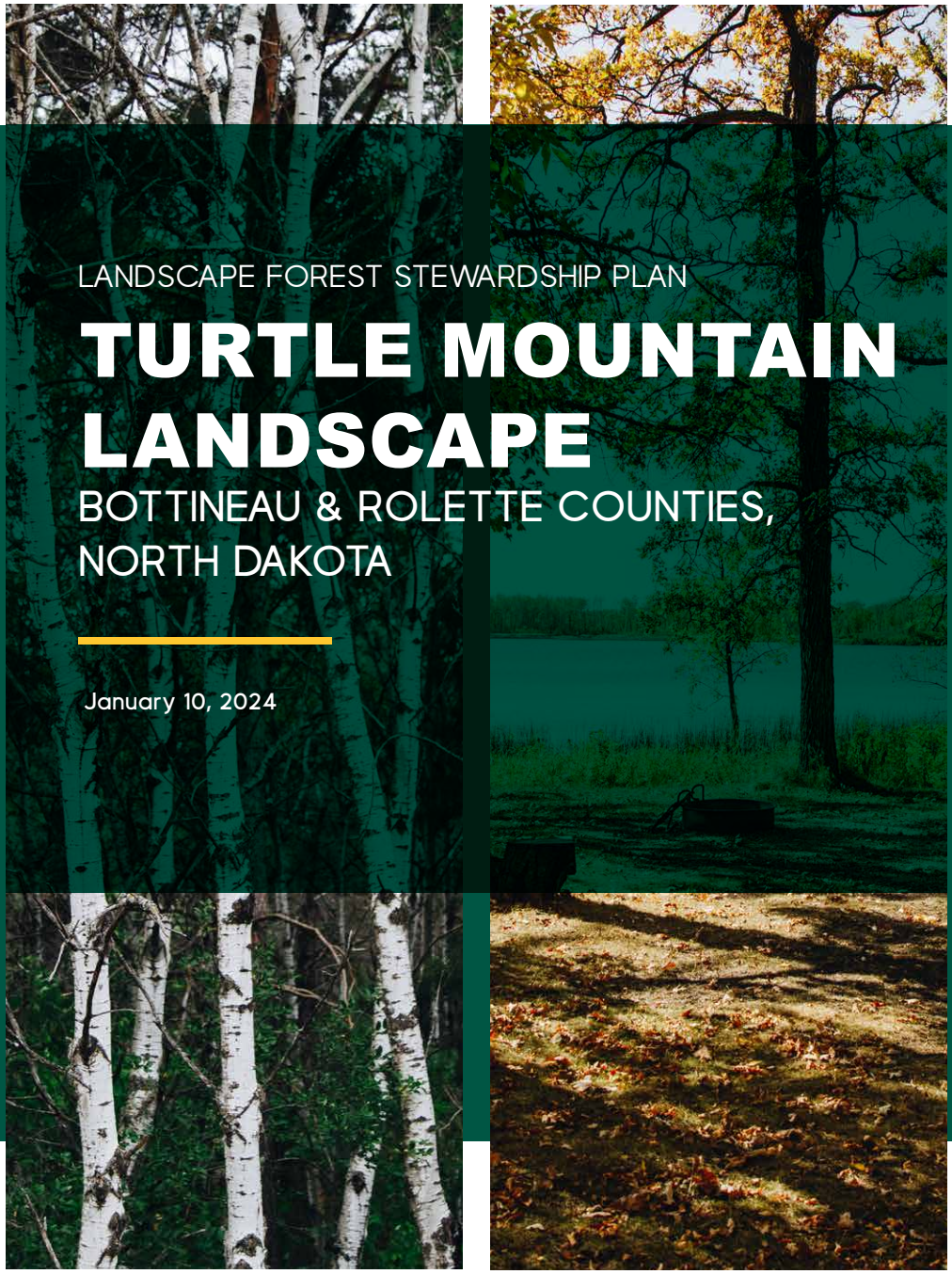


LANDSCAPE FOREST STEWARDSHIP PLAN

TURTLE MOUNTAIN LANDSCAPE

BOTTINEAU & ROLETTE COUNTIES, NORTH DAKOTA

January 10, 2024

USDA

FOREST SERVICE U.S. DEPARTMENT OF AGRICULTURE

NORTH DAKOTA STATE FOREST SERVICE

NDSU

1 INTRODUCTION

1.1 WHAT IS THE PURPOSE OF A LANDSCAPE FOREST STEWARDSHIP PLAN?

A Landscape Forest Stewardship Plan (LFSP) is a multi-landowner Plan written to address landscape-level forestry issues and identify common goals and objectives across all ownerships. This LFSP seeks to provide a framework for stakeholders to voluntarily work together to implement landscape-scale management strategies and articulate, work toward, and achieve shared desired future conditions by setting goals and objectives that will ultimately guide forest management towards sustaining forests for future generations.

Specifically, this LFSP intends to:

- Be implemented adaptively across various conditions, landowner objectives, and property ownerships and used flexibly as forest conditions and objectives change.
- Serve as an informative reference.
- Identify and articulate landscape-level desired future conditions, goals, and objectives.
- Identify and articulate commonly held landowner objectives.
- Illustrate practical forest management options and support the efforts of natural resource professionals from multiple sectors to promote conservation initiatives.
- Be the technical framework for local, state, and national funding opportunities for conservation initiatives on private and public lands.

Landscape stewardship planning operates on various scales, aligning with administrative boundaries such as counties and/or environmental delineations such as watersheds or land use. As the scales narrow (i.e., evaluating parcels compared to states or regions), forest stewardship planning adopts a more specific approach. Landscape-level stewardship planning serves a significant role in providing overarching guidance to smaller-scale planning. The cumulative understanding of objectives at smaller scales is instrumental in accomplishing the expansive goals and objectives set at the landscape level.

1.2 WHAT IS LANDSCAPE STEWARDSHIP?

The U.S. Forest Service (USFS) 2011 Landscape Stewardship Guidance defines landscape stewardship as "bringing together the stakeholders in a community of place or community of interest to address resource-based issues of mutual concern." They further define landscape stewardship as "an 'all lands' approach to forest conservation that works across multiple ownerships to address issues and opportunities identified in each State's Forest Action Plan."

This approach to forest conservation includes four interrelated phases, summarized as:

1. **Planning:** Develop shared desired future conditions with goals and objectives to achieve those conditions.
2. **Coordination:** Build on existing relationships, foster new partnerships, initiate outreach, and allocate responsibilities.
3. **Implementation:** Engage interested stakeholders to implement strategies to achieve the Plan's goals.
4. **Monitoring and Evaluation:** Track accomplishments and evaluate the effectiveness of implementation. Celebrate outcomes and identify ways for the Plan to adapt for continual success.

These phases intend to serve as a guide to help organize and develop a LFSP.

1.3 WHAT IS A FOREST?

At its core, the term "forest" refers to an area predominantly occupied by trees. However, this term carries diverse interpretations, from the strictly scientific to the deeply poetic. The USFS, for instance, furnishes a strictly technical definition of forest as an area with trees covering at least one acre, having minimum dimensions of 120 feet by 363 feet, and 10% live canopy cover. Beyond this, a forest can be understood as a complex ecosystem that includes not only trees but a wide range of plants, animals, fungi, and microorganisms that interact with each other and their environment and therein provide vital habitats for many forms of life. Furthermore, forests hold immense and widely varying recreational, cultural, and spiritual significance. The purpose of the LFSP is not to assign or follow one specific understanding or meaning of the term "forest" but instead to affirm the value of the habitats and showcase the many understandings and meanings of forests within the TML through its collaborative development and expression of desired future conditions, goals, and objectives.

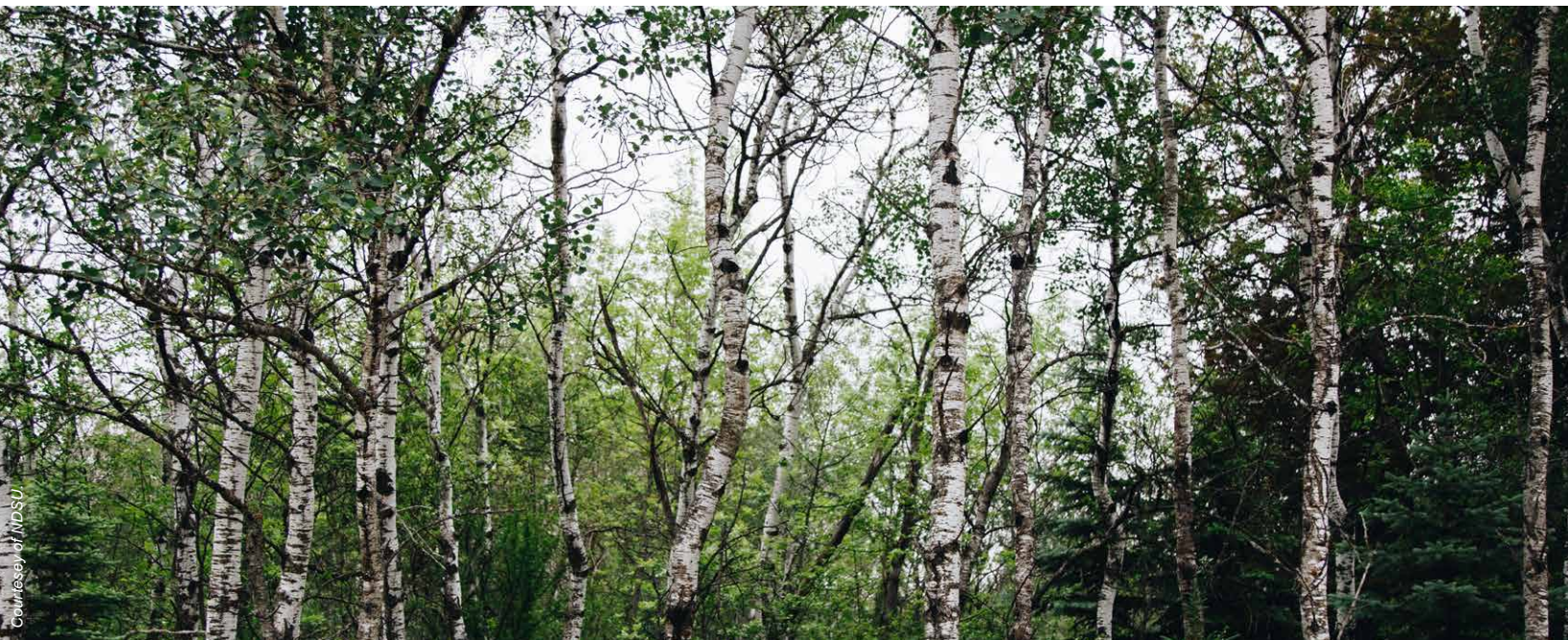
Courtesey of NDSU.

1.4 WHAT IS THE LANDSCAPE?

The purpose of the LFSP is to encourage engagement by stakeholders. Therefore, the Turtle Mountain Landscape (TML) is defined using a combination of existing political and administrative features and ecological boundaries.

This LFSP defines the TML as the forested region of North Dakota, known as the Turtle Mountain. The specific plan area was restricted to the boundary of the Turtle Mountain as mapped by the U.S. Environmental Protection Agency's (USEPA) Level IV Ecoregions of the Continental United States. This allows for a consistent and previously recognized boundary focusing on the ecological components. The TML's forests encompass portions of Bottineau and Rolette counties, which provide administrative boundaries for geopolitical context.

The TML extends north into the Canadian province of Manitoba. While the ecological components are similar, as would be potential goals and outcomes, the LFSP is focused only on the portions within the United States.



