	0	0	0	0
Intermediate Lowland conifers 31-119 years	0	0	0	0	0	0	0	0	1	2
Old Lowland conifers 120 + years	0	0	0	0	0	0	0	0	0	0

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Climate change

Forest management plans will consider the effects of climate change on forest management activities. Efforts will be made to be aware of the specific cover types that are projected to do better in what are anticipated to be future climate trends. Because forest management is implemented over relatively long terms (50-plus years), drastic forest management activities reacting to climate change will not be undertaken. Rather efforts will be made to introduce some cover type conversions and specific Strategies that are consistent with the Department's recommendations concerning how to react to climate change as the SFRMP is prepared and implemented. Climate change impacts are identified in the Department's Strategic Conservation Agenda. See for more information:

[DNRs Strategic Direction - Climate change mitigation and adaptation](#)

More comprehensive research on the impacts of climate change has been prepared by the Northern Institute of Applied Climate Science. See research and further information on NIACS at:

[Northern Institute of Applied Climate Science](#)

[The climate change atlas](#) is a tool used to examine current distributions and modeled future climate habitats for 134 individual tree species by geographic area. The following table was created using data from the climate change atlas and shows the change in potentially suitable habitat for tree species within the PP Section, weighted for both the area and abundance of habitat for various climate model scenarios projected to the year 2100. The data was calculated for the PP Section based on the DISTRIB habitat Model.

A numerical representation of each species' potential suitable habitat is given as an importance value (IV), weighted by its geographic distribution across the Section, and was calculated for high and low emission scenarios in three different GCM climate models (Hadley, PCM, and GFDL). The higher the number, the more likely potential suitable habitat will be available for a species.

Table 16 - Tree Habitat Suitability shows the modeled IV for a subset of the tree species within the PP Section. Species are placed in the order of highest to lowest IV based on the average Hadley, GDFL, PCM High Scenario³.

Species Name	Scientific Name	DISTRIB Weighted SUM IV (Current)	DISTRIB Weighted SUM IV (Hadley High)	DISTRIB Weighted SUM IV (PCM low)	DISTRIB Weighted SUM IV (Average Hadley, GDFL, and PCM High)	DISTRIB Weighted SUM IV (Average of the Hadley, GDFL, and PCM Low)
American elm	Ulmus americana	805	↓ 795	↑ 1,250	↑ 1,042	↑ 1,224
boxelder	Acer negundo	458	↑ 837	↑ 572	↑ 863	↑ 544
bur oak	Quercus macrocarpa	730	↓ 696	↑ 823	↑ 748	↑ 852
hackberry	Celtis occidentalis	163	↑ 502	↑ 509	↑ 574	↑ 565
white oak	Quercus alba	851	↓ 481	↓ 809	↓ 508	↑ 865
silver maple	Acer saccharinum	232	↑ 430	↑ 556	↑ 457	↑ 570
eastern redcedar	Juniperus virginiana	151	↑ 407	↑ 399	↑ 441	↑ 498
black oak	Quercus velutina	367	↑ 413	↑ 418	↑ 425	↑ 466
shagbark hickory	Carya ovata	412	↓ 369	↑ 623	↑ 415	↑ 665
black walnut	Juglans nigra	206	↑ 313	↑ 548	↑ 390	↑ 494
slippery elm	Ulmus rubra	395	↓ 327	↑ 467	↓ 389	↑ 464
honeylocust	Gleditsia triacanthos	6	↑ 321	↑ 310	↑ 364	↑ 335
American basswood	Tilia americana	561	↓ 289	↓ 454	↓ 350	↓ 437
Eastern hophornbeam	Ostrya virginiana	391	↓ 275	↑ 484	↓ 339	↑ 427
bitternut hickory	Carya cordiformis	297	↓ 294	↑ 488	↑ 336	↑ 435
green ash	Fraxinus pennsylvanica	177	↑ 299	↑ 198	↑ 325	↑ 261
eastern cottonwood	Populus deltoides	113	↑ 276	↑ 251	↑ 312	↑ 306
northern red oak	Quercus rubra	937	↓ 203	↓ 683	↓ 305	↓ 651
sugar maple	Acer saccharum	447	↓ 184	↓ 382	↓ 251	↓ 336
white ash	Fraxinus americana	145	↑ 176	↑ 317	↑ 208	↑ 244

³ Prasad, A. M., L. R. Iverson., S. Matthews., M. Peters. 2007-ongoing. A Climate Change Atlas for 134 Forest Tree Species of the Eastern United States [database]. <https://www.nrs.fs.fed.us/atlas/tree>, Northern Research Station, USDA Forest Service, Delaware, Ohio.

