

## Appendix A

### East Central Landscape Planning Committee



This section provides an overview of the people involved with the East Central Landscape Plan Revision.

#### A. East Central Landscape Planning Committee Members

The East Central Landscape Plan Revision involved a large number of people representing a wide range of interests. The following list includes committee members arraigned alphabetically by last name. In addition to those on this list, there were many others who supported the effort in various ways.

Committee Member	Organization	Committee Member	Organization
John Bathke	Private Landowner	Steve Karel	Sherburne NWR
Greg Beck	Pine County Land Department	Wade Mapes	MN DNR Forestry
Paul Dickson	Consulting Forester	Dennis McDougal	USFS State and Private Forestry
Peter Dieser	American Bird Conservancy	Tony Miller	MN DNR Forestry
DJ Forbes	The Trust for Public Land	Jim Parma	Bell Timber
Leslie George	MN DNR Fisheries	Jodie Provost	MN DNR Wildlife
Nichole Henger	St. Croix River Association	Dana Raines	NRCS (retired)
Anna Hess	MN DNR Eco and Water Resources	John Riens	US Fish and Wildlife Service
Jacob Horbacz	Mille Lacs Band of Ojibwe	Paul Swanson	Pine SWCD
Gina Hugo	Sherburne Parks and Rec	Bob Tomlinson	Natural Resources Professional
Don Janes	Private Landowner	Jeff Wilder	MN DNR Forestry

Additional members serving on the Committee for a portion of the landscape planning process:

- Kyle Gill, U of MN Cloquet Forestry Center
- Monica Zachay, St. Croix River Association
- Nicole Butler, St. Croix River Association
- Joe Kelash, Pine County Land Department
- Rick Horton, Minnesota Forest Industries
- Thomas Zimmerman, Isanti SWCD
- Scott Burns, MN DNR Timber Utilization & Marketing

## **B. Staff Supporting the East Central Landscape Plan Revision**

### Minnesota Forest Resources Council

- Eric Schenck, Executive Director
- DeAnn Stish, Former Executive Directory
- Ashlee Lehner, Landscape Planning and Policy Coordinator
- Lindberg Ekola, Former Landscape Program Manager
- Marissa Schmitz, Former Forest Policy Coordinator
- Sadie Mathison, Information Specialist

### Dovetail Partners

- Kathryn Fernholz, President
- Ashley McFarland, Executive Director

### Independent Contractors

- David Henkel-Johnson, Plan Writer
- Mitch Brinks, GIS Technician

## Appendix B

### Glossary

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Definitions of terms used in this Plan:

**Action Item.** These statements outline in more detail what the partners anticipate will be the major tasks in completing the objectives. Objectives should contain several action item statements to help further clarify efforts needed to complete the objectives.

**Age Class.** An interval into which the age range of trees or forest stands is divided for classification or use (e.g., 0-10 years, 10-20 years, etc.). (DNR-SFRMP Definitions)

**Age Class Distribution.** The proportionate amount of various age classes of a forest or forest cover type within a defined geographic area (e.g., ECS subsection). (DNR-SFRMP Definitions)

**Asset.** A benefit or strength that enables or supports progress towards Desired Future Conditions. Assets can be physical or human resources, or useful and desirable qualities: for example, organizational capacities can be an asset in landscape management.

**Biological Diversity.** The variety and abundance of species, their genetic composition, and the communities and landscapes in which they occur, including the ecological structures, functions, and processes occurring at all of these levels. (Minnesota Statute Chapters 89 and 89A. Sustainable Forest Resources Act).

**Coordination Committee.** Portion of the East Central Landscape Committee which will be responsible for coordinating the implementation of the East Central Landscape Plan. This group is composed of a diversity of stakeholders representing the range of interests and ownerships in the region.

**Cover Type.** Expressed as the tree species having the greatest presence (i.e., in terms of volume for older stands or number of trees for younger stands) in a forest stand. (DNR-SFRMP Definitions)

**Crosswalk Table.** A crosswalk table is a kind of table that allows for references to be built that allows the way data is categorized and stored in one database to be matched up with data in another database.

**Desired Future Condition.** Desired Future Conditions (DFC) are broad overarching statements that 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. This plan used a one hundred year horizon when describing the desired future conditions of forests.

**Ecological Classification System (ECS).** A method to identify, describe, and map units of land with different capabilities to support natural resources. This is done by integrating climatic, geologic, hydrologic, topographic, soil, and vegetation data. (DNR-SFRMP Definitions)

**Even Aged.** A forest stand composed of trees of primarily the same age or age class. A stand is considered even-aged if the difference in age between the youngest and oldest trees does not exceed 20 percent of the rotation age (e.g., for a stand with a rotation age of 50 years, the difference in age between the youngest and oldest trees should be 10 years). (DNR-SFRMP Definitions)

**Forest Health.** The perceived condition of a forest derived from concerns about such factors as its age, structure, composition, function, vigor, presence of unusual levels of insects and disease, and resilience to disturbance—note perception and interpretation of forest health are influenced by individual and cultural viewpoints, land management objectives, spatial and temporal scales, the relative health of the stands that comprise the forest, and the appearance of the forest at a point in time. (“The Dictionary of Forestry”, John A. Helms, editor, Society of American Foresters.).

**Forest land.** Land at least 10-percent stocked by trees of any size, including land that formerly had such tree cover and that will be naturally or artificially regenerated. Forest land includes transition zones, such as areas between heavily forested and non-forested lands that are at least 10-percent stocked with trees and forest areas adjacent to urban and built-up lands. The minimum area for classification of forest land is 1 acre and 120 feet wide measured stem-to-stem from the outer-most edge. Unimproved roads and trails, streams, and clearings in forest areas are classified as forest if less than 120 feet wide. Forest land includes three sub-categories: timberland, reserved forestland, and other forestland. (FIA Definitions)

**Forest Management.** The regeneration, management, utilization, and/or conservation of forests to meet specific goals and objectives (“The Dictionary of Forestry”, John A. Helms, editor, Society of American Foresters.).

**Forest Resources.** Those natural assets of forest lands, including timber and other forest crops; biological diversity; recreation; fish and wildlife habitat; wilderness; rare and distinctive flora and fauna; air; water; soil; climate; and educational, aesthetic, and historic values (Minnesota Statute Chapters 89 and 89A. Sustainable Forest Resources Act).

**Forest Resilience.** The capacity of a forest to withstand or recover from disturbance and stress. (Northern Institute of Applied Climate Science)

**Forest Stand.** A group of trees occupying a given area and sufficiently uniform in species composition, age, structure, site quality, and condition so as to be distinguishable from the forest on adjoining areas. (DNR-SFRMP Definitions)

**Forest Spatial Patterns.** The size, shape and arrangement of landscape patches. Patches may be any feature that can be mapped such as: Forest types, habitats, and vegetation communities; Landforms, soils, and aquatic systems; or Disturbances – both natural and human caused (MN DNR – Jim Manolis):

**Fragmentation.** Changes across a landscape that break large continuous areas of a particular land cover (e.g., forest) into smaller isolated patches. (Michael Kilgore, U of MN)

**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 Planning Committee thought needed to be pursued over the next ten to twenty (10 – 20) years to promote sustainable forest resources across the region.

**Issue.** A problem, challenge, or unresolved conflict that requires resolution to improve progress towards Desired Future Conditions.

**Key Findings.** High level strategic conclusions about the landscape developed by the Committee.

**Multiple Use.** The principle of forest management by which forest resources are utilized in the combinations that will best meet the needs of the people of the state; including the harmonious and coordinated management of the forest resources, each with the other, without impairment of the productivity of the land and with consideration of the relative values of the resources, and not necessarily the combination of uses resulting in the greatest economic return or unit output. (Minnesota Statute Chapters 89 and 89A. Sustainable Forest Resources Act).

**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 more specific direction in implementing the goals. Often, objectives will include quantifiable targets, as means to provide more specific and measurable parameters for monitoring progress towards the goals. The initial description of programs and projects are usually found in objective statements.

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

**Natural Area.** A physical and biological area in nearly natural condition that exemplifies an ecological community and its associated vegetation and other biotic, soil, geologic and aquatic features. (“The Dictionary of Forestry”, John A. Helms, editor, Society of American Foresters.)

**Native Species.** An indigenous species that is normally found as part of a particular ecosystem. (“The Dictionary of Forestry”, John A. Helms, editor, Society of American Foresters.)

**Parcelization.** An increase in the number of land parcels in a given area (e.g., fragmentation of land ownership). Fragmentation does not necessarily result in parcelization and vice versa. (Michael Kilgore, U of MN)

**Planning Committee.** Portion of the Northeast Landscape Committee which participated in the revision process. This group was composed of a diversity of stakeholders representing the range of interests and ownerships in the region (MFRC Northeast Planning Committee).

**Prescribed Burning.** To deliberately burn wildlands (e.g., forests, prairie or savanna); in either their natural or their modified state) and under specified conditions within a predetermined area to meet management objectives for the site. (DNR-SFRMP Definitions)

**Prescription.** A written statement that specifies the practices to be implemented in a forest stand to meet management objectives. These specifications reflect the desired future condition at the site and landscape level and incorporate knowledge of the special attributes of the site. (DNR-SFRMP Definitions)

**Reforestation.** The process of natural or artificial forest regeneration, including securing seed, growing seedlings, preparing sites, planting seed, planting trees, removing deleterious growth and underbrush and other activities related to forest regeneration. (Minnesota Statute Chapters 89 and 89A. Sustainable Forest Resources Act).

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

**Reproduction.** Young stands of commercial tree species ranging from one foot high to 4.9 inches diameter at 4-1/2 feet above the ground and at least ten percent stocked. (Minnesota Statute Chapters 89 and 89A. Sustainable Forest Resources Act).