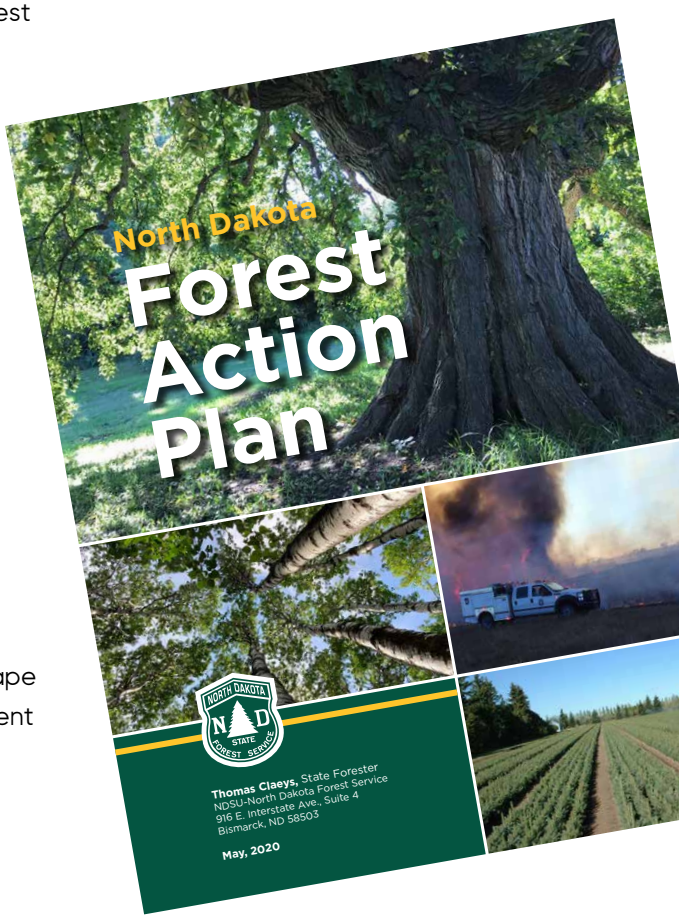
Courtesy of NDSU

1.6 PAST AND ONGOING PLANNING EFFORTS

While the objective of the current effort is to provide a landscape-level plan specific to the TML, it is recognized that this is built from previous efforts that had larger or smaller areas of focus. The following is a summary of several key reports, groups, or sources of information that were considered in developing the LFSP.

North Dakota Forest Service and the 2020 State Forest Action Plan

The mission of the North Dakota Forest Service (NDFS) is to care for, protect, and improve forests and natural resources to enhance the quality of life for present and future generations. The NDFS operates the Forest Stewardship Program, a strictly voluntary program available to any nonindustrial private forest landowner. The program provides assistance to private forest landowners to encourage and enable active, long-term forest management to meet individual goals for the benefit of the forest resource. The program provides forest stewardship plans for private landowners free of charge.



The NDFS coordinated with the North Dakota State Stewardship Coordinating Committee, North Dakota Community Forestry Council, North Dakota State Technical Committee, North Dakota Game and Fish Department (NDGFD), USFS – Dakota Prairie Grasslands, tribal liaisons, and other land management agencies to develop the 2020 North Dakota State Forest Action Plan (SFAP). The SFAP serves as a strategic framework to outline priority forest resources, designate important issues, and identify strategies to address challenges and opportunities. SFAPs are intended to ensure that federal and state resources are focused on important landscape areas, with the greatest opportunity to address shared management priorities and achieve measurable outcomes.

North Dakota Forest Advisory Council

The purpose of the North Dakota Forestry Advisory Council (NDFAC) is to advise the State Forester and the NDFS on the implementation of the State's Forest Action Plan priorities addressing three program areas: Community Forestry, Forest Stewardship, and Forest Health.

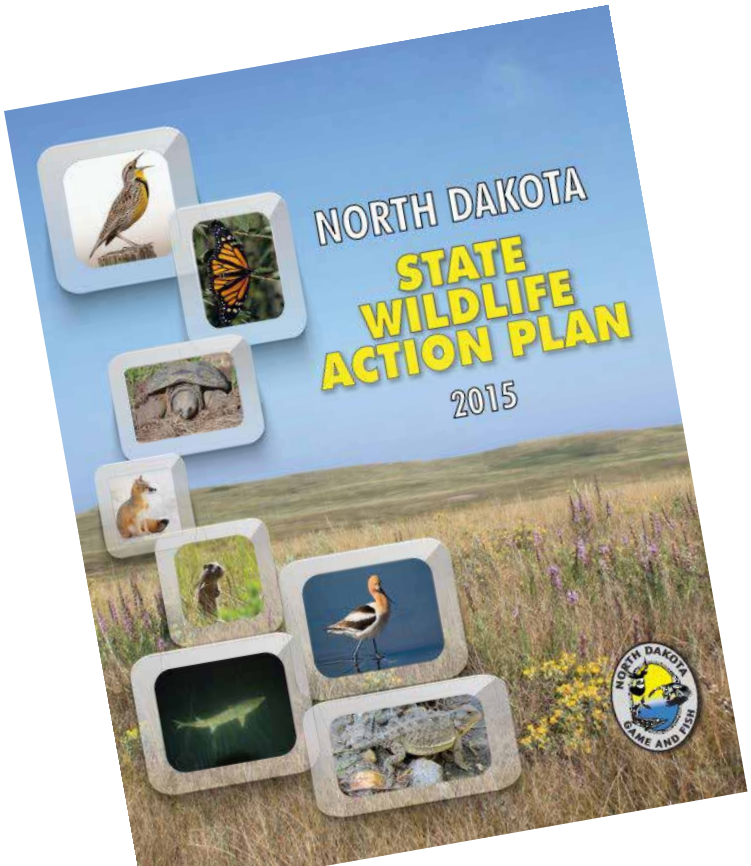
The Council also serves as a forum for the exchange of ideas and supports opportunities to work together to collaboratively address multiple issues of statewide importance. The Council intends to have balanced representation from among the three program areas (Community Forestry, Forest Stewardship, and Forest Health) and from across North Dakota. More information about the Council can be obtained from the NDFS website (*https://www.ag.ndsu.edu/ndfs/north-dakota-forestry-council)*.

Landscape Forest Stewardship Plan Working Group

In March 2022, the NDFAC convened a working group to develop the LFSP for the Turtle Mountain region. This LFSP is a product of the working group, which included staff from the NDFS, the NDGFD, the TMBCI, North Dakota State University (NDSU), and the Natural Resources Conservation Service (NRCS).

ND Game and Fish Department and the 2015 State Wildlife Action Plan

The 2015 State Wildlife Action Plan (SWAP) was completed by the NDGFD with the intention of outlining a strategic vision with the goal of preserving the state's wildlife diversity. Furthermore, it identifies wildlife species of greatest conservation priority, provides fundamental background information, strategic guidance, input from partners, and a framework for developing and coordinating conservation actions to safeguard all fish and wildlife resources.



Turtle Mountain Band of Chippewa Indians and the 2023 Forest Management Plan Environmental Assessment

The TMBCI has completed three forest management plans and a Forest Inventory Analysis (FIA) report. These plans and reports were specific to the lands within and/or owned by the Band. The most recent forest management plan was completed in 2023 and was, in part, informed by the results of the FIA report. The 2023 plan identified statutory objectives, goals, and forest management objectives for the forest land management practices.

Community Wildfire Protection Plans

Community Wildfire Protection Plans (CWPPs) are collaborative, community-driven frameworks that outline local priorities for wildfire risk mitigation. Bottineau County developed a CWPP, but it has expired.

North Dakota Parks and Recreation Lake Metigoshe State Park Master Plan

North Dakota Parks and Recreation Department (NDPRD) Master Plans are tangible, visionary tools used by the agency to be stewards of natural resources through sustainable management while embracing opportunities to enhance recreation opportunities. Master plans identify critical management and recreation priorities, industry and economic trends, and public needs. Using this information, the master plan is developed to act as a consistent guide that informs the decision-making around the long-term preservation, management, and development goals. Master plans are updated on a 10-year cycle; however, planners will continuously meet with Park Managers and Staff to reevaluate the master plans, ensuring they remain flexible, dynamic, and responsive to the ever-changing needs.

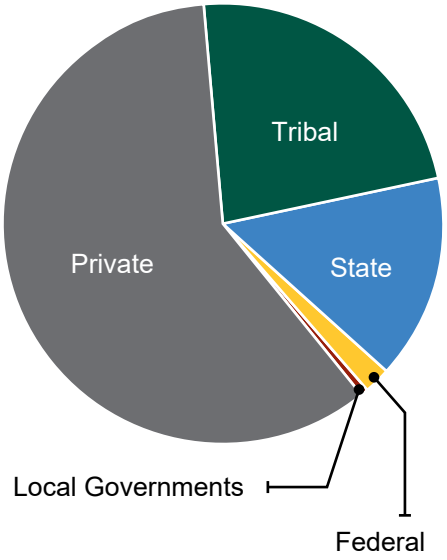
2.2 LAND OWNERSHIP AND MANAGEMENT

Land within the TML is owned by a variety of public and private entities, each with its own management goals and objectives.

Approximately 61% (156,506 acres) of the TML is privately-owned, making individual landowners the majority of the potential LFSP users. According to the USFS National Woodland Owner Survey (NWOS), the average owner of forest land in North Dakota owns 66 acres, with the median being 27 acres.

The TMBCI own 23% percent (59,161 acres, including Reservation and Off-reservation Trust Lands). Public land includes areas under state, federal, or local government (i.e., city or county) ownership. State of North Dakota ownership includes 15% (37,863 acres) within Wildlife Management Areas (WMAs), State Forest, State Parks, and mineral trust lands, which are managed by the NDFS, NDGFD, NDPRD, and others. Federal lands include 2% (4,939 acres) within National Wildlife Refuges (NWRs) and Waterfowl Production Areas (WPAs) that are managed by the U.S. Fish and Wildlife Service (USFWS).

LAND OWNERSHIP WITHIN THE TURTLE MOUNTAIN LANDSCAPE



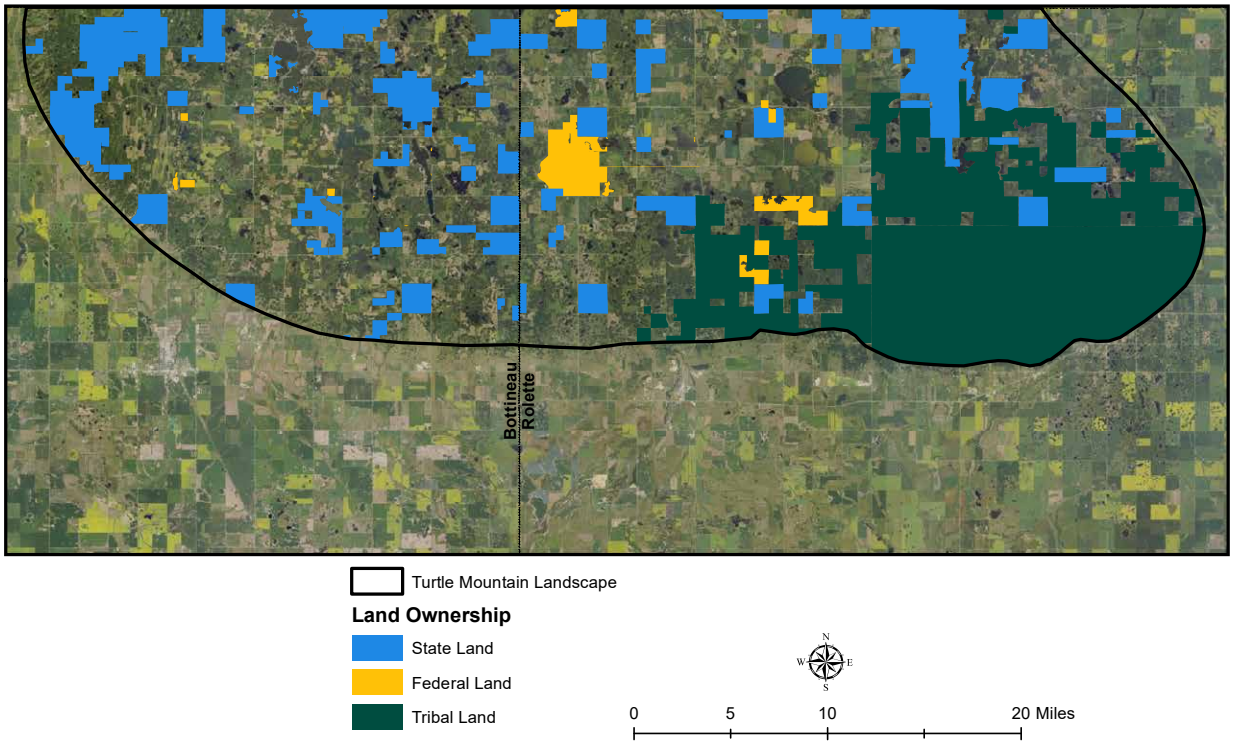


Figure 7: Land ownership within the TML.

North Dakota Game and Fish Department Wildlife Management Areas

The ND Game and Fish Department owns or manages over 12,000 acres of the TML across 12 WMAs within the TML. These include Black Lake, Nickelson, Rabb Lake, School Section Lake, Schuster, Thompson Lake, Turtle Mountain, Turtle Mountain-Brudwick, V.V. Bull, Wakopa, Redfield, and Willow Lake. The Department undertakes mechanical regeneration of aspen on sites between 2.5 and 50 acres in size to replace decadent (80-to-90-year-old) aspen stands with a biodiversity of age classes to improve forest health, diversity, and wildlife habitat. Most recently, the Department utilized a logging contractor to mechanically regenerate 115 acres of aspen at four sites on Wakopa and Willow Lake WMAs to create early successional and forest-edge habitat in support of ruffed grouse (*Bonasa umbellus*).