Peters, M.P., Prasad, A.M., Matthews, S.N., & Iverson, L.R. 2020. Climate change tree atlas, Version 3. U.S. Forest Service, Northern Research Station and Northern Institute of Applied Climate Science, Delaware, OH. <https://www.nrs.fs.fed.us/atlas>.

Species Name	Scientific Name	DISTRIB Weighted SUM IV (Current)	DISTRIB Weighted SUM IV (Hadley High)	DISTRIB Weighted SUM IV (PCM low)	DISTRIB Weighted SUM IV (Average Hadley, GDFL, and PCM High)	DISTRIB Weighted SUM IV (Average of the Hadley, GDFL, and PCM Low)
red maple	Acer rubrum	312	↓ 171	↓ 222	↓ 186	↓ 209
chinkapin oak	Quercus muehlenbergii	0	↑ 136	↑ 48	↑ 167	↑ 126
northern pin oak	Quercus ellipsoidalis	298	↓ 127	↓ 208	↓ 135	↓ 180
black cherry	Prunus serotina	426	↓ 108	↑ 699	↓ 115	↓ 369
river birch	Betula nigra	6	↑ 109	↑ 44	↑ 112	↑ 101
swamp white oak	Quercus bicolor	1	↑ 70	↑ 44	↑ 79	↑ 59
pin oak	Quercus palustris	0	↑ 55	↑ 47	↑ 65	↑ 58
quaking aspen	Populus tremuloides	489	↓ 45	↓ 101	↓ 59	↓ 95
eastern white pine	Pinus strobus	156	↓ 22	↓ 103	↓ 21	↓ 36
balsam poplar	Populus balsamifera	0	↑ 21	↑ 5	↑ 21	↑ 4
jack pine	Pinus banksiana	106	↓ 14	↓ 53	↓ 15	↓ 54
Ohio buckeye	Aesculus glabra	0	↑ 1	↑ 60	↑ 13	↑ 89
paper birch	Betula papyrifera	356	↓ 2	↓ 51	↓ 6	↓ 60
red pine	Pinus resinosa	143	↓ 3	↓ 16	↓ 3	↓ 10
black ash	Fraxinus nigra	77	↓ 2	↓ 53	↓ 2	↓ 34
butternut	Juglans cinerea	106	↓ 0	↓ 56	↓ 1	↓ 20
bigtooth aspen	Populus grandidentata	192	↓ 0	↓ 58	↓ 1	↓ 34

*- species not represented in the FIA that will have new potential habitat within the section

Importance value (IV) - Measure of abundance that accounts for both the tree basal area and number of stems, ranging from 0-100. Higher numbers are more abundant

Current IV Model- DISTRIB species habitat model for conditions in 2000

Hadley- Hadley Climate Model

PCM- Parallel Climate Model

GFCL- Geophysical Fluid Dynamics Laboratory GCM Model

GCM-General Circulation Model

APPENDIX A: Glossary

Acre: An area of land containing 43,560 square feet, roughly the size of a football field, or a square that is 208 feet on a side. A “forty” of land contains 40 acres, and a “section” of land contains 640 acres.

Age class: An interval, commonly ten years, into which the age range of trees or forest stands is divided for classification or use.

Stand examination list: List of stands to be considered for treatment in a particular year that was selected from the 10-year stand examination list. Treatment may include harvest, thinning, regeneration, prescribed burning, re-inventory, etc.

Artificial regeneration: Renewal of a forest stand by planting seedlings or sowing seeds.