**Riparian Areas.** The area of land and water forming a transition from aquatic to terrestrial ecosystems along streams, lakes, and open water wetlands. (DNR-SFRMP Definitions)

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

**Silviculture.** The theory and practice of controlling the establishment, composition, growth, and quality of forest stands to achieve certain desired conditions or management objectives. (DNR-SFRMP Definitions)

**Spatial Analysis.** The mapping and measuring of spatial patterns in a landscape or given area. (MN DNR – Jim Manolis)

**Strategy.** Strategies are general approaches or methods to accomplish the goals or objectives which ultimately move the landscape toward achieving the overall vision or desired future conditions. Strategies provide written descriptions of the general tools and techniques suggested to accomplish the goals or objectives and provide a basis for the further development of the appropriate tactical methods.

**Subsection.** A subsection is one level within the Ecological Classification System (ECS). From largest to smallest in terms of geographic area, the ECS is comprised of the following levels: Province > Section > Subsection > Land Type Association > Land Type > Land Type Phase. Subsections are generally 1-4 million acres in size in Minnesota, with the average being 2.25 million acres. Seventeen subsections are scheduled for the SFRMP process (see subsection map and SFRMP schedule). (DNR-SFRMP Definitions)

**Section Forest Resource Management Plans (SFRMP).** A DNR plan for vegetation management on forest lands administered by DNR Forestry and Wildlife that uses ECS sections as the basic unit of delineation. Initial focus is to identify forest stands and road access needs for the duration of the seven-year plan. There is potential to be more comprehensive in the future. (DNR-SFRMP Definitions)

**Sustainable.** Meeting the needs of the present without compromising the ability of future generations to meet their own needs (Minnesota Statute Chapters 89 and 89A. Sustainable Forest Resources Act).

**Sustained Yield.** The principle of forest management for the achievement and maintenance in perpetuity of a high-level annual or regular periodic output of forest resources without impairment of the productivity of the land; allowing for periods of intensification of management to enhance the current or anticipated output of one or more of the resources. (Minnesota Statute Chapters 89 and 89A. Sustainable Forest Resources Act).

**Thinning.** A silvicultural treatment made to reduce the density of trees within a forest stand primarily to improve growth, enhance forest health, or recover potential mortality (e.g., selective thinning, row thinning, etc.). (DNR-SFRMP Definitions)

**Timber.** Trees that will produce forest products of value, whether standing or down, and including but not limited to logs, bolts, pulpwood, posts, poles, cordwood, lumber and decorative material. (Minnesota Statute Chapters 89 and 89A. Sustainable Forest Resources Act).

**Timberland.** Forest land that is producing or is capable of producing crops of industrial wood and not withdrawn from timber utilization by statute or administrative regulation. (Note: Areas qualifying as timberland are capable of producing in excess of 20 cubic feet per acre per year of industrial wood in natural stands. Currently inaccessible and inoperable areas are included, but these likely are a very small number of acres.) (FIA Definitions).

**Trends.** The general direction of resource movements measurable over time.

**Urban and Community Forestry.** The art, science, and technology of managing the urban forest landscape for the environmental, ecological, physiological, sociological, economic, and aesthetic benefits that trees, shrubs, groundcovers, and associated vegetation provide.

**Watershed Health.** Conditions which lead to functional and sustainable biology, connectivity, geomorphology, hydrology, and water quality (MN DNR – Ecological and Water Resources Division).

**Working Principles.** A series of statements that summarize how the Committee views the context of the forests in the East Central landscape over time and how they generally recommend interested stakeholders pursue sustainable forest management in the future.

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## Appendix C Bibliography



This section lists documents referenced in the East Central Landscape Plan or otherwise used in its development.

- Brown, T., P. Meysembourg, G. Host. 2013. *Geospatial Modeling of Native Plant Communities of Minnesota's Laurentian Mixed Forest*. NRRI Technical Report NRRI/TR-2013/28. Natural Resources Research Institute, University of Minnesota Duluth. Available online at [https://data.nrri.umn.edu/file/MN/forestry/npc/2013/NPC\\_Technical\\_Report.pdf](https://data.nrri.umn.edu/file/MN/forestry/npc/2013/NPC_Technical_Report.pdf).
- Cataranzo, Paul F., D'Amato Anthony, and Huff Emily Silver. 2016. *Increasing Forest Resiliency for an Uncertain Future*. MassWoods, University of Massachusetts Amherst. Available online at <https://masswoods.org/sites/masswoods.net/files/Forest-Resiliency.pdf>.
- Handler, Stephen; Duveneck, Matthew J.; Iverson, Louis; Peters, Emily; Scheller, Robert M.; Wythers, Kirk R.; Brandt, Leslie; Butler, Patricia; Janowiak, Maria; Shannon, P. Danielle; Swanston, Chris; Barrett, Kelly; Kolka, Randy; McQuiston, Casey; Palik, Brian; Reich, Peter B.; Turner, Clarence; White, Mark; Adams, Cheryl; D'Amato, Anthony; Hagell, Suzanne; Johnson, Patricia; Johnson, Rosemary; Larson, Mike; Matthews, Stephen; Montgomery, Rebecca; Olson, Steve; Peters, Matthew; Prasad, Anantha; Rajala, Jack; Daley, Jad; Davenport, Mae; Emery, Marla R.; Fehring, David; Hoving, Christopher L.; Johnson, Gary; Johnson, Lucinda; Neitzel, David; Rissman, Adena; Rittenhouse, Chadwick; Ziel, Robert. 2014. *Minnesota forest ecosystem vulnerability assessment and synthesis: a report from the Northwoods Climate Change Response Framework project*. Gen. Tech. Rep. NRS-133. Newtown Square, PA; U.S. Department of Agriculture, Forest Service, Northern Research Station. 228 p. <https://doi.org/10.2737/NRS-GTR-133>.
- Handler, S., K. Marcinkowski, M. Janowiak, and C. Swanston. 2017. *Climate change field guide for northern Minnesota forests: Site-level considerations and adaptation*. USDA Northern Forests Climate Hub Technical Report #2. University of Minnesota College of Food, Agricultural, and Natural Resource Sciences, St. Paul, MN. 88p. Available at [http://www.forestadaptation.org/MN\\_field\\_guide](http://www.forestadaptation.org/MN_field_guide).
- Host, G. 2018. *Potential Native Plant Communities of Minnesota's Eastern Broadleaf Forest*. Technical Report NRRI/TR-2019/01. Natural Resources Research Institute, University of Minnesota Duluth. Available online at <https://data.nrri.umn.edu/data/no/dataset/cb6d64e5-fb67-4b05-b9cc-5bbebdb3568a/resource/43c8d895-709b-4b82-ae22-7dade35ac1df/download/nrri-tr-2019-01.pdf>.
- Janowiak, Maria K.; Brandt, Leslie A.; Wolf, Kathleen L.; Brady, Mattison; Darling, Lindsay; Derby Lewis, Abigail; Fahey, Robert T.; Giesting, Kristen; Hall, Eboni; Henry, Molly; Hughes, Maisie; Miesbauer, Jason W.; Marcinkowski, Kailey; Ontl, Todd; Rutledge, Annamarie; Scott, Lydia; Swanston, Christopher W. 2021. *Climate adaptation actions for urban forests and human health*. Gen. Tech. Rep. NRS-203. Madison, WI: U.S. Department of Agriculture, Forest Service, Northern Research Station. XX p. <https://doi.org/10.2737/NRS-GTR-203>.

- Minnesota Forest Resources Council. 1997. *Implementing the Landscape-Based Planning and Coordination Program*. Minnesota Forest Resource Council, St. Paul, Minnesota. Available online at <https://mn.gov/frc/>.
- Minnesota Forest Resources Council. 1997. *Landscape-Level Planning and Coordination Process: Principles and Goals*. Minnesota Forest Resource Council, St. Paul, Minnesota. Available online at <https://mn.gov/frc/>.
- Minnesota Forest Resources Council. 2013. *Sustaining Minnesota Forest Resources: Voluntary Site-Level Forest Management Guidelines for Landowners, Loggers and Resource Managers*. Minnesota Forest Resource Council, St. Paul, Minnesota. Available online at <https://mn.gov/frc/>.
- Minnesota Forest Resource Council. 2018. *East Central Landscape Resource Atlas*. Minnesota Forest Resource Council, St. Paul, Minnesota. Available online at <https://mn.gov/frc/>.
- Minnesota Forest Resource Council. 2019. *East Central Landscape Conditions and Trends Report*. Minnesota Forest Resource Council, St. Paul, Minnesota. Available online at <https://mn.gov/frc/>.
- Minnesota Forest Resource Council. 2019. *East Central Landscape Demographics Data Report*. Minnesota Forest Resource Council, St. Paul, Minnesota. Available online at <https://mn.gov/frc/>.
- Minnesota Forest Resource Council. 2019. *East Central Landscape Forest Policy Inventory Report*. Minnesota Forest Resource Council, St. Paul, Minnesota. Available online at <https://mn.gov/frc/>.
- Minnesota Forest Resource Council. 2019. *East Central Landscape Timberland Growing Stock Mortality White Paper*. Minnesota Forest Resource Council, St. Paul, Minnesota. Available online at <https://mn.gov/frc/>.
- Minnesota Forest Resource Council. 2020. *Climate Change and Minnesota's Forests*. Minnesota Forest Resource Council, St. Paul, Minnesota. Available online at <https://mn.gov/frc/>.
- Ontl, T.A., Swanston, C.W., Janowiak, M.K., Daley, J. *Practitioner's menu of adaptation strategies and approaches for forest carbon management*. In: Ontl, T.A., Janowiak, M.K., Swanston, C.W., Daley, J., Handler, S.D., Cornett, M., Hagenbuch, S., Handrick, C., McCarthy, L., Patch, N. 2020. Forest management for carbon sequestration and climate adaptation. *Journal of Forestry* 118(1):86-101. doi:10.1093/jofore/fvz062.
- Pöyry, J. 1994. *Final Generic Environmental Impact Statement (GEIS) Study on Timber Harvesting and Forest Management in Minnesota*. Prepared for the Minnesota Environmental Quality Board. St. Paul, Minnesota. Available online at: [https://www.forestry.umn.edu/sites/forestry.umn.edu/files/GEIS\\_Final\\_1994.pdf](https://www.forestry.umn.edu/sites/forestry.umn.edu/files/GEIS_Final_1994.pdf).
- Swanston, Christopher W.; Janowiak, Maria K.; Brandt, Leslie A.; Butler, Patricia R.; Handler, Stephen D.; Shannon, P. Danielle; Derby Lewis, Abigail; Hall, Kimberly; Fahey, Robert T.; Scott, Lydia; Kerber, Angela; Miesbauer, Jason W.; Darling, Lindsay; Parker, Linda; St. Pierre, Matt. 2016. *Forest Adaptation Resources: climate change tools and approaches for land managers*, 2nd ed. Gen. Tech. Rep. NRS-GTR-87-2. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. 161 p. <http://dx.doi.org/10.2737/NRS-GTR-87-2>.
- Vibrant Cities Lab. 2021. *Climate & health action guide*. <https://www.vibrantcitieslab.com/guides/climate-health-action-guide/>.