Lands and Waters Administered by the U.S. Fish and Wildlife Service

The USFWS maintains three National Wildlife Refuges (Rabb Lake, Willow Lake, and School Section Lake) and two waterfowl production areas (Bottineau County WPA and Rolette County WPA) within the TML. These are part of the J. Clark Salyer Wetland Management District and are managed to conserve fish and wildlife and their habitat for the continued benefit of the American people. Activities such as hunting, fishing, trapping, wildlife observation and photography, environmental education, and interpretation are generally allowed on these lands.

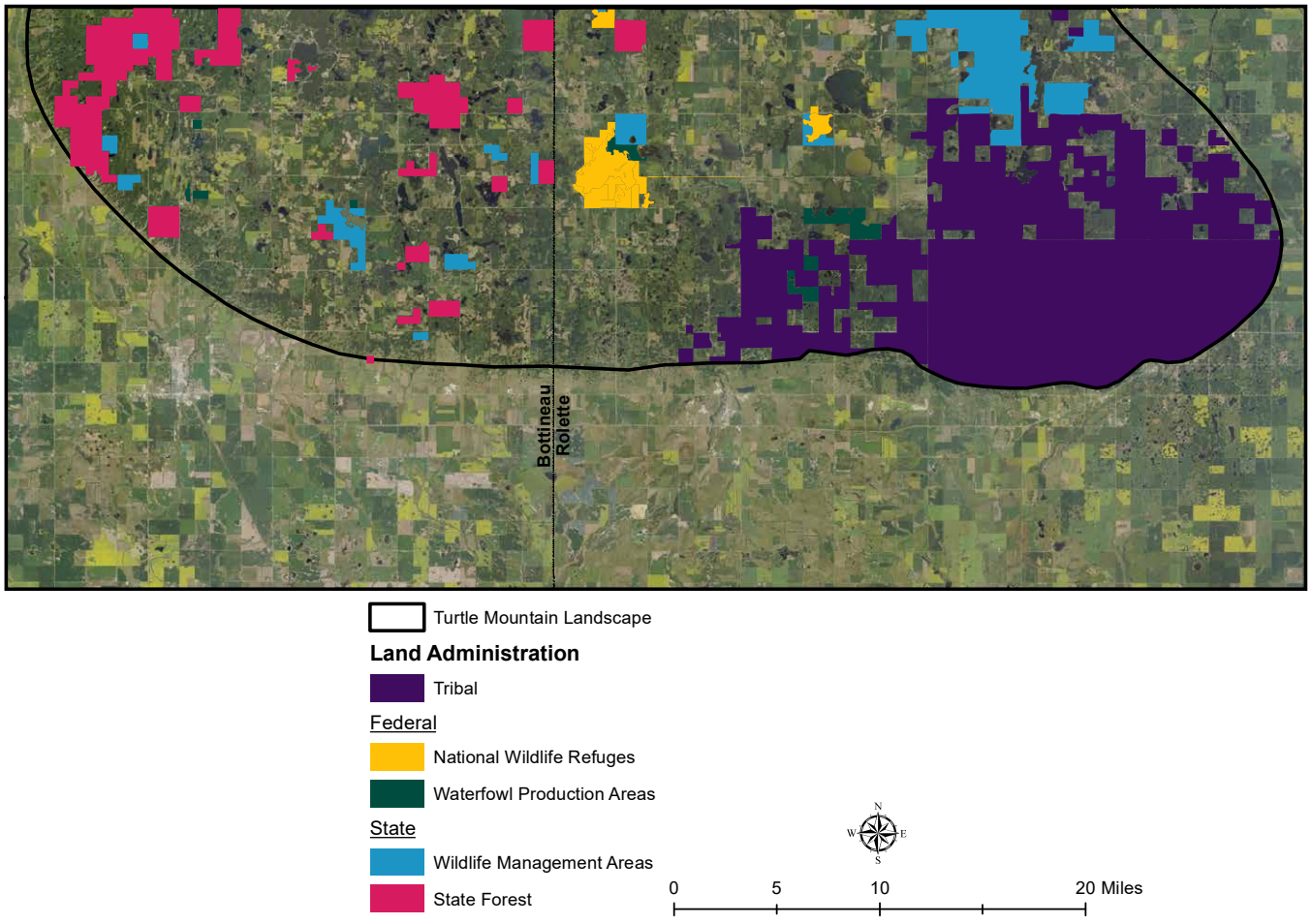


Figure 8: Detailed land administration within the TML.

Water Quality

The NDDEQ also manages the Surface Water Quality Data for North Dakota. The TML has numerous surface water quality monitoring stations.

Several major surficial aquifers are located within and/or serve water to the communities of the TML. These include the Dunseith, Shell Valley, and Rolla aquifers as well as an unnamed aquifer. Of these, the Shell Valley Aquifer is monitored through the NDDEQ's Agricultural Groundwater Monitoring Program. Aquifers are sampled once every five years, and the results are published on the NDDEQ's Groundwater Monitoring Programs website.

2.7 AGRICULTURE

Within the TML, agriculture often occurs on land that was forested prior to European settlement. Agriculture forms the second largest land use of the TML, comprising an estimated 27% of the total land base, according to the 2021 USGS NLCD dataset. Detailed year-to-year tracking of forest conversion to agriculture has not been completed. Although agricultural lands are perceived to be expanding by many stakeholders, there are, as of writing, no specific programs/efforts tracking the conversion of forests to agriculture in the TML. Agroforestry and silvopasture are not widely adopted or are inconsistently implemented; however, landowners have expressed interest in adopting these practices.

2.8 SOCIAL AND CULTURAL USES AND VALUES

Indigenous Peoples' Cultural Traditions

The Turtle Mountain Band of Chippewa Indians reside within the TML. The TMBCI community includes traditions from the Ojibwe (Anishinaabe) and the Metis/Cree peoples, and has a long tradition of cultural uses of the forests and forest-dependent species in this region. The name Turtle Mountain ("Mekinauk Wudjiw") was attributed to the landscape by early Chippewa migrants. The Turtle Mountain Reservation is located in the northern half of Rolette County with smaller holdings elsewhere throughout the TML. Much of this land is forested. Traditional Ojibwe and Metis/Cree peoples relied on the forests of the TML for food, medicines, dyes, tools, construction, basketry, and transportation as well as spiritual and cultural identity.

Courtesey of USFWS.

Forest/Wildland Fire Management

NDFS Fire Management Program supports 378 fire departments

The TML has a history of influence by fire that predates European settlement. The role of fire in the forests of the TML has greatly changed following European settlement. Large, intense fires spread across the region after a period of heavy logging in the late 1800's and early 1900's. These large fires, like much of the nation's approach to forest fires, resulted in policies and approaches to management favoring fire suppression over allowing fires to naturally occur. The NDFS and the TMBCI have recognized the value of prescribed burning as a tool of forest management in simulating the natural process of fire. Both organizations have been evaluating and developing best management practices for the incorporation of prescribed fire in forest management. The use of prescribed fire has the additional benefit of reducing the overall risk of catastrophic fires in the TML. While major catastrophic fires haven't occurred since the early 1900s, the risk of an uncontrolled wildfire that could threaten property and lives remains. Furthermore, a changing climate may result in more frequent fires with greater intensity. Because of the fire potential in the TML, there are several organizations and systems in place with experienced staff and equipment to supress wildfires.

The NDFS Fire Management Program focuses on the protection of lives, property, and natural resources from wildfire. This program supports the state's 378 fire departments, which are essential for enhancing firefighting capabilities and public safety. The program provides rural fire departments with cost-share funds for organizing, training, planning, and purchasing fire equipment. The TMBCI has implemented a Fire Management Plan. This Plan, in conjunction with the Turtle Mountain Agency Fire Prevention Program, provides tools to prevent and suppress fire with the goal of protecting life, property, and resources.

2.9 RECREATION

The TML is a major forest and water-based recreation destination with a wide variety of outdoor recreation opportunities. The hardwood forests provide a unique ecological setting that cannot be found elsewhere in North Dakota. The TML's unique topography in relation to the surrounding landscape provides numerous scenic views, such as those provided at Butte St. Paul State Recreational Area and Mystical Horizons. Abundant lakes provide numerous opportunities for water-based recreation such as fishing, boating, and waterfowl hunting. The dense hardwood forest provides a setting attractive to camping, hiking, backpacking, biking, riding all-terrain vehicles (ATVs), and other outdoor pursuits. Dramatic seasonal temperature changes and conditions allow for a change to winter-based recreation, including downhill and cross-country skiing, ice fishing, snowshoeing, and snowmobiling. The existing infrastructure, in terms of paved, graveled, and natural surfaced roads, as well as resorts, hotels, campgrounds, trails, trailheads, picnic areas, and other developments and businesses, allow access to a wide spectrum of recreational pursuits.

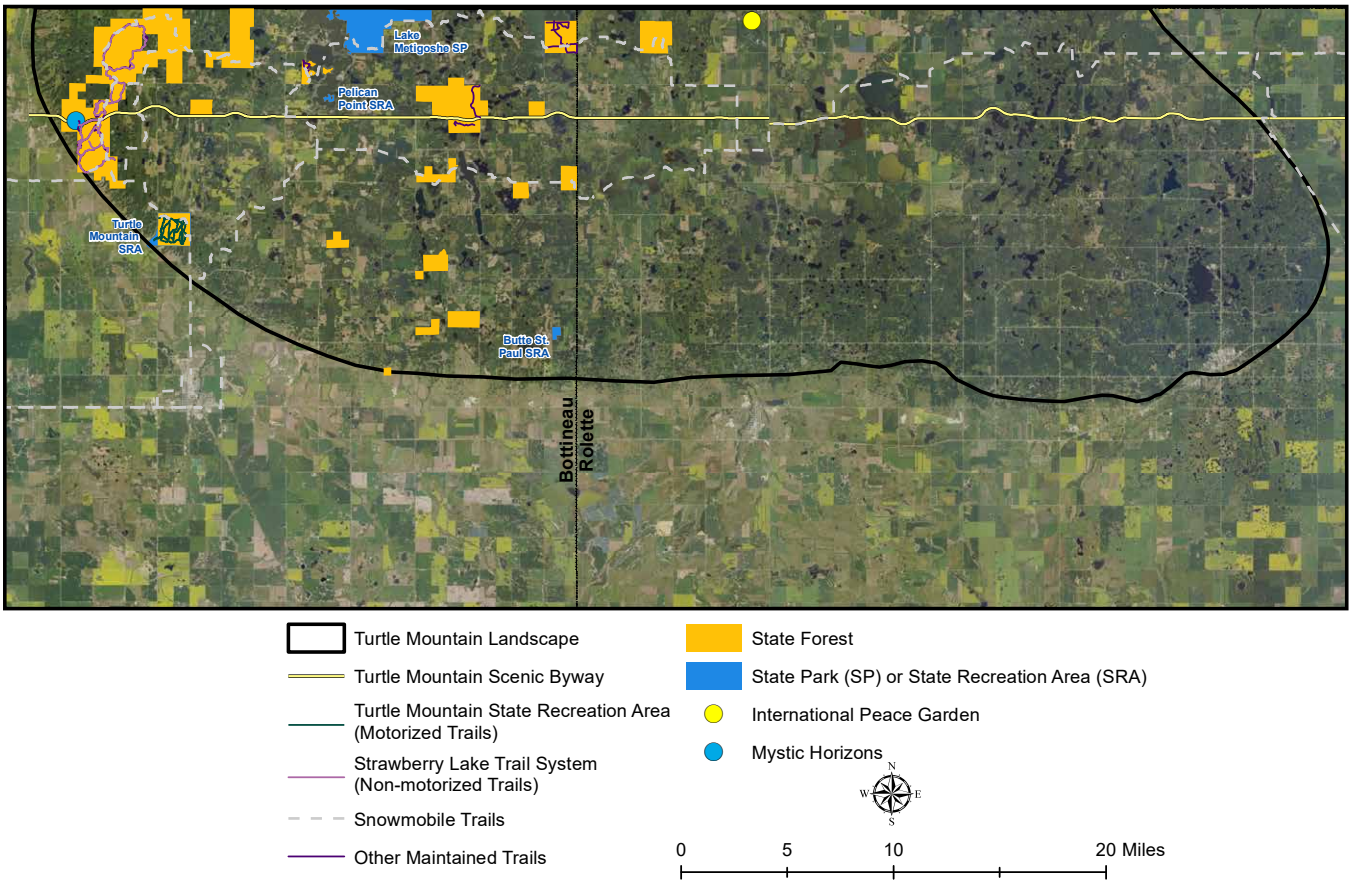


Figure 13: Recreation opportunities of the TML.

