10 134.0 Marsh


An area of Type 10 NFI

This type represents several lowland pockets. The majority of the type is covered by lowland grasses, sedges, and pockets of cattails and/or speckled alder shrubs. Much of this type was open water 10 years ago. These areas are generally considered unproductive for growing trees, but often contain several varieties of wetland flowers and other unique plants.

Value to wildlife: To migrating waterfowl, a marsh is a good place to refuel before heading south. In many cases, a marsh is a rich oasis, producing a superabundance of plant, animal, and insect life. Animals and birds utilizing marshes swim, wade, are able to hover, dive, and take off in restricted places, and can perch on vertical stems. Marsh wrens and red-winged blackbirds balance neatly on bulrush stems. You might hear the booming "oong-KA-chunk" call of the American bittern. Muskrats and minks slip stealthily through the cattails. Many marsh-related wildlife species are adapted to the edge, where they can retreat to the more upland habitat if the wetland dries out.[1]


Male red-winged blackbird NFI

Plan Preparer's Recommendation:

Reserve for wildlife habitat, water conservation, and other wetland benefits. Nest structures for waterfowl could be erected in appropriate habitat areas — mallards, especially, would benefit from nesting structures in this type adjacent to the ponds in the north-central area of this block.

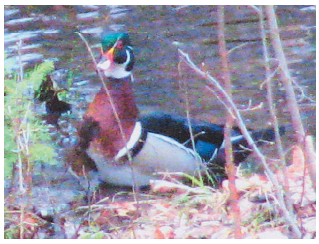
For More Information, Refer to Your Binder:

Section	Title
Water Wildlife Front Cover Pocket	 Lowland Grass & Brush Notes from *Woodworking for Wildlife*: Mallard

[1] Benyus, Janine M., *Northwoods Wildlife - A Watcher's Guide to Habitats* (with permission).

11 31.0 Pond or Lake

This type represents all or portions of three small, permanent bodies of open water. The water levels appear to be relatively stable over the recent past — the type was much larger in the past when the water levels were higher. Flooded trees in the northeastern portion retain a few great blue heron nests — the trees will eventually rot and fall. No other locations on the property currently have flooded timber to provide nesting sites for herons — beaver activity might, in time, create more suitable habitat.



Wood duck drake NFI

Value to wildlife: The seclusion and protection that woodland ponds afford wildlife can attract a variety of species. The shorelines often provide a smorgasbord of water-based foods, including plants, minnows, crustaceans, insects, amphibians, and reptiles. The warm, shallow waters in the summer provide good fishing for wading birds and dabbling ducks. Frogs and salamanders ascend in droves in the spring — the relatively "waveless" water provides a stable place for these amphibians to lay their eggs. Watch for signs of minks, otters, beavers, fox, deer, skunks, raccoons, herons, sandpipers, and wood ducks along the shore. Songbirds often hunt the insects attracted to the flowers on the shoreline.[1]

Plan Preparer's Recommendation:

Reserve for wildlife habitat, water conservation, and other wetland benefits. Erect nesting structures for mallards. If leeches are being harvested in these wetlands, consider limiting the harvest to maintain a viable source of food for waterfowl and other wildlife that depend on leeches for food.

For More Information, Refer to Your Binder:

Section	Title
Water and Wetlands	Managing Your Woodland Wetland
Front Cover Pocket	Notes from *Woodworking for Wildlife*: Mallard

[1] Benyus, Janine M., *Northwoods Wildlife - A Watcher's Guide to Habitats* (with permission).

1 120.0 Hardwood Poletimber/Saplings

Basswoods with top dieback in Type 1 NFI

This type, which is similar to Type 1 in the North Block, represents areas of low density northern hardwoods. A variable mix of American basswood and sugar maple dominates with some bur and northern red oak. Other species present are paper birch, American elm, and black ash. The mature quaking aspen trees were harvested from this type 21 to 25 years ago. Some harvesting of basswood and red oak occurred over the past approximately 25 years. In general, the overstory in this type is of lower density than in the North Block. Sapling and small pole-size sugar maple trees, and to a lesser degree ironwood, have replaced the aspens as the dominant younger age class over the past 10 years (some of the aspen regeneration pockets have been moved to Type 5). Other regeneration tree species (scattered and in clumps) include American basswood, paper birch, and bur and northern red oak, as well as some quaking aspen. Most of the birch and oak regeneration is associated with disturbed areas such as old logging trails and landings. More than 50 percent of the understory in the type is overstocked, limiting tree growth and productivity. The majority of the overstory trees are 90 to 100 years old, with scattered 150-year-old (and older) sugar maples and bur oaks. The productivity and quality of the basswood are good where it is growing in a group with other trees. However, many of the basswoods were heavily affected by recent droughts, and dead tops are common throughout — the overall effect of the dead tops on the timber quality is unknown. Basswoods of the productivity here mature at age 90 and a significant percentage develop center rot by 110 years. Much of the basswood is in the 12- to 14-inch diameter range, with a small component of 16- to 19-inch trees. The larger diameter class will produce good quality sawtimber and is ready for harvest. The scattered basswoods have deteriorated and are generally in poor condition. The quality of the sugar maple, while good for this area, is generally poor for timber production — a few selected trees might produce moderate quality sawtimber. A few live American elms were observed — Dutch elm disease has been gradually killing the pole-size elms in this region for about 30 years. Many small wetlands are found throughout. The sugar maples have shaded out much of the understory shrubs. Currently, the understory is primarily low density patches of beaked hazel with leatherwood and chokecherry. The groundcover has thinned and is now mostly forbs such as asters, sarsaparilla, lopseed, spikenard, and large-flowered bellwort — Pennsylvania sedge and mountain rice grass are common.