## Appendix D

### Action Items and Strategies



Throughout the planning process numerous action items and strategies were proposed to accompany the objectives in Section 6. To keep the plan more concise and readable, the East Central Committee decided to move the action items and strategies to the appendices. The following text repeats the content of Section 6 (Desired Future Conditions, Goals, and Objectives) while including the action items and strategies that were not included in the main plan document. In this context, action items are specific tasks towards completing the objective, while strategies are general approaches or methods to help accomplish the objective.

These action items and strategies are not an exhaustive list of all the possible actions and approaches to accomplish the Plan's objectives. The East Central Committee is encouraged to refine the list as needed.

#### A. Ecological Resource Initiatives

From an ecological perspective, in 100 years the East Central Landscape Committee envisions a landscape with the following Desired Future Conditions (DFCs):

- **DFC 1: Healthy, Resilient, and Sustainable Forests.** Forests in the East Central Landscape are healthy and managed using science-based ecological principles. The East Central Landscape Committee envisions a forest that:
  - is resilient to threats such as climate change, invasive species, pests, and pathogens
  - has a variability of land cover types and age-classes that are consistent with the ecology of landscape, and
  - provides diverse habitats that maintain natural communities and viable populations of native plant and wildlife species in east central Minnesota.
- **DFC 2: Improved and Protected Water Resources.** Both landowners and local units of government recognize that healthy forests and wetlands managed at the watershed level are key to protecting water quality and quantity while maintaining the functionality of our hydrological systems and benefiting aquatic and riparian wildlife. Evaluation of forest and wetland cover is an integral component in the local land use planning process. Forest management is integrated into all water resource initiatives in the East Central Landscape to maintain quality water resources where they exist and restore or enhance impaired waters when necessary.

#### What is Forest Resilience?

*Forest resilience* is the capacity of a forest to withstand or recover from disturbance and stress. Characteristics of resilient forests include:

- Minimal forest stress
- High forest complexity (structure and species)
- Healthy soil conditions and protected water resources
- Threatened, endangered, and at-risk species are protected

The following ecological goals, objectives, action items and strategies outline the steps the Committee believes are necessary to achieve the Desired Future Conditions (DFCs):

**Goal 1: Protect, maintain, and increase ecologically sound and climate resilient forests in the East Central Landscape.**

**Objective 1: Evaluate Forest Resources.** Identify, assess, and document all forest resources in the East Central Landscape. Include projections and impacts from climate change, along with suggested adaptation strategies.

Action Items

1. **CBS.** Gather, organize, and map the results from the County Biological Surveys (CBS) for all counties in the landscape. Identify and map old growth forests in the region.
2. **RSEA.** Complete the Regionally Significant Ecological Areas (RSEA) model for the nine counties in the region.
3. **Forest Resources Study.** Prepare a study of the forest resources in the landscape based on the CBS and RSEA. Identify and inventory ecologically sensitive areas and existing forests that should be protected in the East Central Landscape. Identify the areas in the landscape where the most important high biodiversity sites exist. Organize the results of the study into the following categories: ECS subsections, counties, and municipal levels. Develop specific recommendations for these critical areas to help landowners, local officials and resource agencies implement workable solutions.
4. **Distribution.** Distribute the report to all counties and municipalities as well as the resource agencies working in the region.
5. **Critical Species Lists.** Distribute lists of rare and endangered species in the region to local officials for their use and distribution. Identify forest interior species and the habitat needs they have.

**Objective 2: Support Public Outreach.** Distribute information and increase awareness on the importance of protecting forest resources, sustainable forest management, and existing forestry programs that can help landowners, land managers, government decision makers, and the general public to protect, enhance, and restore native forests in the East Central Landscape. *Also see [Economic Goal 1 Objective 7](#) (Inform and Support Landowners) and [Social Goal 1 Objective 1](#) (Implement Outreach).*

Action Items

1. **Outreach Mailing.** Distribute an executive summary of the Forest Resources Report to local groups and organizations representing landowners and businesses in the region.
2. **Workshop.** Convene a workshop in the region to discuss the results of the RSEA modeling study and the report.
3. **Joint Local Government Meetings.** Present the highlights of the report and the RSEA to joint local government meetings such as the annual township meetings held in each of the nine counties.
4. **Regional Meeting.** Convene a regional meeting to bring together local leaders and representatives from conservation organizations to address potential issues relating to conservation protection efforts such as easements, acquisitions, etc.

### Strategies

1. **Landowner Outreach Program.** Work with the University of Minnesota Extension Service and College of Natural Resources, DNR, Tree Trust, Minnesota Shade Tree Advisory Committee (MN STAC), Minnesota Logger Education Program (MLEP), Minnesota Forestry Association (MFA) and other organizations to distribute and inform private landowners in the region about sustainable forest management and the variety of programs available to them.
2. **Local Officials Program.** Periodically distribute information on sustainable forest management to local officials in the region. Work with the Minnesota Association of Townships, League of Minnesota Cities, Association of Minnesota Counties and other similar organizations to maintain a mailing list of local officials in the region.
3. **Realtor/Developer Program.** Provide information to area, regional and state realtor and developer organizations about the benefits of sustainable forest management and programs currently available.

**Objective 3: Support Conservation Programs and Projects.** Develop, coordinate, and implement sustainable forest management programs and projects that foster native biodiversity by protecting, enhancing, and restoring forests and related wetland, brushland, and grassland ecosystems.

### Action Items

1. **Activate Forest Legacy Program.** Activate the five Forest Legacy Program (FLP) areas located entirely or partly in the East Central Landscape including: 1) Upper St. Croix, 2) Sherburne County, 3) Mille Lacs County, 4) Pine County, and 5) Brainerd Lakes-Walker area.
2. **Large Forest Land Tracts.** Develop an inventory of privately owned large-forested tracts in the region.
3. **East Central Landscape Sustainable Forestry Fund.** Explore the creation of a revolving loan fund and/or grant program to help landowners implement unique and highly beneficial pilot projects to promote sustainable forestry practices, biological diversity, and water quality.

### Strategies

1. **Funding for Forest Legacy Program.** Pursue funding to support FLP.
2. **Conservation Easement Opportunities.** Support efforts to inform non-industrial forest (NIPF) landowners about FLP and other conservation easement programs. Encourage their participation in these programs.
3. **Land Protection Efforts.** Support efforts by local units of government and nonprofit organizations to accept, administer, enforce, and/or create conservation easements that contain desirable vegetation types; or find alternative groups or methods that will, where necessary protect the native plant community features regardless of acreage size.
4. **New WMAs.** Work with landowners, local units of government, organizations and the MN DNR to identify and acquire new wildlife management areas where forest resources are high priority.
5. **New SNAs.** Work with landowners, local units of government, organizations and the MN DNR to identify and acquire new scientific and natural areas where forest resources are high priority.
6. **Other Habitat and Conservation Projects.** Support efforts and projects by other agencies such as the Minnesota Habitat Partnership, the Metro Wildlife Corridors project, etc. to protect forest resources in the region.

7. **Forest Stewardship Program.** Work with the DNR Division of Forestry on an ongoing basis to encourage NIPF landowners (owning 20 to 1,000 acres) to participate in the Forest Stewardship Program.
8. **Current Stewardship Plan Holders.** Support efforts to distribute information about new technical services and financial assistance programs for sustainable forest management to current stewardship plan holders.
9. **Forestry Consultants.** Support and coordinate the distribution of the East Central Forestry Consultants List that includes agency and private consulting foresters in the region who can prepare stewardship plans for NIPF landowners. Place the list on the MFRC web site.
10. **NIPF Landowner/Logger Coordination and Assistance.** Work with the DNR Division of Forestry, Minnesota Forestry Association (MFA), Minnesota Logger Education Program (MLEP) and Minnesota Forest Industries (MFI) to assist in the coordination of connecting NIPF landowners and loggers operating in the region.
11. **MFI Landowner Handbook.** Promote the distribution and use of the Landowner Handbook developed by MFI.
12. **Cost Share Programs.** Maintain a list of forest cost share programs and contacts for each county in the region. Support the ongoing distribution of the list to local officials in the region and place the information on the MFRC web site.
13. **Minnesota SWCD Tree Handbook.** Make copies of the handbook published by the Minnesota SWCD Forestry Association on tree planting available to landowners and local officials in the region.
14. **Forest Management Courses.** Assist in the distribution of information materials that describe courses offered in education programs such as the Woodland Advisors program to NIPF landowners in the region on an ongoing basis (see Administration/Coordination Goal 2).
15. **Sustainable Forest Certification Assistance.** Support efforts to promote forest certification on NIPF lands in the region.
16. **Existing Forest Land Property Tax Programs.** Distribute information on existing forest land property tax programs such as the Sustainable Forestry Incentives Act (SFIA) to eligible landowners (provides incentives to landowners using stewardship plans to provide a basis for sound management).
17. **Recommendations to MFRC for NIPF Landowners.** Periodically make recommendations to the MFRC and the Legislature that promote sustainable forest management on NIPF lands (sales tax exemption for certified wood products sold from NIPF lands, property tax and/or income credits for sustainable forestry/water quality projects, etc.).
18. **DNR Subsection Planning.** Work with the DNR Division of Forestry to develop, implement and/or maintain the subsection plans for the ecological subsections in the East Central Landscape (Mille Lacs Uplands, Anoka Sand Plain, Big Woods, Hardwood Hills).
19. **State Forests, Parks, and Wildlife Management Areas.** Work with the appropriate DNR divisions to develop, implement and/or maintain plans for the state forests, parks, and wildlife management areas that are consistent with the sustainable forestry concepts outlined in this Plan.
20. **National Wildlife Refuges.** Participate in the planning processes for federal lands in the region including the Sherburne and Crane Meadows National Wildlife Refuges, waterfowl production areas and other federal lands.
21. **Mille Lacs Band.** Support efforts by the Mille Lacs Band to develop, implement and/or maintain forest management plans that incorporate sustainable forest management practices and concepts in this Plan.
22. **County Forests.** Support efforts by counties in the region to develop, implement and/or maintain forest management plans that incorporate sustainable forest management practices and concepts in this Plan. Support the inventory of state school trust lands in each county and distribute information on state statutes regarding memorial forests to local officials and organizations.
23. **Municipal Forests.** Encourage cities and townships to manage their public forest lands in ways consistent with this Plan.
24. **Project Coordination.** Provide coordination services to initiate biological diversity projects and mobilize resources.