Public Lands for Recreation

There are numerous areas open to the public for recreation within the TML. The NDPRD oversees one state park and three state recreation areas within the TML. Lake Metigoshe State Park is a popular year-round destination. The small lakes within the park provide excellent opportunities for kayaking, canoeing, and birding. It has over 12 miles of hiking and mountain biking trails along with a three-mile self-guided interpretive hiking trail. The Park provides opportunities for lodging and camping.

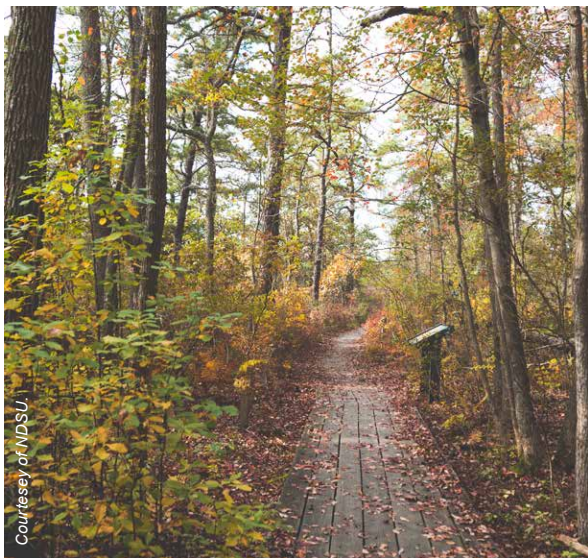
The Turtle Mountain State Recreation Area is located six miles northwest of Bottineau. This recreation area has over 12 miles of motorized trails open to off-highway vehicles (OHVs), hiking, biking, snowshoeing, and horseback riding.

The Butte St. Paul State Recreation Area is located 11 miles east of Bottineau and offers hiking trails and a scenic overlook. It also has historical significance, with a stone cairn and commemorative plaque for the missionary George-Antoine Belcourt on top of the peak. The Pelican Point State Recreation Area is located 10 miles northeast of Bottineau on Lake Metigoshe. It is an undeveloped recreation area with no formal trail system or amenities.

The Turtle Mountain State Forest, located in the western Turtle Mountain region of Bottineau County, encompasses over 7,500 acres of pristine forests, wetlands, and grasslands. Recreation areas include Hahn's Bay Recreation Area, Strawberry Lake Recreation Area, Twisted Oaks Equestrian Campground, and Mystical Horizons Scenic Overlook. The State Forest contains 18 miles of multi-use, non-motorized trails.

7,500+ acres available for a variety of recreational activities

Courtesy of NDPRD



Courtesy of NDSU

Turtle Mountain Scenic Byway

The Turtle Mountain Scenic Byway provides a scenic route along which many of the TML's attractions, such as Mystical Horizons, Lake Metigoshe State Park, and the Pelican Point State Recreation Area, can be visited. The route begins three miles north of Rolla to St. John and continues west on County Highway 43 to State Highway 281, then back onto State Highway 43 until it ends State Highway 14.

International Peace Garden

The International Peace Garden is a popular attraction within the TML. The garden encompasses 2,300 acres, two freshwater lakes, scenic hiking and driving trails, wildflowers, waterfalls, and many North American birds and animals. Modern and rustic camping facilities are available, as well as facilities for hosting weddings, conventions, and reunions. Additionally, it is home to one of the world's most diverse collections of cacti within its conservatory.

Bottineau Winter Park

The Bottineau Winter Park is a family-friendly winter resort located 10 minutes north of Bottineau. It offers eight alpine trails ranging from beginner to expert that bestows scenic views of the Turtle Mountain.

Tommy the Turtle

Mystical Horizons

3 LANDSCAPE-LEVEL DESIRED FUTURE CONDITIONS, GOALS, AND OBJECTIVES

3.1 PLANNING TERMINOLOGY

A series of nested terms were adopted from the Landscape Stewardship Guide to better organize the ideas suggested by stakeholders involved in the planning process. The terms are defined by the Landscape Stewardship Guide as follows:

Desired Future Condition:

Desired Future Conditions (DFC) statements describe preferred or desired conditions that a given geographic area or region will be like at the end of a given timeframe. DFC statements are very general and long-range in nature. They are intended to provide an initial starting point for agreement on what forests in the landscape should be like in the future.

Asset:

A benefit or strength that enables progress towards DFCs.

Issue: challenge, or unresolved conflict that requires resolution to improve progress towards DFCs.

Goal:

Goal statements outline the general aims of an organization that it intends to attain at some point in the future. Goals are intended to provide general direction for a given resource initiative (forest land base, vegetation and wildlife, water resources, etc.). Words such as encourage, protect, promote, preserve, and restore are commonly found in goal statements. The goals in this landscape plan represent what the Working Group thought needed to be pursued over the next 10 to 20 years to promote sustainable forest resources across the region.

Objective:

Statements that provide more specific direction on the efforts or strategies that are needed to implement each goal. Goals usually have more than one objective. Words like construct, plant, remove, and monitor are used to describe the specific direction. The initial descriptions of programs and projects are usually found in objective statements.

3.2 DESIRED FUTURE CONDITIONS, GOALS, AND OBJECTIVES

This section describes the common vision for future forest conditions across the TML by defining and articulating the DFCs and the approaches (goals and objectives) that stakeholders can take to achieve the vision. These goals and objectives are directions toward the DFCs for the TML and can be used to inform or adapt landowner-specific goals and objectives.

Eight resource topics were identified to organize and refine differing strategies:

1. Forest Land Base
2. Forest Biodiversity: Terrestrial Vegetation and Wildlife
3. Forest Health
4. Forest Products
5. Aquatic Resources
6. Agriculture
7. Social and Cultural Uses and Values
8. Recreation

Courtesy of NDFS.

1 FOREST LAND BASE

Forest land base refers to all forested land within the TML.

Desired Future Conditions:

Ensure that forests remain the predominant land cover in the TML by promoting sustainable forest management practices aimed at achieving no net loss of forest area and facilitating reforestation efforts where applicable.

Assets:

Natural Resources: The TML is rich in diverse natural resources like land, water, forests, and both aquatic and terrestrial wildlife, which are vital for local residents and attract tourists.

Forest Coverage: Much of the TML consists of intact forest land, comprising the majority of North Dakota's hardwood forests.

Ecosystem Services: Forests offer crucial services like soil formation, erosion control, nutrient cycling, rainwater filtration, carbon sequestration, and wildlife habitat, among others.

Forests of Recognized Importance: Forests of Recognized Importance (FORI) are considered critically important because of their unique combination of social, cultural, biodiversity and environmental values.

Issues:

Land Development & Forest Conversion to Agriculture: Developed lands may be expanding within the TML. Forests have been and may be converted to cropland.

Ownership and Parcelization: Most of the forestland is privately-owned, which can contribute to parcelization, the dividing of lands into smaller parcels for development. Parcelization often contributes to forest fragmentation and introduces more challenges to landscape-scale forest management.

Limited Tracking of Reforestation/Forest Conversion: Efforts to track reforestation of forest conversion within the TML are limited. Comprehensive tracking methods have not been developed or implemented.

Limited Tax Incentives: Property tax incentives, i.e., Forest Stewardship Tax Law, are not widely supported. Both counties that encompass the TML have not adopted the Forest Stewardship Tax Law. Taxation of forestlands may contribute to the development, parcelization, and/or clearing of forests for agriculture as landowners seek to generate income from their land.

Lack of Awareness of Conservation Programs and Incentives: Lack of awareness and diversity of economic incentives for forestland conservation. There is a perception by landowners that a rental program like the Conservation Reserve Program (CRP) should be available for forests.

Public Misperceptions: Misperceptions/misunderstandings persist about forest activities, including the extent of logging and agricultural conversions.

Goals and Objectives:

Goal 1: Encourage the retention, restoration, and management of forestland in planning and decision-making processes.

Objective A: Integrate forest issues into regional and local land use planning and zoning. Strengthen collaborative and large-scale planning at city, county, state, tribal, and federal levels. Ensure forest resources are represented on planning commissions by distributing information on forest resources to local governmental units for use in local land use planning and advocating for the use of such information in planning.

Objective B: Manage development to minimize conflicts with forests such as those caused by wildfires.

Objective C: Develop forestry programs and incentives that encourage and support the retention, restoration, and management of forestland. Advocate for the adoption of the Forest Stewardship Tax Law and/or other incentives. Advocate for the adoption of the Forest Legacy Program

Objective D: Advocate for the restoration of forestland and inclusion of forest restoration in local planning efforts. Develop a broad and continuous education and outreach campaign explaining the benefits of forest restoration.

Goal 2: Monitor no net loss of forestland.

Objective A: Develop and implement a methodology for annually tracking changes in forest land cover.

Objective B: Identify and monitor forest health in FORI.

Goal 3: Minimize forest fragmentation.

Objective A: Identify and protect core forested areas that are least fragmented and most ecologically valuable.

Objective B: Develop and implement land-use policies that limit the breaking up of larger forest areas into smaller, isolated patches.

Goal 4: Restore degraded or non-forested areas to forest.

Objective A: Identify and track forest lands that have been degraded or deforested that could be restored or converted back to forest.

Objective B: Implement targeted reforestation programs in degraded/deforested areas, using native plant species.

Goal 5: Continue fostering inter-agency and stakeholder collaboration for forest land management.

Objective A: Maintain forums for ongoing dialogue and coordination among government agencies, private landowners, and so forth.

Objective B: Develop collaborative projects and funding mechanisms that can leverage resources from multiple stakeholders to support sustainable forest land management.

2 FOREST BIODIVERSITY: TERRESTRIAL VEGETATION AND WILDLIFE

Desired Future Conditions:

Forests that are structurally, functionally, and compositionally diverse and consistent with the region's ecology capable of supporting native vegetation and game and nongame wildlife species.

Assets:

Wildlife Diversity: Diverse game and nongame wildlife and fish species.

Economically and Culturally Significant Species: Elk, moose, ruffed grouse, and white-tailed deer are examples of some of the wildlife species that are economically and/or culturally significant.

Interest by Stakeholders: Stakeholders are interested in managing forest for wildlife.

Identification of Species of Conservation of Need: The NDGFD 2015 SWAP and the North Dakota Natural Heritage Program 100 Species of Conservation Priority both identify species of conservation need that can better inform forest management for these species.

Ongoing Forest Management for Wildlife: Both the NDGFD and the NDFS are active in forest management for wildlife, particularly the ruffed grouse.

ND Game and Fish Department WMAs: Over 12,000 acres of WMAs can be found in the TML. The primary objective of a WMA is to enhance wildlife production, provide hunting and fishing opportunities, and offer other outdoor recreational and educational uses.

USFWS Administered Lands: Over 1,700 acres of WPAs and 3,100 acres of NWRs can be found in the TML to conserve some of the most threatened and productive migratory bird habitat in the nation.

Issues:

Limited Tracking of Terrestrial Vegetation and Wildlife Populations: Tracking/monitoring of terrestrial vegetation and wildlife populations has been limited such that population trends are not definitively known. There are no ongoing programs to track species of conservation need.

Proximity to International Border: Complex game management issues due to the TML's proximity to Canada and a Provincial Park necessitating cross-country collaboration, which has unique challenges.

Limited Evaluation of Forest Management Practices: Evaluation/monitoring of the benefits that forest management practices have on wildlife and terrestrial vegetation is largely qualitative and anecdotal. Long-term studies tracking/monitoring responses to forest management activities should be considered.

Goals and Objectives:

Goal 1: Protect, maintain, restore, and enhance terrestrial vegetation and wildlife habitat.

Objective A: Implement forest management practices that support different age classes, native forest species, and structural diversity.

Objective B: Protect and manage large contiguous tracts of forest to serve as core wildlife habitats.

Objective C: Partner with private landowners to foster forest management beneficial to a wide range of wildlife.

Objective D: Develop forestry programs and incentives that encourage and support the retention and restoration of forests with plant species native to the TML.

Objective E: Identify and protect regionally significant ecosystems.

Objective F: Develop and implement strategies to support species of conservation need and their habitats.

Goal 2: Evaluate the effectiveness of forest management practices.

Objective A: Collaborate with organizations dedicated to terrestrial vegetation and wildlife to study the impact of forest management.

Objective B: Investigate the potential interactions between federally threatened or endangered species, such as the NLEB, and forest management practices.