Assessment: A compilation of information about the trends and conditions related to natural and socio-economic resources and factors. The initial round of Subsection Forest Resource Management Plans (SFRMP) will focus primarily on trends and conditions of forest resources. Standard core assessment information sources and products have been defined.

Basal area: The cross-sectional area of a tree taken at the base of the tree (i.e., measured at 4.5 feet above the ground). Basal area is often used to measure and describe the density of trees within a geographic area using an estimate of the sum of the basal area of all trees cross-sectional expressed per unit of land area (e.g., basal area per acre).

Biodiversity (biological diversity): The variety and abundance of species, their genetic composition, and the communities and landscapes in which they occur, including the ecological structures, functions, and processes occurring at all of these levels.

Biodiversity Significance: The relative value, in terms of size, condition, and quality, of native biological diversity for a given area of land or water. *(Adapted from Guidelines for MCBS Statewide Biodiversity Significance Rank):* The Minnesota County Biological Survey uses a statewide ranking system to evaluate and communicate the biodiversity significance of surveyed areas (MCBS Sites) to natural resource professionals, state and local government officials, and the public. MCBS Sites are ranked according to several factors, including the quality and types of *Element Occurrences*, the size and quality of native plant communities, and the size and condition of the landscape within the Site. Areas are ranked as *Outstanding, High, Moderate, or Below the Minimum Threshold* for statewide biodiversity significance. *(Draft definition 3/24/2004)*

Outstanding Sites: Those containing the best occurrences of the rarest species, the most outstanding examples of the rarest native plant communities, and/or the largest, most intact functional landscapes present in the state.

High Sites: Those containing the best of the rest, such as sites with very good quality occurrences of the rarest species, high-quality examples of the rarest native plant communities, and/or important functional landscapes.

Moderate Sites: Those containing significant occurrences of rare species and/or moderately disturbed native plant communities and landscapes that have a strong potential for recovery.

Sites Below the Minimum Threshold: Those lacking significant populations of rare species and/or natural features that meet MCBS minimum standards for size and condition. These include areas of conservation value at the local level, such as habitat for native plants and animals, corridors for animal movements, buffers surrounding higher quality natural areas, and open space areas.

Clearcut: The removal of all or most trees during harvest to permit the re-establishment of an even-aged forest. A harvesting method used to regenerate shade-intolerant species, such as aspen and jack pine.

Competition: The struggle between trees to obtain sunlight, nutrients, water, and growing space. Every part of the tree, from the roots to the crown, competes for space and food.

Connectivity: An element of spatial patterning where patches of vegetation such as forest types, native plant communities, or wildlife habitats are connected to allow the flow of organisms and processes between them.

Conversion: A change through forest management from one tree species to another within a forest stand or site.

Cord: A pile of wood 4 feet high, 4 feet wide, and 8 feet long, measuring 128 cubic feet, including bark and air space. The actual volume of solid wood may vary from 60 to 100 cubic feet, depending on the size of individual pieces and how tight the wood is stacked. In the lake states, pulpwood cords are usually four feet x four feet x 100 feet and contain 133 cubic feet. The pulpwood volume of standing trees is estimated in cords. For example, a 10-inch DBH tree, which is 70 feet tall, is about 0.20 cords; or five trees of this size would equal one cord of wood.

Cord Equivalent: Forest product units of measure converted to cords.

Corridor: A defined tract of land connecting two or more areas of similar habitat type through which wildlife species can travel.

Cover-type: Expressed as the tree species having the greatest presence (i.e., in terms of volume for older stands or number of trees for younger stands) in a forest stand. A stand where the major species is aspen would be called an aspen cover type.

Cover type distribution: The location and/or proportionate representation of cover types in a forest or a given geographic area.

Cubic foot: A wood volume measurement containing 1,728 cubic inches, such as a piece of wood measuring one foot on a side. A cubic foot of wood contains approximately six to 10 usable board feet of wood. A cord of wood equals 128 cubic feet.