25. **Technical Assistance.** Provide technical assistance to landowners, businesses and interested groups working on biological diversity projects.
26. **Awareness.** Support efforts to increase the awareness of native plant, fish, and animal species in the region and their habitat needs to help promote healthy and sustainable populations.
27. **Cost Share Programs.** Promote programs administered by resource agencies that help private landowners in the region enhance fish and wildlife habitat that support healthy and sustainable populations of native species.
28. **Sustainable Management.** Assist in the coordination of projects by public land managers to promote healthy and sustained fish and wildlife populations in the region.
29. **MCWCS.** Support efforts by the DNR and other organizations to develop and implement the Minnesota Comprehensive Wildlife Conservation Strategy (MCWCS) to address species in greatest conservation need.
30. **Fish and Wildlife Organizations.** Work with groups such as the Trout Unlimited, Minnesota Deer Hunters Association, Minnesota Ornithological Union, Ruffed Grouse Society, National Wild Turkey Federation, Izaak Walton League and others to provide technical and financial assistance that support healthy and sustainable plant, fish and wildlife populations in the region.

**Objective 4: Monitor and Control Invasive Species, Pests, and Pathogens.** Prevent and/or control the spread of non-native plants, animals, and pathogens. *Also see [Economic Goal 1 Objective 3](#) (Enhance Forest Health and Resilience).*

#### Action Items

1. **Local Officials.** Distribute information to local officials in the region that describe ways to prevent or control the spread invasive plant and animal species that negatively impact forest resources.

#### Strategies

1. **Monitor and Control** active infestations and outbreaks.
2. **Identify and Monitor** areas vulnerable to infestation and outbreaks.
3. **Landowner Awareness.** Support efforts by resource agencies to inform landowners in the region of invasive non-native plant and animal species that negatively impact forest resources and ways to prevent and control them.

**Objective 5: Restore Forests.** Reforest historically forested lands with tree and shrub species appropriate to the native plant community, to the extent possible.

#### Strategies

1. **Natural Succession.** Allow open lands to succeed naturally where appropriate.
2. **NRCS Practice Standards.** Utilize and promote NRCS practice standards to implement appropriate conservation practices.

**Objective 6. Promote Spatial Connectivity.** Maximize forest connectivity and limit fragmentation to benefit native plant and wildlife species and increase landscape resiliency.

#### Strategies

1. **Forest Management Design.** Incorporate into the design of forest management practices, strategies that reduce habitat fragmentation and increase underrepresented forest cover types and age classes in the region.
2. **Restore Corridors.** Maintain and create habitat corridors through reforestation or restoration.
3. **Land Protection.** Protect private lands with tax incentive programs (e.g., SFIA, 2C), easements, and public land acquisition as tools to prevent further parcelization and eventual fragmentation. Focus protection efforts on parcels in riparian corridors, adjacent to existing public lands, and/or contain high indicators of ecological and biological quality.

**Objective 7: Enhance Forest Diversity.** Increase native biological and ecological community composition, as well as species, age, and structural diversity of forests within and between stands to increase ecosystem resiliency. *Also see [Economic Goal 1 Objective 2](#) (Increase Cover Type and Age-Class Diversity).*

#### Action Items

1. **Focal Habitat.** Identify focal areas for habitat management for priority wildlife species, especially those identified as Species of Greatest Conservation Need (SGCN) by the Minnesota Wildlife Action Plan.

#### Strategies

1. **Stand Conversion.** Convert stands of underrepresented species and age-classes where appropriate.
2. **BMPs.** Utilize science-based best management practices for SGCN when available.
3. **Intermediate Treatments.** Increase application of intermediate treatments to improve habitat diversity.
4. **Silvicultural Strategies.**
  - Use a mix of uneven and even aged silvicultural systems with reserves to emulate natural disturbance and promote mixed species forests.
  - Create of variety of patch sizes in harvesting prescriptions.
  - Encourage clumping residuals over scattered individuals while harvesting. Emphasize the importance dominant and codominant trees and promote internal stand diversity.
5. **Reintroduce Species** to NPCs for which they are suited but underrepresented.
6. **Keystone Species.** Identify and manage for keystone species that generate habitat for other species.
7. **Private Forest Management.** Provide private forest management planning and education services.

**Objective 8: Conserve Rare Species.** Consider and promote management objectives to fulfill the needs of endangered, threatened, and special concern plant and wildlife species in forest planning.

**Objective 9: Increase Private Forest Management** to protect forest cover, reforest historically forested lands, and improve forest health and resiliency on private lands. See [Appendix K](#) for a listing of private landowner assistance programs. *Also see [Social Goal 1 Objective 2](#) (Assist Landowners) and [Coordination Goal 3 Objective 1](#) (Enhance Technical Assistance).*

#### Strategies

1. **PFM Service Providers.** Connect landowners with technical service providers (DNR PFM foresters, SWCD foresters, consulting foresters, Boots on Your Ground, NRCS, Call Before You Cut, etc.).
2. **Tan-Incentive Programs.** Enroll landowners in tax-incentives programs such as SFIA or 2C.
3. **Improve SFIA.** Advocate for improving SFIA with higher incentive rates and accountability for active forest management.
4. **Small Acreage Program.** Support development of a small acreage SFIA equivalent program.
5. **Logging Access.** Encourage logging professionals to work with private landowners and neighbors to access hard-to-reach parcels.

**Objective 10: Implement Forest Carbon Projects.** Increase the number and acres of forest carbon offset projects.

#### Strategies

1. **Upfront Cost Reduction.** Encourage landowners interested in carbon offset projects to group together and/or choose programs which would allow them to be paid upfront (e.g., Family Forest Carbon Program).
2. **CRP Payments.** Where possible, roll payments from Conservation Reserve Program (CRP) reforestation/afforestation projects into forest carbon projects.
3. **Emission Reduction Purchase Agreements (ERPAs).** Promote ERPAs as a mechanism for stabilizing the carbon market and connecting local carbon credit producers with local buyers.

### **Goal 2: Improve water quality and storage capacity through forest management.**

**Objective 1: Integrate Forest/Watershed Management Planning.** Integrate forest management into water resource management via watershed-based landscape stewardship plans and One Watershed, One Plan.

#### Action Items

1. **Forests-Water Info.** Provide information to water resource managers representing local units of government, counties, tribes and local organizations on the benefits of forest in relation to water quality.

#### Strategies

1. **Watershed/Forestry Planning.** Participate in planning teams for watershed-based landscape stewardship plans and One, Watershed, One Plan.
2. **Watershed/Forestry Projects.** Support water quality and other watershed based type projects that promote sustainable forest management practices.

3. **Water Quality Education Programs.** Participate in water quality education programs and share information on the benefits of forests in relation to water quality.
4. **Shoreland Restoration/Protection.** Support shoreland restoration projects that promote sustainable forest management practices. Provide information on sustainable forestry to existing water resource management programs such as the county water management program, watershed districts, lake management programs, etc. Encourage landowners and local units of government to find ways to protect existing forest resources in shoreland areas.

**Objective 2: Evaluate Riparian Areas.** Identify and prioritize riparian areas for protection or restoration.

Action Items

1. **Inventory.** Support the preparation of an inventory of all riparian areas in the landscape and the vegetated conditions they are in.
2. **Assessment.** Work with water resource managers to assess the quality of the riparian areas.
3. **Priority Areas.** Identify priority riparian areas where forest management would be beneficial to water quality, fisheries, wildlife, etc.

**Objective 3: Increase Forested Riparian Buffers** along lakes and streams.

Strategies

1. **Riparian Projects.** Support forested riparian restoration projects based on priorities established by the Committee.

**Objective 4: Support Site Level Guidelines.** Support efforts by the MFRC site level program to implement the site-level guidelines/BMPs.

Action Items

1. **Distribute Guidelines.** Assist in distributing the revised site level guidelines to resource managers and appropriate local officials working in the landscape.
2. **Executive Summary.** Distribute the executive summary for the guidelines to interested landowners and organizations in the region.
3. **Workshop.** Convene a workshop that presents riparian guidelines to resource managers, community leaders and landowners in the region.

Strategies

1. **Forest Best Management Practices.** Support the distribution of forest best management practices to landowners and local officials working in the region.

**Objective 5. Protect Private Forest Lands.** Use tax incentive programs (e.g., SFIA, 2C), easements, and public land acquisition as tools to increase protection of private forest lands in priority watersheds. Follow the guidance set forth in watershed-based landscape stewardship plans (e.g., Rum River LSP, Kettle River LSP) to target protection efforts.

**Goal 3: Increase the knowledge and understanding among natural resource professionals and landowners about forest resources within the East Central Landscape to help coordinate management efforts and improve outcomes.**

**Objective 1: Prepare Forest Spatial Analyses Report.** Develop a detailed assessment of past, existing, and projected future spatial and composition patterns of the major forested areas in the East Central Landscape.