Objective C: Conduct research on other less-studied species of conservation need that could be influenced by forest management.

Objective D: Establish monitoring protocols to evaluate the effectiveness of forest management practices on species of conservation need. Tracking/monitoring such as camera traps, acoustic recording units, or exclosures could be implemented.

Goal 3: Enhance public awareness and engagement with terrestrial vegetation and wildlife.

Objective A: Develop and implement educational programs to increase public understanding of the importance of forests and forest management for terrestrial vegetation and wildlife conservation.

Objective B: Establish and support volunteer programs for habitat restoration and wildlife monitoring.

Objective C: Establish a broad and continuous education and outreach campaign, including the use of social media and other platforms to keep the public informed about ongoing projects, success stories, and ways they can contribute.

3 FOREST HEALTH

Desired Future Conditions:

Forests that are actively managed to encourage a diversity of native species, age classes, and ecological communities making them resilient to a variety of stressors, including, but not limited to, climate, pests, diseases, and invasive species.

Assets:

Contiguous Forests: Large areas of contiguous forest cover comprising most of the TML's total land area.

Natural Forest Succession: Relatively undisturbed natural forest succession, with minimal influence from woody invasives, diseases, or nutrient imbalances.

Stakeholder Support: Strong stakeholder support for forest land management and conservation.

NDFS Forest Stewardship Program: The Forest Stewardship Program provides assistance to private forest landowners to encourage and enable active, long-term forest management to meet their individual goals and for the benefit of the forest resource.

Issues:

Few Native Tree Species: Lack of tree species diversity, making forests more vulnerable to pests and diseases such as Emerald Ash Borer and Dutch elm disease.

Decadent Aspen: Presence of unmanaged, aging aspen stands that are declining in health and ecological functionality. Potential for decadent aspen stands to not be as productive in supporting wildlife.

Pests and Diseases: Numerous diseases emerging that could threaten forests including, but not limited to, Emerald Ash Borer, Dutch elm disease, aspen trunk/heart rot, Hypoxylon canker, forest tent caterpillar, and large aspen tortrix.

Emerging Invasive Plant Species: Invasive plant species pose threats to natural forest succession. Buckthorn could significantly alter forest succession such that forests are replaced by buckthorn.

Aspen Vulnerability to Climate Change: Uncertainties about how aspen forests would respond to climate change.

Overstocked Oak-dominated Forests: Overstocked oak stands, resulting in slow growth and diminished perceived value by stakeholders.

Financial: Paying for forest management activities to improve forest health is challenging. Few financial incentives.

Lack of Local/Nearby Forestry Contractors: Very few forestry contractors in the TML. Forestry contractors in surrounding states have generally been uninterested in traveling to ND for work.

Out of State/Region Forestry Equipment: Forestry equipment brought into the TML from other states/regions increases the likelihood of introducing and/or spreading invasive species and diseases. Equipment leaving the TML may similarly be transporting invasive species elsewhere.

Goals and Objectives:

Goal 1: Increase private landowner participation in sustainable forest management.

Objective A: Develop and launch targeted outreach programs to educate and engage stakeholders in sustainable forest management.

Objective B: Continue the NDFS Forest Stewardship Program.

Objective C: Continue advocating for the development and adoption of financial incentive programs that make sustainable forest management more economically appealing for private landowners.

Goal 2: Foster climate-adapted and resilient forests.

Objective A: Identify and implement silvicultural practices that increase forest resilience.

Objective B: Identify seed sources and species adapted to changing biotic and abiotic conditions of the state.

Goal 3: Identify, track, and control invasive species and diseases.

Objective A: Foster collaborations with organizations such as the USDA and County Weed Boards to improve control and tracking measures for invasive species and diseases.

Objective B: Develop and implement methods to ensure that land managers and contractors are implementing best management practices to control and prevent the spread of invasive species.

Goal 4: Increase public awareness and education about forest health.

Objective A: Continue developing and distributing informational handouts and hosting educational workshops with stakeholders.

Objective B: Develop community wildfire protection plans. Increase awareness of the benefits and significant hazards of prescribed fire and wildfire.

Objective C: Implement a citizen-science program to facilitate the identification and reporting of invasive species and diseases.

Goal 5: Optimize forest stand structure for ecological resilience.

Objective A: Conduct regular forest stand evaluations to assess age, density, and species diversity.

Objective B: Develop stewardship plans that aim for a balanced age structure and species mix, where appropriate, to enhance resilience against diseases, pests, and climate change.

Objective C: Develop/identify and implement silvicultural strategies for the management of decadent aspen.

Objective D: Maintain wildfire management and prevention programs.

4 FOREST PRODUCTS

Desired Future Conditions:

Promote a sustainably managed forest that meets the diversified forest product needs of the TML's inhabitants, businesses, and communities, ensuring continuity in harvesting practices.

Assets:

Tribal Sawmill: A tribal-operated sawmill catering to local demand for forestry products.

Hobbyists and Small Businesses: Forest products are utilized for niche and value-added products for numerous hobbyists and small businesses in the TML.

Sustainable and Local Harvesting of Firewood: Private landowners are able to meet heating demands by harvesting from their forests.

Non-Timber Forestry Products: Many stakeholders value and appreciate being able to harvest and produce products from non timber forestry products such as fruits and nuts.

Issues:

Aging Forests: Aging forests, especially stands of decadent aspen, which limit the availability of quality timber.

Few Native Tree Species: Limited tree species diversity constraining harvesting options and limiting the development of a robust forest industry.

Lack of Public Awareness: A general lack of knowledge and appreciation of the forest industry among the broader community.

Lack of Forest Product Markets: The lack of forest product markets contributes to a shortage of forestry professionals in the TML, which limits effective timber management and harvesting.

Aspen Heartrot: The prevalence of heartrot in aspen, which hinders economically viable harvests.

Goals and Objectives:

Goal 1: Enhance awareness of both traditional and innovative forest product opportunities.

- **Objective A:** Highlight the potential of harvesting fruits, nuts, medicinal plants, and other non-timber forest products.

Goal 2: Minimize forest mortality by targeting usable timber for harvesting before its decline.

- **Objective A:** Establish early detection systems to identify stands nearing the end of their economic utility and prioritize them for harvesting.

Goal 3: Promote the use of native species well-suited to the TML while discouraging the introduction of non-native woody species.

- **Objective A:** Develop educational programs and materials underscoring the ecological and economic benefits of native species.

Goal 4: Formulate and execute management practices geared towards nurturing healthy aspen stands devoid of heartrot.

- **Objective A:** Collaborate with forest health experts to develop strategies to reduce the occurrence of heartrot in aspen stands.
- **Objective B:** Regularly monitor forest health and implement timely interventions.

Goal 5: Develop a network of forestry professionals to work within the TML.

- **Objective A:** Contact forestry professionals annually. Host events/programs for forestry professionals.

5 AQUATIC RESOURCES

Desired Future Conditions:

Forests are sustainably managed to maintain or improve key aspects of water quality and watershed health such as soil quality, nutrient cycles, water quality, and riparian areas.

Assets:

Aquatic Resources: Numerous lakes, water bodies, waterways, riparian areas, and wetlands. The TML has an extensive network of lakes and wetlands.

Public Awareness and Appreciation: Public awareness and appreciation of the value of aquatic resources for recreation.

Issues:

Erosion and Sedimentation: Increased potential for erosion, runoff, and sedimentation, which negatively impact water quality, as forestlands are converted for development or agriculture.

Loss of Wetland Habitat: No goals for no net loss of wetland habitat in North Dakota.

Riparian Forest Abundance and Health: The area covered by and the health of riparian forests is not tracked or monitored.

Lack of Public Awareness: Lack of awareness of the value of clean water and healthy aquatic ecosystems and how forest health contributes to those.

Goals and Objectives:

Goal 1: Identify opportunities and develop strategies that combine forest and aquatic resource management and sustain the health of both.

Objective A: Develop and implement best management practices to prevent adverse impacts to aquatic resources during forest management activities.

Objective B: Develop methods to evaluate the health of riparian forests. Implement programs to identify and track riparian forest areas and health.

Goal 2: Promote forest management practices that will enhance biodiversity.

Objective A: Identify and implement forest management practices that protect and/or restore habitats for fish and other aquatic species.

Goal 3: Increase public awareness of the interconnectedness of forests and aquatic resources.

Objective A: Develop educational materials that emphasize the importance of aquatic resource protection and the role of forests in protecting aquatic resources.

Objective B: Incorporate education about the role of forests in supporting the health of aquatic resources into education materials and events.

Objective C: Advocate for the protection of riparian forests.

Goal 4: Encourage private landowners to consult professionals for the management of aquatic resources.

Objective A: Develop and promote programs and incentives for landowners to consult with natural resource professionals for the protection, management, or restoration of aquatic resources.

Goal 5: Foster collaborative watershed management in the TML.

Objective A: Coordinate forest management strategies and practices that promote the TML's water resource sustainability and watershed health. Involve natural resource professionals and stakeholders specialized in aquatic resources, such as staff from the NDDEQ and non-government organizations (NGOs), in forest management activities and planning.

6 AGRICULTURE

Desired Future Conditions:

Balance agriculture demands/needs, the need to support no net loss of forest, and the imperatives of forest conservation, health, resiliency, and sustainability.

Assets:

Engaged Landowners: Landowners are interested in learning about and implementing agroforestry and silvopasture practices.

Opportunities for Agroforestry and Silvopasture: There are numerous pastures that are wooded and have been grazed over time in the TML with different responses to their grazing practices.

Issues:

Undefined and Inconsistent Silvopasture Practices: Current silvopasture practices in the TML are not consistent and the results for sustainable forests are unknown.

Undefined and Inconsistent Agroforestry Practices: Landowners implement agroforestry inconsistently. Differing timing, duration, and intensity. This may require education about various agroforestry practices.

No Metrics of Success: Metrics to measure successful agroforestry and silvopasture practices have yet to be undefined.

Invasive Species: Agroforestry and silvopasture could contribute to the introduction and spread of invasive plant species.

Total Conversion of Forest to Agriculture: Conversion of lands to agriculture reduces forest cover and contributes to fragmentation.

Goals and Objectives:

Goal 1: Research the applicability of agroforestry and silvopasture within the TML.

Objective A: Support an approach to agroforestry and silvopasture in the TML.

Objective B: Develop or identify measures of success for agroforestry and silvopasture.

Goal 2: Increase public awareness of agroforestry and silvopasture BMPs.

Objective A: Develop and distribute educational materials pertaining to agroforestry and silvopasture BMPs.

Objective B: Educate landowners on potentials for reforestation of agricultural lands.

7 SOCIAL AND CULTURAL USES AND VALUES

Desired Future Conditions:

Forests remain an integral component of the quality of life enjoyed by current and future generations and maintain the TML as a place for recreational experiences and living opportunities. Stakeholders have a greater awareness of forests from ecological, social, and economic perspectives and actively and voluntarily engage in forest stewardship. Forests managed in a coordinated and collaborative manner.

Assets:

People: The communities, people, and stakeholders who live in the TML.

Turtle Mountain Band of Chippewa Indians: The TMBCI has a long tradition of cultural relationships with and uses for the forests and forest-dependent wildlife.

Stakeholders Eager to Learn: Stakeholders who are interested in learning about and addressing issues facing the forests.

Youth Engagement Opportunities: Programs aimed at youth engagement, such as the state-wide Eco Ed program and Envirothon.

Species of Cultural Significance: Numerous species of cultural significance are present within the TML.

Recreational Opportunities: Diverse and many recreational opportunities.

NGO/Nonprofit Support: Nonprofits like the Rocky Mountain Elk Foundation, Ducks Unlimited, Ruffed Grouse Society, and the North American Grouse Partnership that support, reinforce, and advocate for conservation efforts.

Collaborative Aspen Regeneration Projects: Collaboration between state and federal agencies and private landowners for aspen regeneration projects.

Collaboration on Wildfire Fighting and Management: NDFS supports and collaborates with rural fire departments with funding, federal-excess equipment, and training.

Educational Curriculums: Project Learning Tree and Project Wild teaches people how to implement educational curriculums for youth.

Issues:

Tribal Disconnect from Forests: Tribal loss of cultural heritage, identity, traditional ecological knowledge as youth are not engaged with or indifferent towards forests.

Few Educational Opportunities: Lack of educational institutions and research with natural resources programs.

Youth/Social Disconnect from Forests: Youth are increasingly not engaged or indifferent towards forests.

Limited Conservation Easement Opportunities: Misperceptions that conservation easements are difficult to implement or not sought after in the TML.

Climate-induced Changes: Climate-induced changes to the forests and forest species composition may change how people interact with the forests.