Ecological classification system (ECS): A method to identify, describe, and map units of land with different capabilities to support natural resources. This is done by integrating climatic, geologic, hydrologic, topographic, soil, and vegetation data. (See Appendix A.)

Endangered species: A plant or animal species that is threatened with extinction throughout all or a significant portion of its range in Minnesota.

Even-aged: A forest stand composed of trees of primarily the same age or age class. A stand is considered even-aged if the difference in age between the youngest and oldest trees does not exceed 20 percent of the rotation age (e.g., for a stand with a rotation age of 50 years, the difference in age between the youngest and oldest trees should be ten years).

Extirpated: The species is no longer found in this portion of its historical range.

Forest inventory and analysis (FIA): A statewide forest survey of timber lands jointly conducted by the DNR and the U.S. Department of Agriculture—Forest Service that periodically, through a system of permanent plots, assesses the current status of and monitors recent trends in, forest area, volume, growth, and removals.

Forest Inventory Module (FIM): The FIM provides a database and application through which field foresters can maintain an integrated and centralized inventory of the forests on publicly owned lands managed by the Division of Forestry and other divisions. In the field, foresters collect raw plot and tree data. Those data are summarized in stand-level data that are linked to a spatial representation of stand boundaries. Part of the DNR's **FOR**estry **I**nformation **S**ysTem (FORIST).

Forest land: Consists of all lands included in the forest inventory, from aspen and pine cover types to stagnant conifers, muskeg, lowland brush, and lakes.

Forest management: the practical application of biological, physical, quantitative, managerial, economic, social, and policy principles to the regeneration, management, utilization, and conservation of forests to meet specified goals and objectives while maintaining the productivity of the forest. Note: forest management includes management for aesthetics, fish, recreation, urban values, water, wilderness, wildlife, wood products, and other forest resource values.

From: The Dictionary of Forestry. 1998. The Society of American Foresters. J.A. Helms, ed.

Forest road: A temporary or permanent road connecting the remote parts of the forest to existing public roads. Forest roads provide access to public land for timber management, fish and wildlife habitat improvement, fire control, and a variety of recreational activities. The Division of Forestry has three classifications for roads and access routes:

Forest stand: A group of trees occupying a given area and sufficiently uniform in species composition, age, structure, site quality, and condition so as to be distinguishable from the forest in adjoining areas.

Globally Imperiled Communities (G1G2): Refers to areas identified by *NatureServe* as highest ranking globally imperiled native plant communities. Through forest certification, the Department is required to identify and appropriately manage these identified communities.

Game Species: In this plan, *game* species include those terrestrial species that are hunted and trapped.

Gap Analysis (GAP): Data produced to provide ownership and land cover information for the USGS [Gap Analysis Project](#).

Group selection: A process of harvesting patches of selected trees to create openings in the forest canopy and to encourage the reproduction of uneven-aged stands.

Growth stage: Growth stages of native plant communities as presented in the *Field Guide to the Native Plant Communities of Minnesota: The Laurentian Mixed Forest Province* are periods of stand maturation where the mixture of trees in the canopy is stable. Growth stages are separated by periods of transition where tree mortality is high and different among the species, usually involving the death of early successional species and replacement by shade-tolerant species or longer-lived species.

Habitat: An area in which a specific plant or animal normally lives, grows, and reproduces; the area that provides a plant or animal with adequate food, water, shelter, and living space.

High Conservation Value Forests: HCVFs are defined as *areas of outstanding biological or cultural significance*. Through Certification, the Department is required to manage for a broad set of objectives and forest resources, including the management and protection of rare species, communities, features, and values across the landscape. This commitment requires certificate holders to identify High Conservation Value Forests (HCVFs) and manage such areas to “maintain or enhance” identified High Conservation Values (HCVs).

Intermediate cut: The removal of immature trees from the forest sometime between establishment and major harvest with the primary objective of improving the quality of the remaining forest stand.

Issue: A natural resource-related concern or conflict that is directly affected by, or directly affects, decisions about the management of vegetation on lands administered by the DNR divisions of Forestry and Fish and Wildlife. Relevant issues will likely be defined by current, anticipated, or desired resource conditions and trends, threats to resources, and vegetation management opportunities. The key factor in determining the importance of issues for SFRMP is whether vegetation management issues can address the issue in whole or substantial part on DNR-administered lands.