Action Items

1. **Forest Patterns Spatial Analysis.** Coordinate the development of a spatial analysis study of the past and existing forest patterns for each county.
2. **Study.** Prepare a study that summarizes the results of the forest spatial analyses.
3. **Distribution/Review.** Distribute the study to local units of government, counties, tribes, and other local organizations in the landscape. Meet with resource managers from these local organizations to review and discuss the results of the spatial analysis.

**Objective 2: Support Cooperative Forest Planning.** Develop a cooperative forest planning program for local units of government, counties, tribes, and other local organizations in the region to develop forest management plans and priority conservation initiatives.

Action Items

1. **Initial Coordination Meeting.** Meet with representatives from local organizations in the region interested in forest management to introduce the proposed cooperative forest planning effort.
2. **Conceptual Model.** Prepare a conceptual forest management plan using the Detailed Forest Spatial Analyses and the information prepared for this Plan.
3. **Pilot Project.** Initiate the cooperative forest planning process along with a pilot project.

Strategies

1. **Technical Assistance.** Provide technical assistance to local organizations as they prepare their forest management plans. Develop a list of services that the MFRC and other agencies can provide to local organizations interested in sustainable forest management.
2. **Vegetation Restoration.** Provide information about the benefits of restoring native vegetation to the landscape and ways that local organizations can support sustainable forestry.
3. **Financial Assistance.** When possible, provide financial assistance to local organizations to help them prepare their plans. Maintain a list of alternative funding sources that local organizations could use to develop forest management plans.

**Objective 3: Monitor Forest Land Cover.** Monitor the extent, composition, and age-classes of public and private forest land in the East Central Landscape.

Action Items

1. **Forest Land Inventory.** Coordinate the inventory of public and private forest land in the East Central Landscape on a county-by-county basis. Use FIA, DNR and other sources.
2. **Fragmentation and Connectivity Monitoring.** Monitor forest fragmentation and connectivity trends at each of the three geographic levels. Work with DNR Forestry and other resource agencies.
3. **Reports.** Prepare a brief outline that documents forest land cover for the region, the three subsections and each county on a periodic basis.
4. **Report Distribution.** Distribute the report to the counties and the resource managers working in the region.

**Objective 4: Set Vegetation Targets.** Develop vegetation restoration and age class targets in acres for the following scales: 1) the East Central Landscape, 2) the three major subsections (Mille Lacs, Anoka Sand Plains, and Big Woods) and 3) each of the nine counties.

Action Items

1. **Forest Vegetation Categories.** Define forest vegetation categories for monitoring (e.g., cover types, forest groups, native plant communities, etc.) and develop acreage and age class targets for each for the years 2025, 2050, and 2100.
2. **Non-forest Vegetation Categories.** Define non-forest vegetation categories (e.g., marsh, savanna, brushland, etc.) and develop acreage targets for each for the years 2025, 2050, and 2100.
3. **Plan Update.** Update this Plan to include these targets when they become available.

## B. Economic Resource Initiatives

From an economic perspective, in 100 years the East Central Landscape Committee envisions a landscape with the following Desired Future Conditions (DFCs):

- **DFC 1: Sustainable Use of Forest Resources.** A wide range of forest products and services are sustainably produced which support local economies while maintaining biological and ecological integrity. The landscape has forests that appeal to the evolving values of residents, tourists, and outdoor enthusiasts. A broad range of opportunities in the forests are available to the public consistent with tribal interests, respect for private property rights, high quality of life enjoyed by residents, and protection of the natural resource base.
- **DFC 2: Adaptive Forest Products Industry.** The forest supports both traditional forest industries as well as emerging opportunities, including ecosystem services, and ensures sustainable forest management.
- **DFC 3: Informed Landscape Planning and Development Decisions.** Land use and development across the landscape are strategically planned using the best available data to minimize fragmentation and preserve contiguous blocks of healthy forests connected by green corridors. Forest, wildlife, and water resources are considered in land planning and management.

The following economic goals, objectives, and action items outline the steps the Committee believes are necessary to achieve the Desired Future Conditions (DFCs):

**Goal 1: Promote sustainable timber production and expanded use of forest products harvested from the East Central Landscape.**

**Objective 1: Improve Forest Productivity.** Work with landowners, foresters, loggers, agencies, and others in the forest products industry to improve forest productivity consistent with landowner objectives and consideration for the site's ecology.

### Strategies

1. **Thinning.** Thin high production stands (e.g., red pine plantations, intensively managed aspen stands) frequently and consistently to avoid stagnation and encourage species diversity.
2. **Rotation Ages.** Cut stands at their rotation age and have a range of rotation ages and retention strategies to promote diversity at multiple scales.
3. **Site-Level Productivity.** Advocate the use of Forest Stewardship plans and the Site Level Guidelines to maximize timber harvests while at the same time minimizing impacts to the site.
4. **Road Access Projects.** Support efforts to coordinate shared road access to help minimize costs for timber harvests and other forest management activities.
5. **Coordinated Timber Harvests.** Assist in the coordination of timber harvesting between public resource agencies and private landowners. Review the DNR work plans for timber harvests in the landscape with the East Central Implementation Committee on a periodic basis.

6. **Research Programs for Private Forest Management.** Explore and research programs in other states that result in sustainable forest management and forest productivity on private lands.

**Objective 2: Increase Cover Type and Age-Class Diversity.** Manage for a mix of age classes and site appropriate cover types across ownerships to maintain or increase sustainable harvest levels and support forest based economies. *Also see [Ecological Goal 1 Objective 7](#) (Enhance Forest Diversity).*

**Objective 3: Enhance Forest Health and Resilience.** Work with landowners to identify and mitigate threats to forest health and timber quality such as invasive species, pests, diseases, drought, wildfire, windthrow, etc. *Also see [Ecological Goal 1 Objective 4](#) (Monitor and Control Invasive Species, Pests, and Pathogens).*

#### Strategies

1. **Forest Health Education.** Support, co-sponsor and/or assist organizing workshops held on a periodic basis to inform landowners on the impacts of forest insects and diseases. Support and promote forest health programs administered by the DNR and other resource agencies.
2. **Forest Stand Improvements.** Support, co-sponsor and/or assist workshops held on a periodic basis to inform landowners on techniques and methods for improving forest stands. Support and promote forest stand improvement programs administered by the DNR and other resource agencies. Refer to strategies developed in the DNR subsection plans for forest stand improvement and timber productivity.
3. **Regeneration/Reforestation Programs.** Support, co-sponsor and/or assist workshops that inform landowners on regeneration/reforestation techniques and practices. Support and promote regeneration/reforestation programs administered by the DNR and other resource agencies that are consistent with the goals in this Plan.
4. **Deer Management Education.** Educate people about the impacts that too high deer populations have on forest resources.
5. **Deer and Wildlife Complaints.** Work with DNR Area Wildlife Managers, Conservation Officers, and local public officials to track complaints and concerns regarding deer related impact/damage to forest resources.
6. **Deer Browse Protection.** Support and advocate methods that minimize or limit the impacts of deer browsing on forests (bud capping, repellants, fencing, wire cages, etc).
7. **Deer Populations.** Support the appropriate lowering of deer populations where deer browsing is impacting forests. If necessary, support legislative initiatives to enhance the management of deer populations by the DNR Division of Fish and Wildlife.

**Objective 4: Advance Research and Development.** Support research and development projects that promote sustainable forest management specific to the East Central Landscape.

#### Strategies

1. **Research Projects.** Support and coordinate research projects specific to the East Central Landscape that promote sustainable forest management.

2. **University Research.** Encourage cross-pollination of ideas/research between UMN Forest Resources & Bioproducts and Biosystems Engineering departments. Especially support university research for wood products from low quality wood and species threatened by climate change and pests (e.g., EAB and ELB).

**Objective 5: Strengthen Markets and Utilization.** Support existing industries, and develop and/or expand wood product markets to improve utilization of forest resources, including brushland. Ensure that economic development efforts include the secondary forest products industry and niche markets.

#### Action Items

1. **CEDS.** Participate in the development and implementation of the Comprehensive Economic Development Strategy (CEDS) administered by the East Central Regional Development Commission (EC RDC), and support the implementation of opportunities for expanding forest products industries in the region.
2. **Small Mill Information.** Share information with landowners and managers about the location and products of smaller mills.
3. **Networking.** Hold networking events for natural resource professionals and small mill/niche forest industry businesses.

#### Strategies

1. **Biomass Markets.** Support initiatives to develop biomass markets and increase utilization of small diameter and low quality woody species.
2. **Utilization and Marketing.** Work with the DNR Division of Forestry to communicate to forest products businesses in the region, new technologies that apply to lesser-utilized species and identify potential markets.
3. **Specialty Forest Products.** Support the creation of value added forest product businesses.
4. **Wood Product Labeling.** Encourage “Made in Minnesota” labeling for wood products.
5. **Regional Coordination and Partnerships.** Work with organizations such as the East Central Regional Development Commission, Minnesota Department of Employment and Economic Development (DEED) and other economic development organizations to promote and coordinate forest related economic development opportunities in the East Central Landscape.
6. **Wood Availability.** Maintain wood availability to local mills by holding regularly scheduled timber auctions and promoting TSI thinnings, especially of overstocked conifer plantations.

**Objective 6: Multiple Use Management.** Look for opportunities to achieve multiple resource objectives while providing sufficient forest products to sustain current and future forest-based industries in the region.

**Objective 7: Inform and Support Landowners.** Provide opportunities to help landowners understand the connection between commercial forest management (including harvesting) and habitat health. Support additional outreach initiatives including tax incentive programs, sustainable harvest guidelines, and habitat best management practices. *Also see [Ecological Goal 1 Objective 2](#) (Support Public Outreach) and [Social Goal 1 Objective 1](#) (Implement Outreach).*

**Objective 8: Collaborative Management and Education.** Promote cooperative and collaborative education efforts that support economic benefits of forest management and effective water protection and other diverse benefits.

**Objective 9: Monitor and Support Outreach About the Regional Forest Economy.** Increase awareness of the breadth of the region’s forest products economy, which covers a large range of products and services that include – but is not limited to – traditional forest products, non-timber forest products, recreation, and ecosystem services (clean air, water, carbon sequestration, etc.).