Limited Collaboration: Lack of strong collaboration/partnerships between local, state, tribal, and federal units of government.

Goals and Objectives:

Goal 1: Foster meaningful learning and recreational forest experiences for youth.

Objective A: Leverage social media, such as iNaturalist or Instagram, to create and/or deliver educational resources and opportunities.

Objective B: Develop educational programs that encourage youth to spend time in the forest. Organize forest-related events such as "bioblitzes," plant/wildlife identification workshops, or educational geocaches.

Objective C: Continue to maintain informational resources identifying recreational and educational opportunities.

Objective D: Work with local educational institutions to bring marketable forestry skills like arboriculture into course offerings.

Objective E: Continue implementing and expanding youth outdoor environmental education such as Project Learning Tree and Project Wild curriculums and Belcourt's Conservation Day Camp.

Goal 2: Promote forest-based experiences for people living, working, and visiting the TML. Enhance the quality of forest interactions for TML residents and visitors.

Objective A: Preserve cultural resources by collaborating with tribal stakeholders, community organizations, and similar groups to ensure forest management helps sustain their cultural traditions.

Objective B: Support community forestry by developing and implementing community forest projects.

Objective C: Support the development and implementation of projects that strengthen the awareness of and interconnectedness between forests and local communities.

Goal 3: Continue to develop public awareness about the importance and benefits of forests in the TML.

Objective A: Continue developing and distributing information about policies, programs, projects, and practices that support and sustain forests for the people living, working, and recreating in the Landscape.

Objective B: Consistently update and distribute information on policies and practices that benefit TML's forests and communities.

Goal 4: Advocate for the inclusion of sustainable forest management concepts into local governmental units and community planning.

Objective A: Continue to support the coordination and integration of planning efforts between public and private landowners and land management agencies.

Objective B: Support private forestland ownership and management through outreach, stewardship planning, and projects that increase the satisfaction and benefits private forestland owners perceive from owning and managing private forestlands.

Goal 5: Continue public outreach events/programs and continue surveying landowners on demographics, interests, objectives, issues, and so forth.

Objective A: Develop a consistent set of questions for use. Develop and maintain a central database of responses.

8 RECREATION

Desired Future Conditions:

Forests that offer a diverse range of forest-based recreation and experiences and provide a seamless, high-quality experience for users, while maintaining the natural beauty and cultural heritage of the TML.

Assets:

Forest-based Recreation: The forests of the TML provide a unique setting for many recreational opportunities.

Water-based Recreation: Access to numerous lakes and miles of streams provide many opportunities for water-based recreational activities.

Scenic Byway: The Turtle Mountain Scenic Byway provides a scenic route along which travelers will find many of the TML's attractions.

Issues:

Multiple Use Conflicts: Managing forests for multiple uses to maximize recreational opportunities while minimizing the potential negative effects of recreation on forests can be challenging.

Decadent Aspen Forest: Forests primarily composed of decadent aspen may be perceived as less visually appealing or suitable for recreational activities.

Goals and Objectives:

Goal 1: Create and enhance sustainable forest-based recreation and experiences.

- **Objective 1:** Work with local agencies and community members to develop recreation sites outside of fragile forest areas.
- **Objective 2:** Ensure sustainable access to public lands and waters for diverse uses.
- **Objective 3:** Support projects that enhance fish and wildlife populations for recreational needs.
- **Objective 4:** Maintain the region's visual quality, especially along scenic routes.

Goal 2: Improve visitor experience and awareness.

- **Objective 1:** Develop and distribute materials with the purpose of raising awareness about the plethora of forest-based recreation and experiences available.

Goal 3: Maintain the beauty, health, and resiliency of the forest as well as aquatic resources, wildlife habitats, and other terrestrial vegetation.

- **Objective 1:** Develop and implement methods to evaluate the impact of recreation on the forest and surrounding ecosystems. Share study results with stakeholders, including landowners, conservation partners, and local and state agencies.

4 LANDOWNER OBJECTIVES

Landowner objectives are crucial considerations for personalized forest management. Because most of the forests of the TML are privately owned, their consideration is crucial for achieving landscape-level desired future conditions, goals, and objectives.

4.1 CONSISTENCY AND SYNERGY WITH LANDSCAPE OBJECTIVES

Landowner objectives can either be identical to landscape objectives (e.g., forest conservation) or can complement them. For instance, a landowner prioritizing forest management for wildlife may inadvertently contribute to landscape-level goals such as wildlife habitat management, species conservation, fostering structural diversity, invasive species control, and so forth. By aligning personal and landscape objectives, landowners not only fulfill their objectives but also contribute to the broader landscape level desired future conditions, goals, and objectives.

Landowner objectives are crucial considerations for personalized forest management

4.2 IDENTIFYING LANDOWNER OBJECTIVES

Identifying a landowner's objectives can help guide forest management in formulating corresponding landscape-level goals. Data collected from surveys, interviews, and stakeholder engagement information regarding common issues, assets, goals, and objectives described by landowners were utilized to identify objectives that are commonly held by landowners across the TML.

Courtesy of NDSU.

The USFS NWOS identified issues and assets described by forest landowners from across North Dakota.

Top five issues identified by NWOS:

1. Keeping land intact.
2. Trespassing and/or poaching.
3. Pests and diseases.
4. Property taxes.
5. Dumping and/or vandalism.

Top five assets identified by NWOS:

1. Wildlife habitat.
2. Beauty or scenery.
3. Family legacy.
4. Nature protection.
5. Hunting.

Through surveys, interviews, and stakeholder engagement, the NDFS Forest Stewardship Program identified a number of commonly held and potential landowner issues and assets.

The top five landowner concerns identified by a survey distributed at the 2022 Turtle Mountain Region Tour included:

1. Limited wood utilization incentives; lack of forest industry.
2. Fire.
3. Forest conversion.
4. Social disconnect from forest.
5. Invasive tree pests.

This information aided in identifying eight categories of objectives commonly held by landowners:

1. Forest Conservation.
2. Forest Aesthetics.
3. Forest Health Management.
4. Wildlife Management.
5. Recreation.
6. Forest Products.
7. Conservation-based Estate/Legacy Planning.
8. Fire (Wild and Prescribed).

The proceeding sections summarizes the categories of objectives commonly held by landowners.

4.3 FOREST CONSERVATION

Many landowners adopt a forest conservation objective to ensure that their forest land remains intact, sustainable, and transmissible to future generations. Areas with high conservation value, such as FORIs or critical habitats, should be identified, protected, and when possible, enhanced. These sites can be recognized for their biodiversity, ecosystem services, landscape-level ecosystems, and cultural values. Forest conservation and legacy planning objectives often intersect, both aiming to ensure the future utility and quality of a forest. To achieve consistency between the two, landowners can employ forest management practices to mimic natural ecological processes for conservation while also implementing restrictions on human activities that diverge from their forest conservation objective. This is often achieved through multiple-use management, which balances the utilization and protection of various forest resources like forest products, wildlife, species of conservation need, recreation, and aquatic resources.

4.4 FOREST AESTHETICS

A prevailing objective for landowners is the pursuit of aesthetic value, which encapsulates the visual quality and "feel" of the forest. Aesthetics are not just about visual appeal; they also elicit a sense of pride, beauty, and stewardship among landowners. This objective extends beyond personal enjoyment to include the well-being of the community, neighbors, and even casual passers-by. Forest aesthetics can be

significantly influenced by the size of the forest, the scale and intensity of forest management practices, and the specific location of the property. Forestry professionals can guide landowners through various management practices to enhance the forest's aesthetic value.

While certain forest management practices, such as prescribed fires or timber thinning, may temporarily diminish the forest's aesthetic appeal, their consistent application can achieve long-term enhancements. For instance, the immediate aftermath of a prescribed fire may not be visually appealing, but within weeks the benefits in terms of species composition and the control of mid-story or nuisance plant species become evident. Similarly, timber thinning may initially alter the forest's visual character, but the long-term gains in spatial arrangement and visual balance far outweighs the short-term visual impacts.

The ultimate reward for landowners comes in the form of pride and fulfillment as they witness the aesthetic improvements that result from their investment in thoughtful and consistent forest management practices. Forest aesthetics can be effectively managed and enhanced through informed, long-term planning and the strategic use of forest management practices.

Courtesy of NDSU

Summary of Landowner Interviews about Forest Aesthetics

Feedback of forest aesthetics was received from landowners through interviews conducted by members of the Working Group during the development of this LFSP. Landowners all expressed an enjoyment and appreciation of their forests and the biodiversity therein.

There is generally a shared consensus that biodiversity should be conserved and/or enhanced without compromising forest health. The sight of aged, decaying aspen was often raised as a concern. Conversely, the grandeur of large, mature oak trees was revered with a widespread desire for their preservation. Landowners contemplating management practices frequently expressed their desire for the retention of oaks and advocated for thinning within aspen-dominated canopies to foster aspen regeneration.

The pervasive density of hazel shrubs in unmanaged forests was a common concern, particularly regarding its implications for aspen regeneration, forest succession, and forest longevity. Many landowners expressed concerns that dense hazel undergrowth prevents the regeneration of tree species without significant disturbance to allow sunlight to reach the forest floor. Furthermore, many landowners referred to hazel as a nuisance because it makes navigation through forests challenging unless on a trail and hampers visibility through the forest.

Among landowners who have completed forest management practices, the rapid aspen growth post-management has been a source of encouragement to continue practicing forest management. The discernible positive transformations shortly after management underscore the worthiness of the effort, fostering optimism for a thriving forest landscape with proactive management.

Words commonly used by landowners when interviewed about the forests of the TML.


Courtesey of NDFS.


Courtesey of NDSU.

4.5 FOREST HEALTH

Forest health is a foundational objective for landowners in the TML. Many landowners initiate consultation with forestry professionals and with the NDFS due to concerns about the health of their forests. A healthy forest is defined as one that can sustain its unique species composition and inherent ecological processes. By maintaining and enhancing forest health, landowners not only serve their individual objectives but also contribute to the TML's landscape-level goals and objectives. By supporting and developing awareness of potential threats and leveraging modern forest management practices, landowners can contribute meaningfully to the long-term health and resilience of these forests in the TML.

Active forest management plays a crucial role in maintaining and improving the health of the forest. Forest management practices are instrumental in reducing risks from wildfire, pests, and invasive species, thereby ensuring the forest's long-term health and vigor. Invasive species can severely disrupt the local ecosystem and pose a continuous threat to forest health. Additionally, pests, such as the EAB, and diseases are ever-present risks that can significantly affect various types of trees in the forest. Yearly inspections should be conducted by the landowner to check for signs of invasive plants, insect infestations, or diseases. These inspections are crucial for the active management of forest health, as they can inform the need for immediate response. Forest health protection is often directly linked to the active management of insects, diseases, and invasive plants.

Summary of Landowner Interviews about Forest Health

Feedback on forest health was received from landowners through interviews conducted by members of the Working Group during the development of this LFSP. Landowners indicated that their aspen forests are generally aging and are dominated by trees that appear weak and decadent. Several landowners noted that wind and ice storms fell numerous trees each year, and larger storms have turned large areas of their aspen forests into a forest of "candle sticks." The density of hazel is perceived as a forest health issue by landowners. It is believed that without disturbance to remove hazel their forests will not regenerate. Many landowners

expressed concern for the longevity of forests dominated by hazel. Some landowners voiced concern regarding impacts from neighboring properties as a result of activities outside of their control, such as regular utility corridor clearing, herbicide drift, or construction of cattle ponds damaging trees on their properties.

4.6 WILDLIFE MANAGEMENT

The TML's natural abundance of forest makes it a sanctuary for a wide variety of wildlife. These include numerous non-game wildlife species of conservation need as well as game wildlife such as the white-tailed deer to the ruffed grouse. Guiding the conservation efforts in this area is the NDGFD 2015 North Dakota SWAP. This strategic guide serves as the compass for preserving the state's wildlife. Many landowners want to play an active role in managing, conserving, and protecting wildlife species and their habitats. Concerns about forest conversion and habitat fragmentation are widely held. These concerns are often connected to concerns about the declining populations of specific species like the ruffed grouse. Because much of the forest of the TML is privately-owned, working with landowners to implement forest management practices that benefit wildlife may be crucial to achieving landscape-level goals and objectives for wildlife.

Summary of Landowner Interviews about Wildlife Management

Feedback on wildlife management was received from landowners through interviews conducted by members of the Working Group during the development of this LFSP. Many landowners expressed concern about whether or not decadent apsen, in combination with an understory of dense hazel, will ultimately change the forest composition and no longer support wildlife. The reduction in ruffed grouse population was a commonly voiced concern, and numerous comments were received regarding grouse observations in recent years as compared to historical observations. Landowners are generally pleased to see their forests supporting deer and other wildlife populations.