Landform: Any physical, recognizable form or feature of the earth’s surface, having a characteristic shape and produced by natural causes. Examples of major landforms are plains, plateaus, and mountains. Examples of minor landforms are hills, valleys, slopes, eskers, and dunes. Together, landforms make up the surface configuration of the earth. The “landform” concept involves both empirical descriptions of a terrain (land-surface form) class and interpretation of genetic factors (“natural causes”). (An Ecological Land Classification Framework for the United States, 1984, p. 40).

Landscape: A general term referring to geographic areas that are usually based on some sort of natural feature or combination of natural features. They can range in scale from very large to very small. Examples include watersheds (from large to small), the many levels of the ECS, and Minnesota Forest Resources Council (MFRC) regional landscapes. The issue being addressed usually defines the type and size of the landscape to be used.

Managed acres: Timberland acres that are available for timber management purposes.

Management pool: In this plan, the acres that are available for timber management purposes.

Marketable timber: Merchantable timber that is accessible now.

Mesic: Moderately moist.

MCBS Sites: Areas of land identified by Minnesota County Biological Survey (MCBS) staff, ranging from tens to thousands of acres in size, selected for survey because they are likely to contain relatively undisturbed native plant communities, large populations, and/or concentrations of rare species, and/or critical animal habitat. The site provides a geographic framework for recording and storing data and compiling descriptive summaries.

Mortality: Death or destruction of forest trees as a result of competition, disease, insect damage, drought, wind, fire, or other factors.

Multi-aged stand: A stand with two or more age classes.

Multiple use: Using and managing a forested area to provide more than one benefit simultaneously. Common uses may include wildlife, timber, recreation, and water.

Native plant community: A group of native plants that interact with each other and with their environment in ways not greatly altered by modern human activity or by introduced organisms. These groups of native plants form recognizable units, such as an oak forest, prairie, or marsh, that tend to reoccur over space and time. Native plant communities are classified and described by physiognomy, hydrology, landforms, soils, and natural disturbance regimes (e.g., wildfires, wind storms, and normal flood cycles).

Natural Area: An area of land with significant native biodiversity, where a primary goal is to protect, enhance or restore ecological processes and Native Plant Community composition and structure. An MCBS *Site* of Outstanding or High biodiversity significance is often recommended for nomination as a natural area. For these Sites, an MCBS *Ecological Evaluation* is written to characterize the ecological significance of the Site as a whole and to serve as a guide for conservation action by the various landowners. Sites (or portions of Sites) that are recommended as natural areas may be identified by the landowner or land management agency for conservation activities such as designation as a (city, county, state, private) park, non-motorized recreation area, scientific and natural area, reserve, special vegetation management (e.g., natural disturbance based forest management for maintenance of mature growth stage), etc. (*Draft definition 3/24/2004*)

Natural disturbances: Disruption of existing conditions by natural events such as wildfires, windstorms, drought, flooding, insects, and disease. Natural disturbances may range in scale from one tree to thousands of acres.

Natural regeneration: The growth of new trees in one of the following ways: (a) from seeds naturally dropped from trees or carried by wind or animals, (b) from seeds stored on the forest floor, or (c) from stumps that sprout or roots that sucker.

Standard DNR rotation age: For even-aged managed cover types, the rotation age for non-Wildlife administered and non-SMA lands.

Old-growth forests: Forests defined by age, structural characteristics, and relative lack of human disturbance. These forests are essentially free from catastrophic disturbances and contain old trees (generally over 120 years old), large snags, and downed trees. Additional details on the management of old-growth forests on DNR-administered lands are contained in Old-Growth Guidelines (1994).

Old forest management complex: Represents an area of land made up of several too many stands that are managed for old-growth, special management zone (SMZ), and extended rotation forest (ERF) in the vicinity of designated old growth stands.

Open or Brushland Landscape Management Area - Forests or patches of trees in these areas that are managed to benefit species with open landscape habitat requirements.