#### Action Items

1. **Annual Landscape Economy Report.** Collect and organize regional and state data regarding the forest products industry from the DNR Division of Forestry, Minnesota Department of Employment and Economic Development (DEED), and other organizations. Develop a brief report that summarizes the major forest products economic trends. Include data on stumpage prices at the county level. When available, document information at the county level or areas within counties. Coordinate the landscape level report with annual reporting maintained by the DNR Division of Forestry and other interested agencies.
2. **Distribution.** Distribute the report to forest landowners, loggers, industry, local officials, and forest land managers working in the region.
3. **Market Utilization Studies.** Collect and distribute market utilization studies to members of the East Central Implementation Committee.
4. **Presentations.** Invite economists from DEED, University of Minnesota and other organizations to make presentations on trends and challenges facing the global, state and regional forest products economies. Convene meetings between the speakers with East Central Implementation Committee, local officials, landowners, foresters, loggers, industry representatives and other interested stakeholders.

*For additional objectives about enhancing private forest management see [Ecological Goal 1 Objective 9](#) (Increase Private Forest Management), [Social Goal 1 Objective 2](#) (Assist Landowners), and [Coordination Goal 3 Objective 1](#) (Enhance Technical Assistance).*

**Goal 2: Integrate sustainable forest management into land use planning and decision-making processes.**

**Objective 1: Support County and Community Planning.** Support and advocate sustainable forest management concepts through local land use planning, plan implementation, and private land development.

#### Action Items

1. **Forest Resource Maps and Data.** Provide forest resource maps and data to the nine counties and communities in the East Central Landscape for use in their comprehensive planning processes.
2. **Example Forest Policy Statements.** Distribute sample language relating to sustainable forestry for local governments to consider when developing their long range plans. Encourage policies that discourage forest fragmentation.
3. **Site Level Guidelines.** Distribute information from the MFRC Site Level Guidelines to local units of government for their use in working with landowners and developers who are developing lands within their jurisdictions.
4. **Forestry BMPs.** Distribute information regarding forestry best management practices to local officials, developers and landowners.
5. **Model Subdivision Regulation Provisions.** Develop and distribute portions of model subdivision regulations that guide land development in ways that protect forest resources and encourage the retaining of as many trees as possible. Encourage the adoption

of ordinances that allow conservation subdivisions and other resource conservation approaches. Provide examples of incentive-based practices in subdivision regulations to help encourage sustainable forest management.

6. **Model Zoning Ordinance Provisions.** Develop and distribute portions of model zoning ordinances that guide land use in ways that protect forest resources. Encourage the adoption of ordinances that protect significant or sensitive forest resources (old growth forests, riparian forests, etc.) Provide examples of incentive-based practices in zoning ordinances to help encourage sustainable forest management.
7. **Site Planning Concepts.** Distribute information and documents that illustrate techniques such as planned unit developments, conservation subdivisions, etc. that landowners and developers can use to help protect forest resources on their property while still allowing for development. Collect and organize examples of projects that have incorporated sustainable forestry practices into the site development.

### Strategies

1. **Guide to Using Natural Resource Information.** Work the DNR Ecological Services to promote the use of the “Guide to Using Natural Resource Information” handbook and CD by local units of government in the region as a part of their land use planning efforts.
2. **Natural Heritage Database.** Encourage local units of government to work with the DNR Ecological Services to use and interpret data collected for the Natural Heritage Database.
3. **Firewise.** Support the incorporation of forest fire management concepts developed for the Firewise program in local and county land use planning processes.
4. **Forest Land Use Category.** Advocate that counties and communities consider creating a forest land use category in their policies and on their land use plans.
5. **Conservation Easements Strategy.** Encourage local units of government to discuss conservation easements in conjunction with their land use planning as an optional tool for guiding and managing land within their jurisdiction.
6. **Firewise.** Support the distribution of information describing the Firewise program administered by the DNR Division of Forestry including materials for homeowners; developers, landscapers and contractors; and local officials. Include information of yard vegetation maintenance, planting guidelines and other site level considerations.
7. **Forestry Based Zoning Districts.** Encourage local units of government to consider developing zoning districts where forestry and conservation uses are the primary land uses intended for that district. Encourage the consideration of a minimum parcel size of 40 acres or larger. This type of district could be similar to the way some counties have developed agricultural zoning districts and could provide one way to help protect areas of large privately owned forested tracts of land.

**Objective 2: Consider Other Plans.** Consider and implement concepts from other forest resource plans.

**Goal 3: Promote forestry-based recreation and tourism.**

**Objective 1: Increase Public Awareness.** Increase accessibility of information about the benefits that forests provide to tourism and recreation, and the potential impacts from use.

### Action Items

1. **MFRC Website.** Develop statistical information that describes the benefits of recreation and tourism in the East Central Landscape for the MFRC web site (landscape program). Organize and develop information that describes the major impacts that recreation activities can cause and ways users can help protect forest resources. Request tourism and recreation service providers to create links to the MFRC web site.
2. **State Parks/Forest Visitors.** Collect and organize information about the MFRC landscape program, benefits of forests for recreation, and tips on ways for visitors and recreationalists to minimize their impacts on forest resources. Distribute the information resources at state parks and forests in the region.
3. **Sportsmen/Hunters/Landowner Groups.** Collect, organize and distribute information to sporting, outdoor and landowner organizations in the region about the benefit of forests for recreation activities and ways to minimize impacts on forests.

### Strategies

1. **Signage.** Support the installation of signage on specific sites managed by tourism and recreation service providers in the region that use sustainable forest management practices.

**Objective 2: Promote Recreation Planning.** Plan for future recreation systems in the region. Encourage the integration of sustainable forest management practices in the local, county, regional, state, and federal planning and implementation programs.

### Action Items

1. **Inventory of Public Parklands.** Assist in the development of a comprehensive inventory of parklands in the region and the inventory of forest resources within these parks. Make the data and maps from the inventory available to local officials, resource agencies, conservation organizations, and the general public.
2. **Inventory of State School Trust Lands.** Assist in the development of an inventory of state school trust lands in each county in the East Central Landscape. Document the inventory on a township basis. Assist in evaluating forest resources on these lands.

### Strategies

1. **County Parks.** Support the use of sustainable forest management practices on existing and future county parklands. Encourage counties to consider protecting state school trust lands for forestry and recreation uses.
2. **Community Parks.** Encourage townships, cities, and tribes to incorporate sustainable forestry in their recreation planning efforts and to support efforts by counties to retain and manage state school trust lands for forestry and recreation uses.
3. **State Parks.** Assist and coordinate the review and comment by members of the East Central Implementation Committee on forest management activities proposed in the state parks in the East Central Landscape.
4. **Public Access to Forest Lands.** Support efforts to provide responsible public access to forest lands in the region.

## C. Social Resource Initiatives

From a social perspective, in 100 years the East Central Landscape Committee envisions a landscape with the following Desired Future Conditions (DFCs):

- **DFC 1: Strong Cultural Connection to Forests.** People living, working, and recreating in the East Central Landscape are more closely connected to the forests and the landscape. They recognize the value of historical connections and the need for leaving the legacy of healthy forests for future generations. People have a greater awareness of the importance of forests from ecological, economic, social, and traditional perspectives.
- **DFC 2: Diverse Users.** People from diverse backgrounds are engaged in forest uses and advocacy.

The following social goals, objectives, and action items outline the steps the Committee believes are necessary to achieve the Desired Future Conditions (DFCs):

**Goal 1: Increase the public awareness, including private landowners, about the importance of sustainable forest management.**

**Objective 1: Implement Outreach.** Increase accessibility of information through resource professionals, events, and multiple media outlets about the Sustainable Forest Resources Act (SFRA), the Minnesota Forest Resources Council (MFRC), the landscape program, and other plans. *Also see [Ecological Goal 1 Objective 2](#) (Support Public Outreach) and [Economic Goal 1 Objective 7](#) (Inform and Support Landowners).*

### Action Items

1. **Outreach Mailings.** Send letters and informational materials to local officials describing the SFRA, MFRC, landscape planning process and the goals and objectives outlined in this Plan.
2. **Local Newspapers.** Submit on a regular basis, press releases to local newspapers in the region regarding goals and objectives outlined in this Plan.
3. **State Parks Interpretive Centers.** Distribute literature regarding the Sustainable Forest Resources Act, the Minnesota Forest Resources Council and the landscape program to visitors at state parks. Include general information about forest management practices, proper timber harvesting, and other land management topics.

### Strategies

1. **MFRC Website.** Invite readers to participate in projects and programs recommended in this Plan. Consider placing ads for special projects and volunteer opportunities.
2. **Youth Education Program.** Work with existing youth education programs such as the education programs administered by the DNR Division of Forestry and Extension Service (4-H) and water resource education events sponsored through local water planning initiatives.

3. **Woodland Landowner Events.** Support and co-sponsor events, banquets and social gatherings for woodland organizations in the region. Distribute materials on sustainable forest management practices and the range of services and resources available to landowners.
4. **Billboards, Videos, Shopping Malls, and Other Media.** Consider a range of mediums in developing and distributing public relation materials for the landscape program and the efforts in the East Central Landscape.

**Objective 2: Assist Landowners.** Encourage and support landowner assistance in sustainable forest management and coordination and collaboration across property boundaries, from back yards to back forties. See [Appendix K](#) for a listing of private landowner assistance programs. Also see [Ecological Goal 1 Objective 9](#) (Increase Private Forest Management) and [Coordination Goal 3 Objective 1](#) (Enhance Technical Assistance).

**Goal 2: Promote the wellbeing of the people living, working, and recreating in the region through sustainable forest management.**

**Objective 1: Foster Sense of Place.** Support community efforts such as scenic roadway designations and other community design programs that encourage sustainable forest management.

Strategies

1. **Minnesota Design Team.** Work with local communities, the Minnesota Design Team, and other agencies to incorporate sustainable forest management principles and concepts into their programs.
2. **Scenic Byways Program.** Work with MN DOT and other agencies to incorporate sustainable forest management principles and concepts into their programs.