Sugar maple NFI

Age: 90-100/20-25 years; Site Quality: Medium (SI=60); Total Timber Volume: 5-10 cords/acre, Average Tree Diameter: 12/4 inches

Management Options:

1. Allow natural succession to continue and the now-mature basswood and red oak will decline over the next 20 years. Basswood mortality can be expected to

continue and accelerate. Sugar maple will gradually become more dominant and replace much of the basswood and red oak component. The scattered aspens will mature in about 15 to 20 years and then begin to decline.

2. In the next five years, harvest the mature basswood and red oak in the overstory in one-third or more of the type to promote improved regeneration and provide continued tree age diversity for wildlife habitat. Harvest the scattered, poor quality sugar maples and other hardwoods. Reserve the larger sugar maples, including some cull trees, for wildlife. Reserve the wooded lowlands for wildlife habitat and other wetland benefits.

3. Thin the understory to promote larger, heathier hardwoods. Reserve and favor the scattered basswoods and oaks over the sugar maples. Reduce the tree stocking level to 300 healthy stems per acre or less.

4. Establish a series of two-acre wildlife openings by bulldozing areas with sparse vegetation. The areas should be strategically located to be used as both wildlife openings and permanent log landings. When established, These areas provide a number of key spring and fall habitat requirements for white-tailed deer and ruffed grouse. After being cleared of debris and stumps, the openings will need to be disked and seeded to a cover crop. A mixture of clover, legumes, and grasses is usually seeded. The need to mow these areas yearly is optional. A good "catch" of the seeding might remain productive for two to four years before it needs to be disked and re-seeded. If farming equipment is readily available, winter wheat or rye would provide even better nutrition for the deer. The advantage of these crops is their availability to the deer in the fall and early spring. The disadvantage is that they require intensive yearly attention.

Plan Preparer's Recommendation:

Option 2 will help meet your goals of realizing periodic income from wood production, maintaining the current forest types, featuring the appearance of big trees, and maintaining habitat for a variety of wildlife species. Basswood, paper birch, and sugar maple would be the primary species to be thinned. Option 4 would help to meet your goal of permanently preserving the upland openings (and would expedite timber management operations).

For More Information, Refer to Your Binder:

Section	Title
Tree Species	Northern Hardwoods
	Oaks
	Lowland Hardwoods
Wildlife	Managing Your Woodland for Wildlife
	Woodlands and Nongame Wildlife
Forest Stand Improvements	Timber Stand Improvement: Deciduous

2 23.0 Overmature Aspen/Immature Basswood Poletimber

Basswood & ironwood in Type 2 NFI

This type, in the eastern eighty of the South Bock, is a mix of overmature quaking aspen and immature American basswood. (Some of the areas of low density aspen have been moved to Types 4 and 6.) There is also some quality northern red oak poletimber and a minor component of sugar maple and bur oak. The aspen, although in poor condition with a high amount of rot and mortality overall, is still marketable for timber. The now near-mature basswood and red oak trees are mostly healthy, but growth has slowed. Basswood and red oak of the productivity here mature at about 90 years. The mature and immature species are intermixed, creating a challenge to management. The understory is light to medium density beaked hazel with low density sugar maple and ironwood saplings. The groundcover is light density forbs and fallen leaves. Some oversize aspens (20-plus inches in diameter) are found in portions of the type — some of this large material might not be marketable. The soil is productive for growing aspen — for the trees here, 45 years is considered mature. The loam soil is best suited for handling heavy harvesting equipment in winter or during dry portions of the growing season.

Age: 80-86 years; Site Quality: Aspen - Good (SI=75+); Total Timber Volume: 20-25 cords/acre; Average Tree Diameter: 12-14 inches

Management Options:

1. Allow natural succession to continue and the present stand of aspen will die out in the next 10 to 20 years, leaving a moderately stocked northern hardwood stand with a sugar maple understory.