Partial cut: A cutting or harvest of trees where only some of the trees in a stand are removed.

Patch: An area of forest that is relatively homogenous in structure, primarily in height and stand density, and differs from the surrounding forest. It may be one stand or a group of stands.

Plantation: A stand composed primarily of trees established by planting or artificial seeding.

Prescribed burn: To deliberately burn wildlands (e.g., forests, prairie, or savanna) in either their natural or modified state and under specified conditions within a predetermined area to meet management objectives for the site. A fire ignited under known conditions of fuel, weather, and topography to achieve specific objectives.

Prescription: A planned treatment (clear-cut, selective harvest, thin, reforest, reserve, etc.) designed to change the current stand structure to one that meets management goals. A written statement that specifies the practices to be implemented in a forest stand to meet management objectives. These specifications reflect the desired future condition at the site and landscape level and incorporate knowledge of the special attributes of the site.

Pulpwood: Wood cut or prepared primarily for manufacture into wood pulp or chips for subsequent manufacture into paper, fiberboard, or chipboard. Generally, trees 5 to 12 inches in diameter at breast height are used.

Rare plants. Rare plants tracked are all species that are listed as Federally endangered, threatened, or as candidates for Federal listing; all species that are State listed as endangered, threatened, or special concern. Several rare species are also tracked, which currently have no legal status but need further monitoring to determine their status.

Rare animals. All animal species that are listed as Federally endangered or threatened (except the gray wolf) are tracked, as well as all birds, small mammals, reptiles, amphibians, mussels, and butterflies that are listed as State endangered, threatened, or special concern.

Rare species: A plant or animal species designated as **endangered, threatened,** or of **special concern** by the state of Minnesota (this includes all species designated as endangered or threatened at the federal level) or an uncommon species that does not (yet) have an official designation, but whose distribution and abundance need to be better understood.

Regeneration: The act of renewing tree cover by establishing young trees naturally (e.g., stump sprouts, root suckers, natural seeding) or artificially (e.g., tree planting, seeding).

Representative Sample Areas (RSAs): Ecologically viable representative samples designated to serve one or more of three purposes: 1) To establish and/or maintain an ecological reference condition; or 2) To create or maintain an under-represented ecological condition; or 3) To serve as a set of protected areas or refugia for species, communities and community types not captured in other Criteria of this Standard.

Reserved forestland: Forestland withdrawn from timber utilization through statute, administrative regulation, or designation.

Rotation age: The period of years between when a forest stand (i.e., primarily even-aged) is established (i.e., regeneration) and when it receives its final harvest. This time period is an administrative decision based on economics, site condition, growth rates, and other factors.

Ruffed Grouse Management Areas (RGMAs) - Ruffed grouse management areas are managed to supply all of the habitat needs of ruffed grouse, as well as other species with similar habitat requirements, such as woodcock.

Salvage cut: A harvest made to remove trees killed or damaged by fire, wind, insects, disease, or other injurious agents. The purpose of salvage cuts is to use available wood fiber before further deterioration occurs to recover the value that otherwise would be lost.

Sanitation cut: A cutting made to remove trees killed or injured by fire, insects, disease, or other injurious agents (and sometimes trees susceptible to such injuries) for the purpose of preventing the spread of insects or diseases.

Scientific and natural areas (SNAs): Areas established by the DNR, Division of Ecological Services, to preserve natural features and rare resources of exceptional scientific and educational value.

Selective harvest: Removal of single scattered trees or small groups of trees at relatively short intervals. The continuous establishment of reproduction is encouraged, and an all-aged stand is maintained. A management option used for shade-tolerant species.

Shelterwood harvest: A harvest cutting in which trees on the harvest area are removed in a series of two or more cuttings to allow the establishment and early growth of new seedlings under partial shade and protection of older trees. Produces an even-aged forest.

Silviculture: The art and science of establishing, growing, and tending stands of trees. The theory and practice of controlling the establishment, composition, growth, and quality of forest stands to achieve certain desired conditions or management objectives.