**Objective 2: Promote Community Forestry.** Support and assist communities to develop and implement community forestry programs, such as School Forests.

Action Items

1. **ReLeaf and Other Financial Assistance.** Distribute information to communities in the region on financial assistance programs such as ReLeaf and other state and federal programs.

Strategies

1. **DNR Community Forestry.** Advocate and support the connecting of communities in the region with the DNR Community Forestry Program.
2. **Tree City USA.** Support efforts by cities in the region to participate in the Tree City USA program.
3. **Forestry Organizations.** Encourage local officials and citizens in the region to become members of forestry organizations such as Minnesota Forestry Association, Minnesota Shade Tree Advisory Committee,

4. **Technical Assistance.** Assist in connecting communities with technical service providers such as the DNR Division of Forestry, Minnesota Tree Care Advisors, University of Minnesota Extension Services and other organizations.

**Objective 3: Support Wild and Natural Areas.** Connect local organizations and conservation organizations with state and federal agencies in managing and maintaining wild and natural areas.

Strategies

1. **State Owned Lands.** Work with DNR staff to encourage local organizations and conservation organizations to support the managing and maintaining of state owned forest lands in the region.
2. **Federally Owned Lands.** Work with US Fish and Wildlife Service, US National Park Service and other federal agencies to connect local organizations and conservation organizations manage and maintain federally owned forest lands in the region.

<b>Goal 3: Promote diverse forest uses.</b>
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**Objective 1: Conduct Public Outreach.** Increase awareness of opportunities on public land.

**Objective 2: Conduct Private Outreach.** Increase awareness of non-extractive forest uses to private landowners while respecting landowners' values.

**Economic Goal 3** *(Promote forestry-based recreation and tourism) also supports the Social DFCs.*

## D. Administration/Coordination/Financial Initiatives

From a coordination perspective, in 100 years the East Central Landscape Committee envisions a landscape with the following Desired Future Condition (DFC):

- **DFC 1: Shared Stewardship Management Approach.** Landscape planning is universally practiced and part of standard operating procedures to enhance management across multiple ownerships. Coordinated and collaborative management of East Central Landscape's forest resources is a thoroughly established practice. Landowners, local officials, local nonprofits and agency staff work collaboratively on both the planning and management of forest resources to achieve the goals set forth in this plan.

The following coordination goals, objectives, and action items outline the steps the Committee believes are necessary to achieve the Desired Future Condition (DFC):

**Goal 1: Increase coordination of sustainable forest management in the East Central Landscape.**

**Objective 1: Establish Landscape Committee.** Form an East Central Landscape Committee to oversee the overall coordination and implementation of this Plan.

Action Items

1. **Regular Meetings.** Convene the East Central Landscape Committee on a regular basis (as determined by the group) to oversee the implementation of this Plan.
2. **Annual Work Program.** Prepare an annual work program that guides efforts to be worked on in the upcoming year.
3. **Working Subcommittees.** Create working teams or subcommittees as appropriate to do much of the legwork.

**Objective 2: Promote Shared Stewardship.** Facilitate communication and establish working relationships between the East Central Landscape Committee, land managers, and other key stakeholders.

Action Items

1. **Resource Agency Meetings.** Convene a meeting on an annual basis (or as needed) between the Implementation Committee and resource agencies to review coordination activities needed to implement this Plan.
2. **County Meetings.** Attend meetings with county commissioners, SWCD supervisors, water plan task forces, and/or staff to review coordination activities needed to implement this Plan.

**Objective 3: Improve Private Landowner Cooperation.** Develop cooperative land management approach across ownerships (peer to peer networking). Capitalize on MFA, MNWWN, and Master Woodland Owner Program.

**Goal 2: Promote public involvement in sustainable forest management throughout the East Central Landscape and build leadership capacity to maintain sustainable forest management.**

**Objective 1: Implement Public Outreach.** Increase awareness and appreciation among the public, local officials, and natural resource professionals about efforts being undertaken by the East Central Landscape Committee to promote sustainable forest management and communicate ways they can get involved.

Action Items

1. **Committee Member Connections.** Develop a list of people that members of the East Central Implementation Committee work with on a regular basis on forestry matters. Ask for their participation and involvement. Invite local officials to attend Committee meetings.
2. **Local Meetings and Educational Events.** Distribute information about this Plan and the efforts to implement it at local meetings and events being held in the region. Some of the other meetings and events include county and SWCD board meetings, county water plan meetings, city council meetings, Woodland Advisors courses, MLEP sessions, and landowner meetings.
3. **MFRC Website.** Develop and place informational materials on the MFRC web site that summarize this Plan and ways that people can get involved.

**Objective 2: Support Volunteerism.** Establish approaches for recruiting and organizing volunteers to help implement specific forest stewardship projects and activities as outlined in this plan and as developed by the Landscape Committee and its subcommittees.

Actions Items

1. **Local Newspapers.** Periodically publish articles in the local newspapers that provide summaries of this Plan and volunteer opportunities to participate in its implementation.
2. **Forestry Organization Newsletters.** Periodically publish articles about this Plan and volunteer opportunities in newsletters maintained by organizations in the region and state such as MFA and MN STAC.
3. **DNR Volunteer Newsletter.** Place requests for volunteers in the DNR Volunteer newsletter for appropriate projects and programs listed in this Plan.

**Objective 3: Develop Local Leadership.** Work with foundations and organizations to support the development of a natural resource leadership training program for the East Central Landscape that focuses on sustainable forest management.

Action Items

1. **Form Subcommittee.** Form a subcommittee group to assess what leadership training programs are available and decide on what approach to take to develop a sustainable forestry leadership program.
2. **Foundation Support.** Meet with foundations that work in the leadership development arena to review and seek funding for the leadership training program.
3. **Implement the Proposal.** Support and coordinate the implementation of the leadership training program.

**Objective 4. Survey Public Attitudes.** Periodically gather public opinion regarding the work being completed by the East Central Landscape Committee, the MFRC, resource agencies, and organizations managing forests in the region.

#### Action Items

1. **Landowners and Local Officials.** Develop and distribute a brief survey for landowners and local officials regarding their interests and needs relating to sustainable forestry and managing forests on their lands or in their communities.
2. **Foresters and Loggers.** Develop and distribute a brief survey for foresters and loggers regarding their interests and needs relating to sustainable forestry and serving landowners in the region.
3. **Surveys by Other Organizations.** Collect and review surveys developed by agencies and other organizations and distribute to members of the East Central Implementation Committee.

#### Strategies

1. **Anoka Sand Plains Plant Materials Evaluation and Demonstration Site.** Support and promote the Plant Materials Evaluation and Demonstration Site located in the Anoka Sand Plain Region near Becker, Minnesota, for public use and research purposes. The site is a joint cooperative project with Anoka Sand Plain SWCD's, NRCS, Univ. of MN, and local groups. The site is used to research plant hardiness and species tolerance on soils in the region. Monitoring and evaluation are done regularly to determine what grows best.

**Goal 3: Expand and improve assistance to stakeholders regarding sustainable forest management.**

**Objective 1: Enhance Technical Assistance.** Enhance the coordination and delivery of technical assistance to private landowners, tribal agencies, loggers, forest industries, and local land use officials. See [Appendix K](#) for a listing of private landowner assistance programs. *Also see [Ecological Goal 1 Objective 9](#) (Increase Private Forest Management) and [Social Goal 1 Objective 2](#) (Assist Landowners).*

#### Action Items

1. **Forestry Consultants.** Develop and maintain a list of agency and private consulting foresters in the region who are knowledgeable about ecologically based management practices and can prepare stewardship plans for NIPF landowners. Review evaluations of the projected workloads and the amount of capacity that public and private sector foresters can provide. Make recommendations to the MFRC, DNR, universities and technical colleges, and other appropriate organizations on ways to meet the technical service needs and increase recruitment of future foresters.
2. **Delivery of Forest Resource Knowledge.** Convene meetings between local officials, resource agencies, and members of the East Central Implementation to review and discuss the ways in which forest resource information is made available to local units if government in the region. Explore ways to increase the transfer and benefits of forest resource knowledge into local land use planning efforts.

### Strategies

1. **Increased Funding for the Forest Stewardship Program.** Advocate the increased funding for the Forest Stewardship Program at the state and federal levels.
2. **Stewardship Program Coordination.** Assist in convening meetings between landowners, DNR, agency foresters and consulting foresters to discuss ways to enhance technical services provided through the Forest Stewardship Program.
3. **Small NIPF Landowners.** Work with DNR Division of Forestry, BWSR, SWCDs, and local units of government to develop technical services designed for “small” NIPF landowners (ownership of less than 20 acres)
4. **Minnesota SWCD Forestry Association.** Work with the Minnesota SWCD Forestry Association to implement the NIPF landowner technical assistance and educational goals and objectives in their plan (SWCD Tree Handbook, District needs survey, compiling technical resources, etc.)
5. **MLEP.** Support efforts by the Minnesota Logger Education Program (MLEP) to providing technical assistance and training to loggers working in the region.
6. **MFI.** Maintain a working relationship with MFI on their education programs for loggers and forest products industry.

**Objective 2: Promote Use of Research.** Ensure natural resource professionals, loggers, and other forest operators are working with the most recent research and recommendations.

**Goal 4: Expand the financial resources available to support the implementation of this Plan and to enhance the quality of technical assistance provided to landowners in the region on sustainable forest management.**

**Objective 1: Advocate for Funding.** Develop and pursue outside funding sources (in addition to the MFRC budget) and leverage collaborative assistance to identify and finance priority stewardship projects.

### Action Items

1. **Potential Funding Sources.** Collect and organize information about potential funding sources for projects and programs listed in this Plan in addition to funding from the MFRC.
2. **EC Sustainable Forestry Education Fund.** Solicit funding from individuals, private industry, local, regional, state and federal sources to provide funds for high priority education projects listed in this Plan.
3. **EC Sustainable Forestry Projects Fund.** Solicit funding from individuals, private industry, local, regional, state and federal sources to provide funds for high priority forest management projects listed in this Plan.
4. **Grant Writing.** Prepare and submit grants for high priority projects recommended by the East Central Landscape Committee.
5. **Legislative Recommendations.** Develop recommendations to increase the amount of funding for technical assistance for private landowners such as the private forest management program and for managing deer populations. Forward recommendations to the MFRC for inclusion into their recommendations to the Governor and the Legislature.