2. Harvest the stand within five years, before a significant proportion of the timber is lost to rot and disease. Clearcut to open the soil to sunlight to stimulate root sprouting of aspen and stump sprouting of northern hardwoods. Reserve the bur oaks for wildlife habitat — acorns for food and holes for cavity-nesters. Fell or run down the light density brush and hardwoods sprouts.

3. Harvest most of the type as described in Option 2, but reserve the denser pockets of northern hardwoods. Manage for quality basswood, which will mature in about 15 years.

Plan Preparer's Recommendation:

Option 2 will best meet your goals of maintaining the current forest types and providing periodic income from the harvest of timber. Harvest the short-lived or poor quality hardwoods within the type to help open the cutting areas to sunlight, which stimulates aspen sprouting. In addition to some of the oaks, reserve any standing dead or rotten trees as habitat for cavity dwelling birds and mammals.

For More Information, Refer to Your Binder:

Section	Title
Tree Species	Aspen
	Aspen Management: Harvest and Regeneration
	Northern Hardwoods
	Oaks
Harvest	
Wildlife	Northern Minnesota Young Forests

3 24.0 Basswood/Red Oak Poletimber

This type is similar to Type 3 in the North Block. It is a moderately stocked, medium quality northern hardwood type dominated by American basswood with a significant northern red oak component. Pole-size bur oak, paper birch, sugar maple, and ironwood trees were also observed. The aspen trees were harvested from this type at the same time as in most of the other types (10 to 15 years ago). The basswood and red oak trees, which are mature to overmature, range in age from 90 to 120 years. The western stand is the oldest, with many of the overmature trees containing significant rot. Basswoods with dead tops, and some mortality, are found throughout. The productivity and quality of the basswoods vary from poor to moderate — there is a significant amount of small and crooked trees. Basswoods of the productivity here mature at age 90 and a significant percentage develop center rot by 110 years. Much of the basswood is in the 10- to 13-inch diameter range.

Ironwood "hop" NFI

The quality of the red oak is medium for this area — some top dieback and scattered mortality occurred during the drought years of the 1980s. The paper birch trees are overmature and in decline. The understory is primarily light density sugar maple and ironwood saplings and patchy beaked hazel shrubs. The groundcover is light density forbs and leaf litter. The terrain is gently rolling. The oaks' acorns provide a high quality source of nutrition for a wide variety of wildlife species.

Age: 90-120 years; Site Quality: Basswood - Excellent (SI=60+), Red oak - Good (SI=60); Average Tree Density: Medium (BA=50-70); Total Timber Volume: 12-17 cords/acre (50 percent basswood); Average Tree Diameter: 10-13 inches

Management Options:

1. Allow natural succession to continue and the paper birch will die out in less than 10 years. The basswoods and oaks have lifespans that exceed 150 years under normal climatic conditions. The open pockets created by paper birch mortality will gradually fill in with shade-tolerant species such as sugar maple and ironwood.

2. In the next five years, begin a shelterwood harvest. Red oaks are shade-intolerant and basswoods are somewhat shade-intolerant and regenerate best when openings are created to allow sunlight to reach the ground. Most of the natural regeneration will be from red oak and basswood stump sprouts with some additional seedlings from acorns (if present). The area could also be planted with red oak. Some tubular tree shelters might be used to prevent animal browsing on both the stump sprouts and planted seedlings. Where basswood regeneration is desired, the competing young hardwoods should be controlled by cutting.

Plan Preparer's Recommendation:

Option 2 would best meet the goal of maintaining the current forest types. Harvest during the winter to avoid soil rutting and compaction. . Markets for these timber species vary considerably from year to year — sometimes it is better to wait than to sell at low stumpage prices.

For More Information, Refer to Your Binder:

Section	Title
Tree Species	Northern Hardwoods Oaks Paper Birch Aspen
Forest Stand Improvements	Timber Stand Improvement: Deciduous

4 36.0 Immature Basswood/Bur Oak Poletimber

This is a pole-size northern hardwood type from which the aspen was harvested about 25 years ago. American basswood and bur oak trees are common throughout with patchy areas of poorly drained soils containing black ash and American elm. Red oak and sugar maple trees are found associated with the basswoods. The amount of the overstory that was removed during the harvest ranged from 40 to 90 percent. Portions of the type are moderately well stocked with basswood poletimber. Some of the basswoods have dead tops and there is scattered mortality. The bur oaks appear to be in generally good condition. A relatively high percentage of the basswoods are in clusters of two to four stems (resulting from stump sprouting). The overall quality and productivity of the basswood here is lower than in other types on the property. Most of the overstory appears to be in the 75- to 85-year-old age class and somewhat younger than previously measured. All ash species are threatened by the introduction of the invasive, nonnative emerald ash borer. Where 60 percent or more of the overstory was removed, the aspens root-sprouted — the sprouts are adequately stocked and vigorous only in the most open portions of this type. The type has portions with a very dense understory of beaked hazel and other shrubs. Other portions of the understory vary from lightly to densely stocked areas of sugar maple seedlings and saplings and scattered pockets of ironwood regeneration. The understory on the poorer drained soil has moderate to dense black ash regeneration with some prickly-ash shrubs. The groundcover is a light mixture of forbs with a high component of upland sedges. Dead and downed hardwoods are common in portions. Some rutting damage occurred during past logging on the poorly drained soils.