Site index (SI): A species-specific measure of actual or potential forest productivity or site quality, expressed in terms of the average height of dominant trees at specific key ages, usually 50 years in the eastern U.S.

Special concern species: A plant or animal species that is extremely uncommon in Minnesota or has a unique or highly specific habitat requirement and deserves careful monitoring. Species on the periphery of their ranges may be included in this category, as well as species that were once threatened or endangered but now have increasing or stable and protected populations.

Special management zone (SMZ): a buffer immediately surrounding designated old-growth forest stands. It is intended to minimize edge effects and windthrow damage to old-growth stands. The minimum width is 330- feet from the edge of the old-growth stand. Timber harvest is allowed in the SMZ, but there are limitations on how much can be clearcut at any given time.

Stand: A contiguous group of trees similar in age, species composition, and structure, and growing on a site of similar quality, is a distinguishable forest unit. A forest is comprised of many stands. A **pure stand** is composed of essentially a single species, such as a red pine plantation. A **mixed stand** is composed of a mixture of species, such as a northern hardwood stand consisting of maple, birch, basswood, and oak. An **even-aged stand** is one in which all of the trees present are essentially the same age, usually within ten years of age for aspen and jack pine stands. An **uneven-aged stand** is one in which a variety of ages and sizes of trees are growing together on a uniform site, such as a northern hardwood stand with three or more age classes.

Stand age: The average age of the main species within a stand.

Stand examination list: DNR forest stands to be considered for treatment (e.g., harvest, thinning, regeneration, prescribed burning, reinventory, etc.) over the planning period based on established criteria (e.g., rotation age, site index, basal area, desired future cover-type composition, etc.). These stands will be assigned preliminary prescriptions, and most will receive the prescribed treatment. However, based on field appraisal visits, prescriptions may change for some stands because of new information on the stand or its condition.

State forest road: Any permanent road constructed, maintained, or administered by the DNR for the purposes of accessing or traversing state forest lands.

Strategic planning: A process to plan for desired future states. Includes aspects of a plan or planning process that provide statements and guides for future direction. The geographic, programmatic, and policy focus can range from very broad and general to more specific in providing tiers/levels of direction. Strategic planning is usually long-term (i.e., at least five years, often longer). It usually includes an assessment of current trends and conditions (e.g., social, natural resource, etc.), opportunities, and threats; identification of key issues; and the resulting development of goals (e.g., desired future conditions), strategies, and objectives. Vision and mission statements may also be included.

Subsection: A subsection is one level within the ECS. From largest to smallest in terms of geographic area, the ECS is comprised of the following levels: Province, Section, Subsection, Land Type Association, Land Type, and Land Type Phase. Subsections areas are generally one to four million acres in Minnesota, with the average being 2.25 million acres. Seventeen subsections are scheduled for the SFRMP process.

Section forest resource management plan (SFRMP): A DNR plan for vegetation management on forest lands administered by DNR Divisions of Forestry and Fish and Wildlife that uses ECS Sections as the basic unit of delineation. The initial focus will be to identify forest stands and road access needs for the duration of the 10-year plan. There is potential to be more comprehensive in the future.

Succession: The natural replacement, over time, of one plant community with another.

Thinning: A silvicultural treatment made to reduce the density of trees within a forest stand primarily to improve growth, enhance forest health, or recover potential mortality. **Row thinning** is where selected rows are harvested, usually the first thinning, which provides equipment operating room for future selective thinnings. **Selective thinning** is where individual trees are marked or specified (e.g., by diameter, spacing, or quality) for harvest. **Commercial thinning** is thinning after the trees are of merchantable size for timber markets. **Pre-commercial thinning** is done before the trees reach a merchantable size, usually done in overstocked (very high stems per acre) stands to provide more growing space for crop trees that will be harvested in future years.

Threatened species: A plant or animal species that is likely to become endangered within the foreseeable future throughout all or a significant portion of its range in Minnesota.