Courtesey of NDGFD

4.7 RECREATION

The forests of the TML provide a unique context not found elsewhere in ND for many of the traditional recreational activities. This is valued and appreciated by many landowners who enjoy many forest-oriented recreational activities in the TML. These range from walks or hikes through their forests, wildlife viewing or hunting, and to riding ATVs/OHVs. Additionally, many people travel to the TML to also partake in these forest-oriented recreational activities. A list summarizing the forest-oriented recreational opportunities enjoyed by landowners and tourists is provided below:

- Hunting and fishing
- Wildlife viewing and birding
- Equestrian/horseback riding
- Camping
- Environmental education
- Foraging and gathering
- Geocaching
- Walking and hiking
- ATVs or OHVs and leases
- Snowmobiling
- Snowshoeing
- Cross-country skiing


Courtesy of NDFS.


Courtesy of NDFS.

4.8 FOREST PRODUCTS

Many landowners are interested in exploring forest-based revenue generation. While financial gain is a common interest, many landowners also seek to balance or prioritize other objectives over forest-based revenue generation. The livelihood of few, if any, landowners is solely derived from forest-based revenue. This is partially attributable to the low demand for aspen and oak trees as timber, which has hindered the development of a robust timber industry that could drive forest-based economic activity. In lieu of this industry, some innovative landowners have pivoted towards alternative methods of generating forest-based revenue. These methods include harvesting timber for firewood or niche and/or value-added products like artisanal furniture and crafts, selling hunting leases, and selling forest-grown fruits or nuts. Each of these alternatives exemplifies a unique method through which landowners have derived economic value from products derived from their forests.

4.9 CONSERVATION-BASED ESTATE/ LEGACY PLANNING

Conservation-based estate/legacy planning is a commonly held objective among landowners. The overarching intent is to ensure that their forest land remains intact, sustainable, and transmissible to future generations. Although legacy planning and conservation share an overarching goal to ensure the long-term viability of forest resources, they differ in strategy and implementation. Legacy planning often focuses on restricting non-aligned human activities to preserve the land's character for future generations. Meanwhile, conservation-based planning uses management techniques to simulate natural ecological processes beneficial to the forest ecosystem. Legacy planning is more than just preserving forestland for future generations; it is about making informed, long-term decisions that benefit both the land and the community.

Legacy planning often focuses on restricting non-aligned human activities to preserve the land's character for future generations

According to the USFS's 2018 Family Forest (10+ Acres) Ownership Characteristics: North Dakota report, the average age of a family forest owner in North Dakota was 67 years old. With aging landowners, incorporating estate planning with forest management recommendations is key to achieving both landowner and landscape-level goals and objectives. The choices that these aging landowners make concerning the future use and ownership of their land can significantly influence landscape-level changes. Ensuring that sufficient forestlands, of adequate sizes, continue to flourish is not just about conserving forests but also preserving the numerous public benefits these forests offer.

The role of forestry professionals in guiding these decisions cannot be overstated, as they provide invaluable resources and expertise. Forestry professionals, such as those with the NDFS, can aid landowners in making informed decisions about their land's future use and ownership. Many forest stewardship practices, including specific management recommendations, require multi-year or even multi-decade commitments to achieve their objectives. It is crucial, therefore, to integrate these long-term forest management plans with estate planning to ensure continuity and accomplishment of legacy goals.

4.10 FIRE (WILD AND PRESCRIBED)


Photos is courtesy of USFWS.

Fire has been a natural occurrence in the TML and could play an important role in forest management and health in the TML. Historically, wildfires occurred within the forests of the TML and were a catalyst of forest succession. Post-European settlement, the prevalent approach among landowners was to suppress wildfires and not implement prescribed fires due to concerns surrounding the risk of fire to property and life. However, this approach is gradually changing in part due to outreach initiatives led by various agencies and organizations. Some landowners are beginning to view human-caused wildfires as a natural component of the TML and prescribed fires as a potentially useful forest management tool in some areas. The use of prescribed fire aligns with several forest management objectives as it, when employed in a safe and controlled manner by experts, can mitigate the risks associated with wildfires while also promoting forest health. Landowners interested in forest management and health have recognized this and are interested in exploring how prescribed fire could be safely integrated into their forest stewardship practices.

Summary of Landowner Interviews about Fire

Feedback on the use of prescribed fire as a forest management tool was received from landowners through interviews conducted by members of the Working Group during the development of this LFSP. Many landowners expressed support for use of prescribed burns in a controlled manner when conditions allow for low-intensity, slow-moving fires. The understanding that wildfires typically start under extreme circumstances and are difficult to control is a concern, and that using prescribed burns during optimal conditions to reduce fire fuel loadings is something that could be beneficial. Generally, landowners expressed a reluctance to implement controlled burns by themselves, especially for management of the forest floor, but were supportive of trained professionals using the management technique. More often landowners burn woody debris on a smaller scale in piles, during optimal conditions to reduce the likelihood of unintentional spread. Support for utilizing prescribed fire for invasive species management or converting agricultural fields from row crops to pasture was also expressed.

5 FOREST MANAGEMENT

Forest management can be completed at multiple levels, with the purpose and motivation determined by the landowner or agency that is completing the management activities to meet their goals. Forest management is typically completed to enhance the ecology and forest health, aesthetics, recreation and sporting, fire suppression, and to develop marketable timber or other forest-related commodities.

Since there has been little demand in the TML, there has historically been little interest in forest management to develop forestry products. Where forest product markets exist, the costs of managing forests can often be recovered, eventually, when the trees are harvested. The costs of forest management are borne by the landowner, perhaps with some cost-share assistance, and therefore, forest management recommendations must take that into consideration if the desired outcome is to provide forestry products. In general, forest management specific to timber harvest has not been a component of the TML, as the supply is small, the demand is small, and the economics are not favorable.

Because most of the forests of the TML are privately-owned, most forest management practices are recommended to landowners through collaborative planning efforts with the NDFS and forestry professionals through the Forest Stewardship Program. The NDFS, through its Forest Stewardship Program, bears the cost of conducting an inventory and developing a Forest Stewardship Plan (FSP), a forest management plan for nonindustrial private landowners. A management plan will help a landowner achieve their objectives efficiently and economically by helping the landowner make knowledgeable decisions and evaluating progress. Additionally, the NDFS has developed a set of forestry best management practices intended to protect the productivity and sustainability of forests. These are detailed in the 2010 North Dakota Forestry Best Management Practices document, which can be provided by NDFS staff on request or retrieved from their website (*https://www.ag.ndsu.edu/ndfs/documents/bmp-2010-final-doc-11-12-10.pdf*).

It is recommended that a landowner contact the NDFS for the development of an FSP. Ultimately, a forest management plan strives to provide recommendations for forest management practices that are rooted in broader landscape-level desired future conditions, goals, and objectives for the TML while balancing those needs with a landowner's specific objectives for their forest.

To request forestry technical assistance, including a forest stewardship plan, contact the NDFS. The following website includes a link to a survey to an online form to request assistance:

https://www.ag.ndsu.edu/ndfs/programs-and-services/forest-stewardship-1

5.1 COMMONLY RECOMMENDED FOREST MANAGEMENT PRACTICES

A number of forest management practices are available for landowners to utilize in ways that align with diverse landowner objectives. Before implementing any one forest management practice, it is recommended that a landowner contact the NDFS for an FSP. The planning process is voluntary and the resulting plan is non-binding. FSPs are intended to encourage good stewardship of North Dakota's private forestlands. FSPs also recommend proven management practices and the benefits extend beyond the immediate area.

The development of an FSP generally includes a site visit and forest inventory conducted by a forester, a review of landowner objectives, and an assessment of applicable management practices. Commonly recommended forest management practices for landowners to utilize include, but are not necessarily limited to, the following practices:

1. Clear-cutting or Regeneration Harvest
2. Patch and Mosaic Cuts
3. Forest Thinning and Forest Stand Improvement
4. Stump Sprout Management
5. Woody Waste and Residual Management
6. Reforestation
7. Forest Monitoring for Damage from Insects, Disease, and Weather

These practices can be utilized to fulfill one or multiple landowner objectives, contingent on the distinct timeline and budget allocated for the activities. Additionally, the selection of appropriate forest management practices is influenced by a number of factors including, local contractor or forestry professional accessibility, site-specific conditions, climatic conditions, wildlife habitat, and potential effects on water quality, among others. These elements collectively shape the forest stewardship planning process of both foresters and landowners when identifying the most efficient and economical tools to meet a landowner's objectives for their forest.

Below is a summary of the aforementioned most commonly used forest management practices and their applicability to the commonly held landowner objectives.

5.1.1 CLEAR-CUTTING OR REGENERATION HARVESTING

Clear-cutting, also known as regeneration harvesting or coppicing, serves as a pivotal forest management tool. This practice involves the removal of the above ground portion of the tree and allowing the re-sprouting from the stump and roots to provide replacement trees in a particular area such that an even-aged forest stand can regenerate. Within the TML, this practice is utilized in the management of aspen-dominated forests, as they can regenerate from the stumps quickly. This technique is also effective for regenerating oak dominated forests, which regenerate through stump sprouts.

Because aspen is shade intolerant and can vigorously regenerate through root sprouting, this practice is an effective method of removing a diseased/decadent aspen stand and creating the conditions for the regeneration of a robust even-aged stand of aspen. When implementing this practice, timing and technique are important to avoid excessive soil

Courtesy of NDGFD.

1 Year Post Aspen Regeneration Harvest

Courtesy of NDGFD.

10 Year Post Aspen Regeneration Harvest

Courtesy of NDGFD.

compaction and other adverse effects. This practice is best performed in the fall or winter when aspen have entered dormancy and their energy reserves have been transferred to the root system. Allowing this storage to occur will assist with ensuring vigorous regrowth in the spring. Oak trees over five inches in diameter should be left standing to provide mast production. Wet conditions should be avoided to prevent soil compaction, and techniques like mat logging may be employed in wetter areas to protect the soil and hydrological features from rutting and damage.

Aspen Regeneration on NDFS Managed Lands

Aspen regeneration efforts on NDFS managed lands in the TML have been a periodic, ongoing priority for natural resources managers since the 1980s. Past efforts included using a bulldozer with a specialty shear blade to encourage root suckering. This practice was effective but resulted in negative perceptions from the public.

In 2016, a new, less aggressive approach with less soil disturbance was employed with support from the NDGFD and the Rocky Mountain Elk Foundation. The NDFS began an aspen management program to regenerate decadent, declining aspen stands. The program entailed conducting forest stand inventories to identify high-priority stands that would benefit from treatment practices, delineating those stands, and conducting pre-treatment treatment inventories. Using a forestry brush cutter, the understory is cleared, and the overstory is felled. All other species found within the stand were macerated to ground level. Following treatment, stocking surveys are conducted two years post treatment to assess treatment effectiveness.

Aerial photograph showing aspen regeneration on the right versus mature aspen on the left.

Courtesy of NDGFD

5.1.2 PATCH AND MOSAIC CUTS

Patch cuts involve removing trees from small areas (i.e., patches) within a forest while preserving select trees like bur oak and snags for wildlife habitat. These patches, typically 2.5 acres in size, should be in a natural-looking pattern that will allow more sunlight into the center of the unit. Managing adjacent sites in 10+ year increments allows multiple age classes of aspen to be created within a small area.

Mosaic cuts are similar to patch cuts but have less defined perimeters, allowing the managing landowner to blend with the natural contours of the land, avoiding straight lines to maintain the landscape's aesthetic integrity. These cuts are typically greater than five acres in size, and resemble the effects of natural disturbances, such as windstorms or wildfires.

For aspen dominated forests, particularly those that are over-mature with low basal areas, understory removal and coppicing can serve as an effective regenerative treatment. Rarely, an aspen dominated forests will be so over-mature and have such a low basal area that an understory of other tree species will form. In this case, understory removal is not an effective regeneration treatment. The cut trees can either be repurposed as firewood or lumber, or left on-site to decompose naturally, returning nutrients to the soil, providing wildlife habitat, and supporting the stand's future growth. Because this practice is clear-cutting or regeneration harvesting but within a small area, the same timing and technique recommendations provided in that section apply.