Black ash *NFI*

Age: 25/75 years average; Site Quality: Basswood - Good (SI=65); Total Timber Volume: 3-5 cords/acre; Stand Density: Low (BA=20-40); Average Tree Diameter: 1/10-11 inches

Management Options:

1. Allow natural succession to continue and sugar maple might replace the basswood and aspen to become the dominant species in the type. Infestation by the emerald ash borer could reduce the presence of ash.

2. In the next five to 10 years, thin the hardwoods in one-third or more of the type to improve the growing conditions and quality of the bur oak. Harvest much of the basswood, red oak, and black ash. Reserve the standing larger diameter sugar maple for aesthetics and nest cavities.

Plan Preparer's Recommendation:

Option 2 meets the goal of providing periodic income. The portions of this type with black ash could be included with the harvest of other types in anticipation of an emerald ash borer infestation (the beetles were discovered in Duluth in October 2015). The objective of a thinning would be to thin out the dying and smaller, poor quality basswood as well as some of the surrounding trees that might be crowding the better quality trees. If the density is not great enough or timber markets are

poor, reserve this area until the hardwoods are large enough to derive income from a thinning — when the trees reach 12 to 14 inches in diameter at breast height (four and one-half feet above the ground), in 10 to 15 years. Reserve most of the oaks for hard mast (acorn) production for wildlife.

For More Information, Refer to Your Binder:

Section	Title
Tree Species	Northern Hardwoods
	Aspen
	Oaks
Wildlife	Woodlands and Nongame Wildlife
Front Cover Pocket	Signs and Symptoms of the Emerald Ash Borer

5 91.0 Aspen Poletimber

This quaking aspen dominated type has transitioned from sapling to pole-size over the past 10 years. The type resulted from a timber harvest 21 to 27 years ago. (Part of this type, which is now dominated by sugar maple saplings and small poletimber, has been moved to Type 1.) This type differs from the previous types in that, except for a few pockets and scattered trees, most of the overstory was removed. The stocking of aspen varies from moderate to good. The portions of the type in the southernmost forty and the eastern eighty of the South Block have a greater percentage of hardwoods than in most of the rest of the type. Ironwood and ash species are very prevalent in the southern forty. Aspen of the productivity here matures at 45 years of age. Other regeneration tree species (scattered and in clumps) include American basswood, sugar maple, bur oak, northern red oak, green and black ash, paper birch, and ironwood. Most of the oak and birch regeneration is located in disturbed areas such as old logging trails and landings. Some residual poletimber was left scattered singly and in pockets after harvest. The species left were American basswood, bur oak, sugar maple, and paper birch. The overstory density (or crown cover) ranges from 10 to 20 percent. The understory is generally low density beaked hazel with some alternate-leaved dogwood and willow shrubs and a mix of other shrub species. The groundcover is a light mixture of forbs, upland sedges, and leaf litter.

Paper birch *NFI*

Age: 21-27 years; Site Quality: Good (SI=70+); Tree Density: Medium to high (2,000+ average stems/acre); Average Tree Diameter: 1-2 inches; Residual Stand Volume: 1-3 cords/acre

Plan Preparer's Recommendation:

To attain your goal of maintaining the current forest types, allow natural succession to continue and this area will produce aspen stands with fair to good density with lesser components of the other species listed above. Reserve the type until the stands mature, in about 20 to 25 years. The type can then be evaluated for extended rotation at that time. Extended rotation would provide habitat for area-sensitive wildlife species by increasing the harvest age to about 60 years (if the stands remain intact until then). The shade-tolerant hardwood component is not significant enough to consider release.