Timberland: Forestland capable of producing timber of marketable size and volume at the normal harvest age for the cover type. It does not include lands withdrawn from timber utilization by statute (e.g., Boundary Waters Canoe Area Wilderness) or administrative regulation such as designated old growth forests and state parks. On state forest lands, this includes stands that can produce at least three cords per acre of merchantable timber at the normal harvest age for that cover type. It does not include very low-productivity sites such as those classified as stagnant spruce, tamarack, cedar, offsite aspen, or nonforest land.

Timber productivity: The quantity and quality of timber produced on a site. The rate at which timber volume is produced per unit area over a period of time (e.g., cords per acre per year). The relative capacity of a site to sustain a level of timber production over time.

Understory: The shorter vegetation (shrubs, seedlings, saplings, small trees) within a forest stand that forms a layer between the overstory and the herbaceous plants of the forest floor.

Uneven-aged stand: A stand of trees of a variety of ages and sizes growing together on a uniform site. A stand of trees with three or more distinct age classes.

Uneven-aged management: Forest management resulting in a forest stand that is comprised of intermingling trees or small groups that have three or more distinct age classes. Best suited for shade-tolerant species.

Volume: The amount of wood in a tree or stand according to some unit of measurement (board feet, cubic feet, cords) or some standard of use (pulpwood, sawtimber, etc.).

Well-stocked: The situation in which a forest stand contains trees spaced widely enough to prevent competition yet close enough to utilize the entire site.

Wildlife management area (WMA): Areas established by the DNR, Division of Fish and Wildlife, to manage, preserve and restore natural communities, perpetuate wildlife populations, and provide recreational and educational opportunities.

DRAFT

Appendix B: Acronyms

Acronym	Definition
DBH	Diameter at Breast Height
DNR	Department of Natural Resources
ECS	Ecological Classification System
ETS	Endangered, Threatened, or Special Concern
FIA	Forest Inventory and Analysis
FIM	Forest Inventory Module
FORIST	Forest Information System
FY	Fiscal Year
G1G2	Globally Critically Imperiled (G1) and Globally Imperiled (G2) Native Plant Communities
GAP	Gap Analysis Program
GM	Gypsy Moth
HCVF	High Conservation Value Forest
MCBS	Minnesota County Biological Survey
NHIS	Natural Heritage Information System
NPC	Native Plant Community
PP	Paleozoic Plateau
OFMC	Old Forest Management Complex
SFRMP	Subsection Forest Resource Management Plan
SGCN	Species in Greatest Conservation Need
SI	Site Index
SMA	Special Management Area
SMZ	Special Management Zone
SNA	Scientific and Natural Area
WMA	Wildlife Management Area

APPENDIX C: METADATA

<i>Data</i>	<i>Date(s)</i>	<i>Source</i>	<i>Size of Data Area</i>	<i>Spatial Resolution</i>	<i>Summary</i>	<i>Pros (+) / Cons (-)</i>
Forest Inventory Module FIM	2010 2017 2021	Aerial photos and ground surveys	Minnesota Stand Level, Public Forest Lands	1 to 3 acres	An updated version of CSA.	+ Detailed forest stand information - Only land managed by public agencies
Forest Inventory and Analysis FIA	1977 1990	Aerial photos and ground surveys	Minnesota, Plot Level	1225 acres represented per plot	A federally funded inventory of the state's forest resources: their type, extent, growth, mortality, and removals.	+ Detailed forest stand information + Represents public and private lands - Poor spatial resolution
GAP Stewardship	2008	PLS Sections and ownership data	Minnesota	40 acres	Database containing land ownership information. Attribute fields describe ownership, administrator, and conservation management code	+ Best data available to get quickly get an idea of land ownership. -Inaccurate below 40-acre level.
National Land Cover Dataset (NLCD)	2016	Aerial photos and satellite images	Conterminous United States	30 meters	Shows land use broken down by 16 different land cover classifications.	+Recognize and evaluate types of land use changes
Natural Heritage Information System	2021	MNDNR Section of Ecological Services, Nongame Program	Varies according to completion of CBS in the state.		Displays inventory of native plant communities, rare species, and biodiversity.	+ Extensive habitat classification - Not complete statewide - Different standards statewide