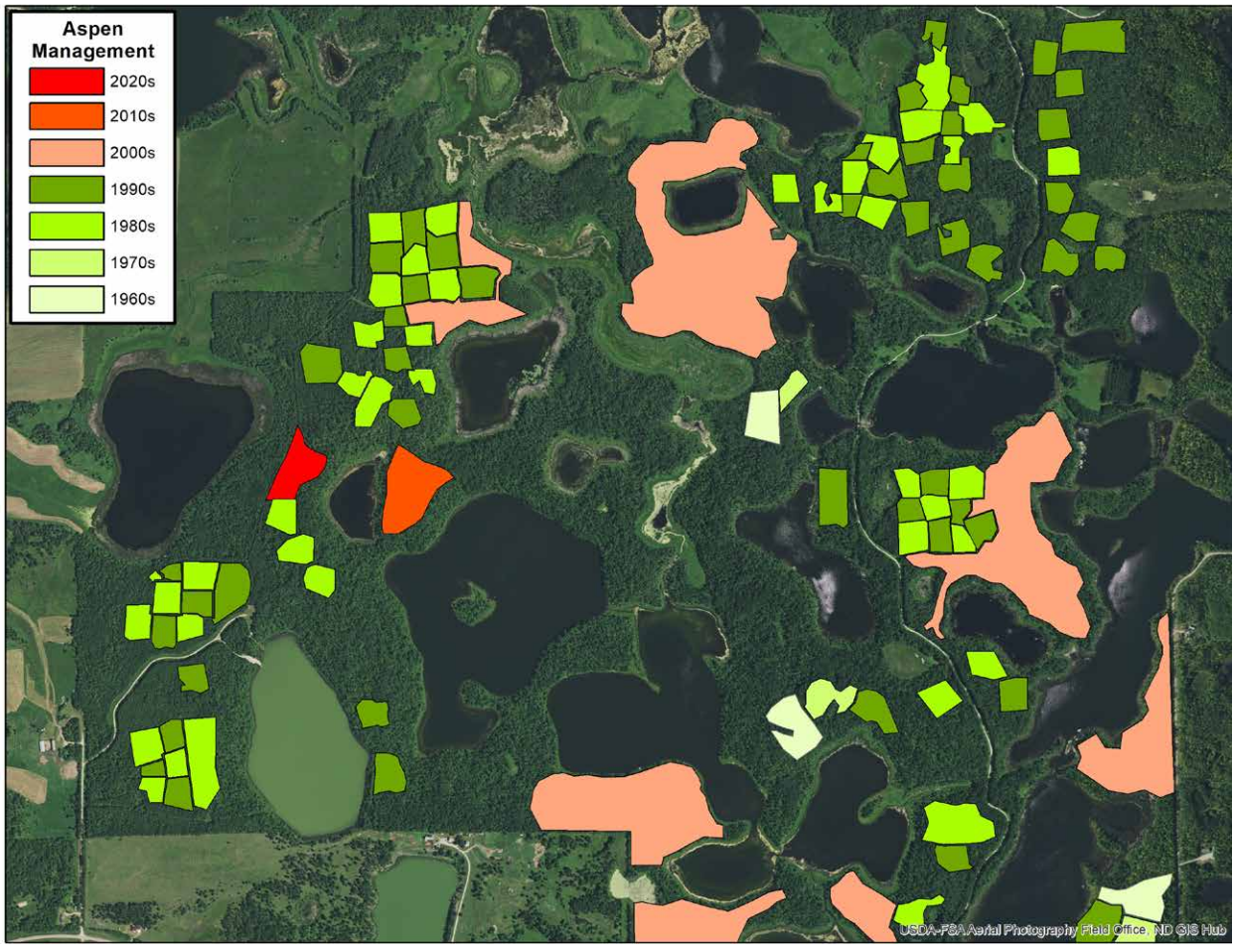


Figure 14: An example of patch and mosaic cuts completed by the NDGFD from the 1960s to the 2020s within the TML. Figure provided by the NDGFD.

5.1.3 FOREST THINNING AND FOREST STAND IMPROVEMENT

Forest stand improvement encompasses all cuttings apart from principal harvests (e.g., clear-cutting or regeneration harvest) directed at enhancing the composition, condition, health, and/or growth rate of a forest stand. These cuttings may yield commercial benefits if the trees are of marketable size, or they may be non-commercial in nature. To implement forest stand improvement effectively, it's critical to assess the current state of the stand and establish well-defined objectives. These objectives might include improving timber quality, eradicating trees affected by pests or diseases, removing invasive species, and conserving or augmenting wildlife habitat and visual appeal. Preventative measures against wildfire damage, such as the thinning of dense growth or removal of ladder fuels and the pruning of lower branches, can also form part of a forest stand improvement strategy. Forest stand improvement can be achieved through various harvesting methods:

- **Cleaning or Weeding:** Targeting saplings or shrubs with a diameter at breast height (DBH) of four inches or less, this method involves the removal of undesirable young trees to allow the preferred saplings space to grow, thereby improving stand quality.
- **Release Cutting:** Similar to cleaning, release cuttings free young saplings from competition by removing the overshadowing, older trees that hinder their development.
- **Thinning or Improvement Cuttings:** Conducted in maturing stands past the sapling phase, thinning is designed to accelerate the growth of the remaining trees by reducing competition for resources. This is a common practice in the management of oak stands as the removal of undesirable trees and shrub species can result in accelerated growth of young oak. During these operations, it is crucial to selectively remove competing trees and retain those with favorable traits, like larger DBH and straight form. It's essential to maintain a careful balance, as over-thinning may increase susceptibility to windthrow. When removing competing trees, avoid harming the trees left standing. Thinning can also lead to increased acorn production, offering substantial benefits to local wildlife. In stands that have progressed beyond the sapling stage, improvement cuttings are carried out to eliminate trees with poor form, condition, or undesirable species, thereby enhancing the stand's overall quality.
- **Salvage or Sanitation Harvest or Cuts:** Salvage or sanitation cuts are generally implemented in response to natural disasters such as wildfires, severe weather events, and the outbreak of disease or pests. It consists of the removal of dead or damaged trees and the harvesting of available trees before further deterioration occurs. Generally, the primary objective of salvage or sanitation harvesting is to make the best use of the affected forest resources to recover value from damaged timber before it loses its merchantability due to mortality or decay. However, within the TML, where the merchantability of timber is less of a concern, salvage harvesting can play a significant role in maintaining forest health and aesthetics. Additionally, it can reduce the accumulation of hazardous fuels, thereby lowering the risk of subsequent wildfires and pest infestations. This practice is particularly relevant in aspen forests, which are susceptible to damage from severe weather events and pest outbreaks.

To aid landowners in this complex process, a tailored management plan can be developed for specific areas within their forest. It's advisable to engage with the NDFS and forestry professionals for a thorough inventory and expert guidance on marking trees prior to undertaking any forest stand improvement practices. This approach ensures a detailed understanding of the stand's condition and informs the specific recommendations for its enhancement.

5.1.4 STUMP SPROUT MANAGEMENT

Most tree species in the TML will produce new sprouts from the stump after the tree is cut. These include trembling aspen, bur oak, balsam poplar, cottonwood, green ash, and paper birch. Following a harvest or thinning, a multitude of these sprouts will compete for limited resources such as sunlight and water. Although natural thinning will occur over time as the weaker sprouts die off, stump sprout management can enhance the forest's health and productivity. For cottonwood, green ash, paper birch, and bur oak, selectively retaining only the most vigorous one or two sprouts per stump approximately three years post-harvest, landowners can improve the growth rates and overall health of the regenerating trees. Additionally, the application of an approved herbicide to stumps can inhibit the emergence of or kill sprouts and the establishment of more desirable trees. This chemical application can be used to foster a forest composition that is more resilient and better suited to future conditions that meet a landowner's objectives.

Courtesy of NDFS

The timing of when trees are cut can further assist with stump sprout management. Trees cut in the fall or dormant season will have greater sprouting potential as there is an abundance of stored carbohydrates in the root systems. Trees cut in the spring/early summer will sprout less as carbohydrate reserves will be depleted following leaf out. The timing of tree removal should be factored into the landowner's desired stand condition.


Courtesy of NDFS

5.1.5 WOODY WASTE AND RESIDUAL MANAGEMENT

Forestry management practices often yield a considerable volume of woody debris. Given the limited timber market in the TML and the nominal commercial value of the trees and shrubs to be removed, creative strategies may be necessary to manage the resulting biomass aesthetically and effectively. For brush, mulching can facilitate decomposition and minimize visual impact. Brush with a DBH over one inch can be processed with a forestry mulcher. Alternatively, spreading the woody waste across the site can encourage natural breakdown, especially when pieces are in direct contact with the soil and moisture. This material typically breaks down within a couple of years. The organization of the woody debris into burnable piles for disposal by fire, following a drying period and ensuring adherence to local fire regulations, can be an effective way to dispose of woody waste. The utilization of larger woody debris for firewood or milling into slabs may be viable. Local hobbyist sawmills might express interest in oak. If heavy machinery is involved, it's prudent to stack woody debris soon after harvesting to avoid damage to the regenerating forest. Overall, the management of woody debris requires a balance between practicality, aesthetics, ecosystem benefits, and potential future uses. Landowners are encouraged to consider these options carefully and to consult with forestry professionals to ensure the chosen methods align with their long-term land management goals.

Green ash infested with EAB

Courtesey of NDSU

Aspen stem break

Courtesey of NDFS

5.1.6 REFORESTATION

Reforestation stands as a cornerstone of sustainable forestry, supporting the long-term health and productivity of forests. Reforestation strives to re-establish tree species that naturally occurred and are well-suited to a given site. This practice requires careful planning and decision-making across several critical areas: choosing between artificial and natural regeneration methods, selecting appropriate species and seedlings, determining optimal planting densities, preparing the site, deciding on the best planting techniques, and implementing post-planting management strategies. Each decision in the reforestation process is influenced by a confluence of factors, including but not limited to the landowner's specific objectives, the unique characteristics of the site, anticipated market conditions for timber and non-timber forest products, and available financial resources.

Because there has been little demand for traditional forest products, there has been little economic incentive to implement reforestation in the TML beyond allowing stands to naturally regenerate. Furthermore, aspen's ability to naturally regenerate in response to coppicing further limits the economic incentive.

Artificial means of reforestation in the TML have been limited to planting monocultures of non-native conifers, primarily Black Hills spruce (*Picea glacua* var. *densata*) and blue spruce (*Picea pungens*). This was done for various reasons including seed orchard establishment, future timber harvest opportunities, and aesthetics. Conifer plantations are not considered an effective form of reforestation. Such plantations are prone to insect and disease and are not well suited for the TML. Reforestation efforts should emphasize naturally occurring forests and the ecological services they provide. Conifer plantations can provide species diversity, winter cover for wildlife, and aesthetics. Conversion to or establishment of conifer plantations is generally not recommended for landowners as it requires costly investment and long-term planning that has limited potential for economic return.

5.1.7 FOREST MONITORING FOR DAMAGE FROM INSECTS, DISEASE, AND WEATHER

Landowners play a pivotal role in safeguarding the health and resiliency of their forests. Vigilance against pests and diseases is essential, as these can pose significant threats to forest ecosystems. The most effective strategy for pest and disease management is regular and

thorough monitoring. Prompt identification of issues can significantly reduce both the impact of the problem and the costs associated with its resolution. When conducting inspections for insects and diseases, landowners should be attentive to several indicators:

- **Dead Trees:** Look for any patterns or clusters of mortality. Are the affected trees of the same species, age, or in a particular area?
- **Foliage Conditions:** Examine leaves for signs of damage such as holes, deformities, discoloration, or unusual spotting.
- **Limb and Branch Health:** Check for abnormalities like swellings, discoloration, or the presence of sap or other fluids, which may indicate stress or injury.
- **Insect Activity:** Note the presence of insects, their location, and the type of damage they may be causing.

Should there be any suspicion of insect infestation or disease presence, it's crucial to gather comprehensive information. Document the nature and extent of the damage, any discernible patterns, potential contributing factors, and any other information that the landowner feels is pertinent. For expert guidance and diagnosis, landowners are encouraged to reach out to the NDFS or the NDSU Extension agent. These professionals can provide valuable assistance in identifying the problem and recommending appropriate management strategies to protect the forest's health and longevity.

Courtesey of USFS.


Courtesey of USFWS.

5.2 FOREST MANAGEMENT PRACTICE NOT COMMONLY UTILIZED OR CURRENTLY RECOMMENDED IN THE TML

The following forest management practice can be utilized to achieve varying objectives in forests but is not commonly utilized or currently recommended within the TML.

5.2.1 PRESCRIBED FIRES

Prescribed fires should not be utilized without coordination with local fire departments, local governmental units, and forestry professionals. NDFS currently has no role in prescibed fires in forests. While, when utilized correctly and safely by professionals, prescribed fire can be a useful and cost-effective forest management practice, the improper use of prescribed fire can result in uncontrolled wildfires that often