For More Information, Refer to Your Binder:

Section	Title
Tree Species	Aspen
	Aspen Management: Harvest and Regeneration
	Northern Hardwoods
Ecology	Minnesota's "Old Growth" Forests
Wildlife	Woodlands and Nongame Wildlife

6 120.0 Basswood/Sugar Maple Poletimber


Northern hardwoods in Type 6 NFI

This type represents areas of northern hardwoods dominated by American basswood with a significant sugar maple component. Portions of this type are found in both the South and East Blocks. Basswood dominates much of the area (50 percent of the volume) with sugar maple (20 percent of the volume) found throughout. Other tree species present are bur and northern red oak, black and green ash, and paper birch. There are a couple of "stray" eastern cottonwood trees along the public road — cottonwood is a bottomland species usually found on streams to the south and west of this region. Little timber harvesting, except for low density aspen, has occurred in this type in the recent past. The majority of the basswood and red oak trees are 75 to 80 years old in the South Block and 90 to 100 years old in the East Block. The sugar maple and bur oak trees range from 30 to 150-plus years old. The productivity and quality of the basswoods are fair to good, but top dieback is found throughout. Basswoods of the productivity here mature at age 90 and a significant percentage develop center rot by 110 years. Much of the basswood is in the 11- to 13-inch diameter range, with a small component of 16- to 19-inch diameter trees (mostly in the East Block) — the larger diameter class will produce some quality sawtimber and is ready for harvest. The quality of the sugar maple, while good for this area, is generally poor for timber production. There are some larger, poor quality sugar maple, and northern red and bur oak trees on top of the ridge in the East Block. In general, this land is moderately productive for basswood in the region. Some larger paper birch trees are found throughout — they are in decline. The understory is primarily light density beaked hazel with some prickly-ash. Sugar maple saplings and small poletimber and ironwood saplings are found in generally low to moderate density (200 to 400 stems per acre) throughout with a few very dense pockets. The groundcover is upland sedges with some forbs. The terrain is rolling with some steep drops to some small lowland basins and intermittent flowages. The oaks' acorns provide a high quality source of nutrition for a wide variety of wildlife species.


Eastern cottonwood NFI

Age: 70-90 years; Site Quality: Basswood - Good (SI=60), Aspen - Good (SI=70); Average Stand Density: Low (BA=60-90); Total Timber Volume: 10-15 cords/acre; Average Tree Diameter: 12 inches

Management Options:

1. Allow natural succession to continue and the basswood and sugar maple trees will dominate this type for several generations — they have lifespans that exceed 150 years under normal climatic conditions. The open pockets created by natural mortality will gradually fill in with aspen sprouts. The areas where a dense canopy of hardwoods remains will regenerate to shade- tolerant species such as sugar maple and ironwood.

2. Thin the basswoods and a few selected sugar maple, red oak, and paper birch trees to provide improved growing room for the remaining high quality trees. A professional forester should mark selected trees for harvesting (about 30 percent of the basal area) to improve the growing conditions for the remaining basswood and sugar maple. About 70 percent of the area might not need immediate attention.

3. In the next 10 to 15 years, on a third or more of the type, harvest the mature basswood and red oak in the overstory to promote improved regeneration and provide continued tree age diversity for wildlife habitat. Harvest the scattered poor quality sugar maple and other hardwoods. Reserve the larger sugar maples, including some cull trees, for wildlife. Reserve the lowlands for wildlife habitat and other wetland benefits.

4. Utilize the healthy and vigorous sugar maples with low timber value for maple syrup production.

5. The stand along Daigle Lake would be a suitable location for some well-built and properly placed and maintained wood duck nesting boxes. Many other birds, including goldeneyes, owls, hawks, and woodpeckers, use wood duck boxes. Predation on ducklings by raccoons, squirrels, and fishers can be reduced by placing duck boxes on poles with metal cones and 500 feet or more away from the water's edge.

Plan Preparer's Recommendation:

Option 2 will help meet your goals of realizing periodic income from wood production, maintaining the current forest types, featuring the appearance of big trees, and maintaining habitat for a variety of wildlife species. Basswood, ash, paper birch, and sugar maple would be the primary species to be thinned.

For More Information, Refer to Your Binder:

Section	Title
Tree Species	Northern Hardwoods
	Oaks
	Aspen
Forest Stand Improvements	Timber Stand Improvement: Deciduous
Wildlife	Managing Your Woodland for Wildlife
	Woodlands and Nongame Wildlife
Front Cover Pocket	How to Tap Maple Trees and Make Maple Syrup
	Notes from *Woodworking for Wildlife*: Wood Duck

7 8.0 Northern Hardwood Sawtimber

This type is a beautiful stand of predominantly overmature sawlog-size northern hardwoods. It represents the largest concentration of "big" trees on the property. The type is composed of American basswood, sugar maple, bur oak, northern red oak, paper birch, and ironwood. Most of the mature quaking aspen trees were harvested from the stand with the surrounding types 20 to 25 years ago. Due to the generally dense residual tree stocking, little aspen root sprouting occurred. The stand age was not determined, but appears to exceed 100 years. In general, there is some moderate quality sawlog material that is ready for harvest. Red oaks of the productivity here mature at between 110 and 120 years. Sugar maple also dominates portions of this type. Root rot and old age have claimed a few trees over the past few years. The understory is medium to heavy density ironwood (800 stems per acre) with a lesser amount of sugar maple (400 stems per acre) seedlings and saplings. This area is relatively open and pleasant to walk through. The groundcover is medium density sugar maple seedlings, light forbs, upland sedges, and fallen leaves.

Northern red oak NFI

Age: 100+ years; Site Quality: Basswood - Good (SI=65), Sugar Maple - Medium (SI=50); Tree Density: Low (BA=70-90); Total Timber Volume: 15-20 cords/acre; Average Tree Diameter 14+ inches

Management Options:

1. Allow natural succession to continue and the sugar maple and bur oak trees might continue to thrive for decades. The basswoods and red oaks will begin to slowly die out over the next 20 years. Over time, the type will become dominated by sugar maple and bur oak.

2. In the next five years, harvest selected trees to capture income from the maturing basswood and initiate basswood regeneration. Select the poorer quality, overmature, and dying basswoods and red oaks for harvesting. A second harvest would remove the remaining basswood in about 10 years.

Plan Preparer's Recommendation:

Option 2 will provide some income from timber as well initiating regeneration within the type. However, these are the largest trees on the property and this area could be reserved for aesthetic enjoyment — although some light thinning would not significantly alter the appearance.

For More Information, Refer to Your Binder:

Section	Title
Tree Species	Northern Hardwoods Oaks
Forest Stand Improvements	Timber Stand Improvement: Deciduous

8 30.0 Shrub Swamp


Willow flowers NFI

This type includes areas that are predominantly covered by tall, decadent speckled alder and willow shrubs. The majority of the area is very wet.

Plan Preparer's Recommendation:

Reserve these areas for management when the mature aspen on the property has died or been cut — they can then be sheared or cut to provide additional browse for edge-dependent wildlife species.

For More Information, Refer to Your Binder:

Section	Title
Water and Wetlands	Managing Your Woodland Wetland
Front Cover Pocket	Lowland Grass and Brush
	Managing Your Brushland for Wildlife

9 46.0 Marsh

This type represents several lowland pockets. The majority of the type is covered by lowland grasses, sedges, and pockets of cattails and/or speckled alder shrubs. These areas are generally considered unproductive for growing trees, but often contain several varieties of wetland flowers and other unique plants.

Cattail marsh NFI

Plan Preparer's Recommendation:

Reserve for wildlife habitat, water conservation, and other wetland benefits. Nest structures for waterfowl could be erected in appropriate habitat areas — the area around the small lake in the northern part of the South Block would be a great spot for some mallard baskets.

For More Information, Refer to Your Binder:

Section	Title
Water and Wetlands	Managing Your Woodland Wetland
Front Cover Pocket	Lowland Grass and Brush
	Notes from *Woodworking for Wildlife*: Mallard

10 16.4 Pond or Lake

"Beaver" pond NFI

This type, which included all or parts of three areas in the previous plan, has been changed to one permanent body of open water. The water levels appear to be relatively stable over the recent past.

Plan Preparer's Recommendation:

Reserve for wildlife habitat, water conservation, and other wetland benefits. Erect nesting structures for mallards. If leeches are being harvested here, consider limiting the harvest to maintain a viable source of food for waterfowl and other wildlife that depend on leeches for food.

For More Information, Refer to Your Binder:

Section	Title
Water and Wetlands	Managing Your Woodland Wetland
Front Cover Pocket	Notes from *Woodworking for Wildlife*: Mallard

150-200 acres Timber Stand Improvement

Row thinning NFI

Forest stands, natural and planted, can often be improved or protected to better meet your objectives. Practices such as thinning, pruning, or reduction of competing vegetation may be utilized to enhance the stand's ability to control erosion, provide wildlife habitat, improve aesthetics, or produce wood fiber.
[Project: Tree Stand Improvement]

200-250 acres Timber Harvesting

Logging slasher/loader NFI

Harvesting can enhance wildlife habitat, provide visual diversity, and yield wood fiber for your own use or for sale. Because of the long-term effects of harvesting on the environment, a well designed sale and cutting contract should be prepared specifically for the site. The appropriate voluntary site-level forest management guidelines should also be applied.
[Project: Timber Harvest]

20-30 boxes Wildlife Nest Boxes

Tree swallow NFI

Some nesting sites will be removed during the management of the timbered types on this property. Properly constructed and placed boxes, if maintained annually, can temporarily substitute for natural tree holes. To provide additional permanent nesting sites for waterfowl, birds, and small mammals, construct and erect nesting boxes in appropriate habitat areas.
[Project: Nesting Boxes]

Cost-Share Practice Details:

Type #	Units	Description	NRCS Code*	Dates	
				Planned	Completed
North Block					
1	60-80 acres	Forest Stand Improvement: Manage excess and poor quality regeneration	666	02/2017	
	60-80 acres	Forest Stand Improvement: Thin stump sprouts	666	08/2022	
2	25-35 acres	Forest Stand Improvement: Manage regeneration	666	02/2017	
	10-15 acres	Tree/Shrub Site Preparation	490	08/2018	
	10-15 acres	Tree/Shrub Establishment	612	05/2019	
	25-35 acres	Forest Stand Improvement: Thin stump sprouts	666	08/2022	
South & East Blocks					
1	40-50 acres	Forest Stand Improvement: Manage excess and poor quality regeneration	666	02/2017	
	40-50 acres	Forest Stand Improvement: Thin stump sprouts	666	08/2022	
2	10-15 acres	Forest Stand Improvement: Manage regeneration	666	02/2017	
	5-10 acres	Tree/Shrub Site Preparation	490	08/2018	
	5-10 acres	Tree/Shrub Establishment	612	05/2019	
	10-15 acres	Forest Stand Improvement: Thin stump sprouts	666	08/2022	

* See the Minnesota NRCS Conservation Practice Standard sheet(s) in the front cover pocket of your binder.

North Block

Type Number	Years 2016 through 2020	2021 through 2025	2026 through 2030
1	**Harvest %/Fell understory**	**Thin stump sprouts**	—
	Completed: Units:	Completed: Units:	Completed: Units:
2	**Harvest %/Fell understory**	**Thin stump sprouts**	—
	Completed: Units:	Completed: Units:	Completed: Units:
3	—	—	**Select harvest %**
	Completed: Units:	Completed: Units:	Completed: Units:
4	—	**Select harvest**	—
	Completed: Units:	Completed: Units:	Completed: Units:
5	**Harvest**	—	—
	Completed: Units:	Completed: Units:	Completed: Units:
6	—	—	**Harvest**
	Completed: Units:	Completed: Units:	Completed: Units:
7	—	—	—
	Completed: Units:	Completed: Units:	Completed: Units:
8	**Optional: Plant conifers**	—	—
	Completed: Units:	Completed: Units:	Completed: Units:
9	—	—	—
	Completed: Units:	Completed: Units:	Completed: Units:

South & East Blocks

Type Number	Years 2016 through 2020	2021 through 2025	2026 through 2030
1	**Select harvest %/ Fell understory**	**Thin stump sprouts**	—
	Completed: Units:	Completed: Units:	Completed: Units:
2	**Harvest/ Fell understory**	—	—
	Completed: Units:	Completed: Units:	Completed: Units:
3	**Select harvest %/ Fell understory**	**Thin stump sprouts**	—
	Completed: Units:	Completed: Units:	Completed: Units:
4	—	**Select harvest %**	—
	Completed: Units:	Completed: Units:	Completed: Units:
5	—	—	—
	Completed: Units:	Completed: Units:	Completed: Units:
6	—	—	**Select harvest %**
	Completed: Units:	Completed: Units:	Completed: Units:
7	**Optional: Thin**	—	—
	Completed: Units:	Completed: Units:	Completed: Units:
8	—	—	—
	Completed: Units:	Completed: Units:	Completed: Units:

Wildlife Habitat Management

By following the recommendations in this plan, you will be providing improved habitat for a variety of wildlife species. Often, the vertical structure of the vegetation is more critical than the specific plant species. For example, a forest carpeted with dead logs and herbs with a layer of shrubs under a mixed species overstory with standing dead trees provides denning and nesting sites with safe pathways to food. A woodland rich in wildlife may not be aesthetically pleasing, but the more "jumbled" it appears, the more wildlife species it can support. Horizontal diversity is achieved by having varying blocks of cover types in relation to each other. For example, a grassy field adjacent to an aspen stand next to a white spruce type has more horizontal diversity than a solid hardwood stand.

Coarse woody debris NFI

Not all habitats can be fit onto one property but, in general, there are two distinct types of habitat that can be managed: the patchy edge-dependent and the contiguous area-sensitive. Habitat can be improved for ruffed grouse, white-tailed deer, and other edge-dependent wildlife species by providing a distribution of tree age classes and maintaining winter cover. Area-sensitive species habitat is best maintained or enhanced by maintaining contiguous forest cover. If the objective is to improve deer habitat, periodic harvesting provides both areas of cover and a more constant supply of young, vigorous browse species. Thermal cover, used in the winter by deer, is lacking on the property — planting blocks of conifers might be beneficial. White spruce is a good planting choice due to its unpalatability for deer browse.

By reserving the some areas dominated by northern hardwoods, you will be enhancing the habitat primarily for area-sensitive wildlife species such as northern goshawks, fishers, barred owls, and many warblers. These species require large, unbroken forest tracts containing big standing and downed trees. For example, fishers' home ranges are just under 5,000 acres and barred owls' are 200 to 900 acres. The minimum diameter of a suitable den tree for barred owls is 20 inches. The main management strategy is to maintain contiguous forest cover with plenty of large snags.

Wildlife snag NFI

Dead and deformed trees in harvest areas should be reserved for cavity nesting and denning wildlife such as woodpeckers and wood ducks. The large bur oaks on the property should be reserved for the benefit of wildlife species that utilize hard mast (acorn) crops, such as deer, bear, squirrels, wood ducks, and others. Reserving some large downed trees will provide territorial "drumming" logs for male grouse, as well as foraging habitat for a variety of species, including black bear and fisher.

Red oaks also provide mast for a variety of wildlife but, unfortunately, the lifespan of red oak is on average significantly less than bur oak. Drought and disease kill many red oaks before they reach 100 years. Most lose the capability to regenerate by stump sprouts, the major source of regeneration, by 120 years. Regeneration cuts are inconsistent for producing new red oak forests but, in the absence of forest fires, the only option available to promote regeneration.

A wildlife opening can, if managed, provide forage for deer throughout the growing season. Dominant white-tailed does have core areas — the size and number of these areas are determined by the amount and accessibility of habitat requirements. Planting a variety of forage provides better nutrition for deer. Plants such as clovers and alfalfa, once established and mowed

annually, can last for three growing seasons. Annual crops, such as canola, rye, and rutabagas, can provide added nutrition — canola is more attractive after it freezes. The key to forage plantings is establishment. The seedbed should be as weed-free as practical. Herbicides are very helpful in controlling weeds that can choke forage plantings. Plant species that are acclimated to this climate. Mow clovers and alfalfa annually to provide fresh, young forage for the fall. Soil testing is recommended to determine fertilizer needs. You might also consider planting winter wheat or rye on a portion of the field to provide improved spring and fall nutrition for the deer. Once established, disk the wheat each year after the seed matures to provide a new crop for the fall.

Deer in opening NFI

Woodland ponds are valuable for aesthetics, water conservation, and wildlife habitat. Providing quality natural wood duck habitat is ideal — reserving acorn-producing oaks and large snags — but you can have fun and learn about the habits of these beautiful birds by constructing and erecting nest boxes. Wood duck nesting success is often higher if the boxes are placed away from, but within about one-eighth mile of the ponds.

Heron rookeries, which are primarily dependent on trees being killed by flooding caused by beaver dams, are transient. Most nests are built in dead ash trees within flooded basins. The standing dead trees only last so long before being uprooted or felled by rot. The topography in the North Block does not appear to favor much new flooding. The south-central portion of the South Block might, in time, be found to be favorable to beavers for more dam construction. Wetland laws tend to discourage the construction of artificial dams for this purpose. In time, flooded basins will again grow trees and the natural cycle will be renewed.

Some of the wildlife information in this plan is from a book you might want to own: *Northwoods Wildlife: A Watcher's Guide to Habitats* by Janine M. Benyus. It gives great detail on wildlife species that can be found in the various habitats on your property. The soft-cover version is about $20. It's available at many major bookstores in the Midwest. If you can't find the book locally, you can order it from many popular online booksellers.

When planning management, it is important to know what has or will be occurring on the adjacent ownership as well. It is important to maintain the contiguous tracts of forests through the agricultural area — these areas form relatively safe "travel lanes" for many wildlife species. You might want to plan any deer habitat improvements to provide the best overall mix of habitat between the adjacent ownerships. Implementing a number of habitat improvement activities, timed to provide a consistent sources of food and cover, will provide the habitat the deer, in particular, need to thrive in peak numbers.

Timber Management

By following the timber management recommendations outlined in this plan, you will provide an excellent opportunity for the forested types to naturally regenerate themselves. The keys to obtaining healthy and vigorous regeneration of naturally sprouting species, such as aspen, are to avoid leaving a significant amount of residual trees in the harvest area and damaging the soil during harvesting.


Aspen root suckers *U of MN*

Aspen stands naturally regenerate after disturbances, such as fire or wind, open the forest canopy and let the sunlight reach the ground to stimulate the roots to sprout. Clearcutting aspen simulates the same process. Research and practical experience have shown that harvesting aspen during the growing season can reduce the number of sprouts per acre and, in some cases, affect the long-term health of the stand. A rule-of-thumb is to winter harvest areas where soil rutting might occur.

Timber thinning, if successful, can improve the quality or the remaining timber, increase the lifespan of the stand, and provide periodic income from the property. If done improperly, without careful planning, a thinning or high-grade can have the reverse impact on a stand. A forester can assess thinning needs for a given stand, make recommendations, and mark the individual trees to be harvested (if necessary)

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Oak stands, although somewhat longer lived than aspen, naturally regenerate after disturbance in a similar manner — although oak sprouts from the stump while aspen sprouts from the roots. Oak stands can benefit from intermediate thinning, however after a certain time the root systems deteriorate and the stand begins to die out. If oaks are to be maintained as an important component of the forest types on the property, at some time patch clearcutting of portions of areas dominated by oak will be necessary.