### Strategies

1. **Local Funding Sources.** Support efforts by local units of government to explore ways to raise local funds for locally administered forest management programs and initiatives. Money raised locally could be matched by state and federal sources and its allocation be locally determined.”

**Objective 2: Support Budget Development.** Encourage adequate budgets to implement the actions outlined in this Plan and those developed by the East Central Landscape Committee.

### Action Items

1. **Potential Projects List.** Develop a list of potential projects with lead and supporting organizations, completion timeframes and estimated costs.
2. **Annual Budget.** Prepare an annual budget for the East Central Landscape.
3. **MFRC Approval.** Review the annual budget with the Landscape Committee and the MFRC and obtain their approval.

**Ecological Goal 3** *(Increase the knowledge and understanding among natural resource professionals and landowners about forest resources within the East Central Landscape to help coordinate management efforts and improve outcomes) also supports the Coordination DFC.*

## Appendix E

### Potential Collaboration Projects

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The following is a compilation of all potential collaboration projects suggested by the East Central Committee during the planning process. This includes the projects listed with the native plant communities and habitat types in Section 7 (Vegetation Management Framework) as well as general projects that were not included in the main plan document.

#### Outreach & Education Projects

- Work with:
  - local landowner groups, such as MFA – Kettle River Woodland Council.
  - non-profit organizations, such as the Osprey Wilds Environmental Learning Center or St. Croix River Association.
  - educational programs, such as the Sustainable Forestry Education Cooperative or the Minnesota Logger Education Program.
- O & E on
  - Sustainable forest management strategies.
  - Latest research and development relating to the ecology, management, and benefits of native plant communities.
  - Climate change.
  - Use and benefits of the landscape plan and management approaches with local government, state, and private landowners.
  - The private landowners “management toolbox”.
  - Forest health threats such as EAB, oak wilt, bur oak blight, eastern larch beetle.
  - Benefits of forested wetlands
  - Benefits of floodplain and wet forest NPCs relating to shoreland/floodplain development and land use ordinances.
  - Planting and stand diversification using co-occurring tree species.
- Field days and tours sponsored by MFA, local woodland chapters, and local farmer/rancher co-ops.
- Forest Management for Timber and Wildlife seminars/workshops.
- Strategic targeted engagement to private land engagement and education, especially to changing demographic groups.
- Workshops at Sherburne NWR and Camp Ripley on managing fire-dependent communities.
- County education – highway department, planning re: culverts, roads, hydrology.
- Annual brush removal public-participation events on public land oak savannas.
- Regular publication of educational materials and articles about oak savannas in local or statewide newsletters, magazines, or journals.
- Annual oak savanna public education open events held on public lands.
- Online or public-arena access to materials providing background on oak savanna biological communities and recommendations for landowner “backyard” work.

## Research and Development Projects

- Resources and information (tools) to assist local government units and non-profit groups find and apply for potential grant opportunities.
- Proactive planting grants for climate change.
- Surveys and treatments for oak wilt, EAB, eastern larch beetle.
- Treatment and prevention of Heterobasidion Root Disease (HRD).
- Effects of prescribed fire in different seasons.
- Effects of prescribed burns compared to emulating natural disturbances through silviculture.
- Potential for assisted migration involving oaks and other fire-dependent species.
- Long-term silvicultural trials to improve quality in northern hardwood and mixed oak stands.
- Comparison of increased deer hunting pressure vs deer exclosures to promote oak regeneration.
- Use of fire to promote spruce regeneration.
- Long-term sustainability of spruce tip collection – ecological and economic factors.
- Carbon quantification.
- Test some of the experimental trials or initial findings from the [SPRUCE experiment](#) in northern MN.
- Tamarack influences on hydrology and how to maintain if tamarack disappears.
- Alternative harvesting systems or equipment to decrease dependence on frozen ground conditions for management activities.
- Effects of wood chip movement on EAB.
- Biocontrol of EAB.
- EAB mitigation strategies.
- Ash replacement strategies and approaches.
- Monitor and evaluate winter severity effects on EAB.
- Promote existing research and monitoring programs for ongoing ash management.
- Develop ongoing volunteer data-collection efforts to track progress of habitat management and restoration on private and public lands. Make data and results accessible to volunteers online (suggest Better Impacts online software).
- Organize existing datasets and identify potential ways to compare data between sites, evaluate habitat quality, and assess the effectiveness of management techniques.
- Collaborate with Federal agencies, Tribal representatives, UM or other academic institutions to identify potential projects for studying the oak savanna biological community specific to Minnesota.
- Conduct surveys of property managers and landowners across the geographic area to evaluate habitat expanse, habitat quality, and management methods.
- Collaborate with School Trust Lands to conduct before and after habitat assessments on oak savanna harvest sites.

## Opportunity Area Projects – Pilots or Demonstration Projects

- Township based forest collaborative projects.
- Multiple ownership co-ops.

- Multiple ownership timber sale blocks and habitat management projects.
- Pilot project for managing fire-dependent NPC systems - potentially located in Isanti and Chisago counties where there seems to be the most concentrated area for fire-dependent NPC systems.
- Pilot project to track changes in water quality and quantify from a post-EAB wet forest system and its downstream impacts on fisheries, drinking water, etc.
- Potential project with public agencies and private landowners that promotes awareness and benefits of lowland forest NPC systems (i.e., acid peatlands, forested rich peatlands, floodplain forests, wet forests).
- Bundling wetland sales on private lands.
- Bundling for forest carbon projects on multiple small peatlands.
- Public lands that are part of an oak savanna long-term management plan, such as St. Croix State Park.
- Camp Ripley oak savanna restoration.

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## Appendix F

### Native Plant Community Supplement

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The forest management goals and strategies developed in Section 7 of the East Central Landscape Plan. This appendix summarizes the native plant community information at system level used in this plan. For additional information see the Field Guide to Native Plant Communities of Minnesota, MN DNR 2003 or visit [www.dnr.state.mn.us/ecs/index.html](http://www.dnr.state.mn.us/ecs/index.html)

#### A. Native Plant Communities (NPC)

A native plant community is a group of native plants that interact with each other and with their environment in ways not greatly altered by modern human activity or by introduced organisms. These groups of native plant species form recognizable units, such as hardwood forests, pine forests, or marshes, that tend to repeat over space and time. Native plant communities are classified and described by considering 1) vegetation, 2) hydrology, 3) landforms, 4) soils, and 5) natural disturbance regimes. Examples of natural disturbances include: wildfires, severe droughts, windstorms, and floods.

Sometimes referred to as native habitats or natural communities, native plant communities are named for the characteristic plant species within them or for characteristic environmental features. Examples of native plant communities in the East Central Landscape include Central Rich Dry Pine Woodland, Northern Dry-Mesic Mixed Woodland, Northern Mesic Hardwood Forest, and Northern Wet Ash Swamp. There are many kinds of vegetated areas that are not native plant communities. These include places where native species have largely been replaced by exotic or invasive species such as smooth brome grass, buckthorn, and purple loosestrife, and planted areas such as orchards, pine plantations, golf courses, and lawns. Other areas not considered to be native plant communities include areas where modern human activities such as farming, overgrazing, non-sustainable logging, and development have greatly altered the vegetation.

More information on NPC Classes can be found in the 'Field Guide to the Native Plant Communities of Minnesota' or at [www.dnr.state.mn.us/npc/classification.html](http://www.dnr.state.mn.us/npc/classification.html)

#### Native Plant Community Classification

In 2003, researchers in the Minnesota Department of Natural Resources (DNR) completed a classification of the native vegetation of Minnesota, Minnesota's Native Plant Community Classification (Version 2.0). The DNR's classification system is intended to provide a framework and common language for improving our ability to manage vegetation, to survey natural areas for biodiversity conservation, to identify research needs, and to promote study and appreciation of native vegetation in Minnesota. Version 2.0 of the DNR's native plant community classification is based strongly on plant species composition and was developed through analysis of extensive field data collected from sample plots in forests, prairies, wetlands, and other habitats. The classification is hierarchical, with vegetation units described at levels

ranging from broad landscape-level ecological systems to local communities. One of the most important features of the new classification is the inclusion of ecological processes as an organizing principle.

The NPC classification has six levels (Table F-1). **System Groups**, the highest level, were created to allow development of manageable field keys for lower levels of the classification. System Groups were formed by combining lower levels of the classification along major physiognomic and hydrologic splits in vegetation. **Ecological Systems** are groups of native plant communities that are unified by strong influence from a major ecological process or set of processes, especially nutrient cycling and natural disturbances. **Floristic Regions** are divisions within Ecological Systems that reflect the distribution of Minnesota's plant species into characteristically northern, northwestern, central, and southern groups, or floras. The important influences on these species distributions appear to be climate and paleohistory. **Native Plant Community Classes** are units of vegetation that generally have uniform soil texture, soil moisture, soil nutrients, topography, and disturbance regimes. For wooded vegetation, Native Plant Community Classes were developed by emphasizing understory vegetation more than canopy trees, under the hypothesis that in much of Minnesota understory plants are often more strongly tied to specific habitat conditions (such as levels of nutrients and moisture) than are canopy trees. **Native Plant Community Types** are defined by dominant canopy trees, variation in substrate, or fine-scale differences in environmental factors such as moisture or nutrients. Type distinctions were also made to describe geographic patterns within a Class. **Native Plant Community Subtypes** are based on finer distinctions in canopy composition, substrates, or other environmental factors. In some instances, Subtypes represent apparent trends within a Type for which more study and collection of data are needed. In other instances Subtypes are well-documented, fine-scale units of vegetation that are useful for work such as rare plant habitat surveys.

**Table F-1. Native Plant Community (NPC) classification hierarchy.**

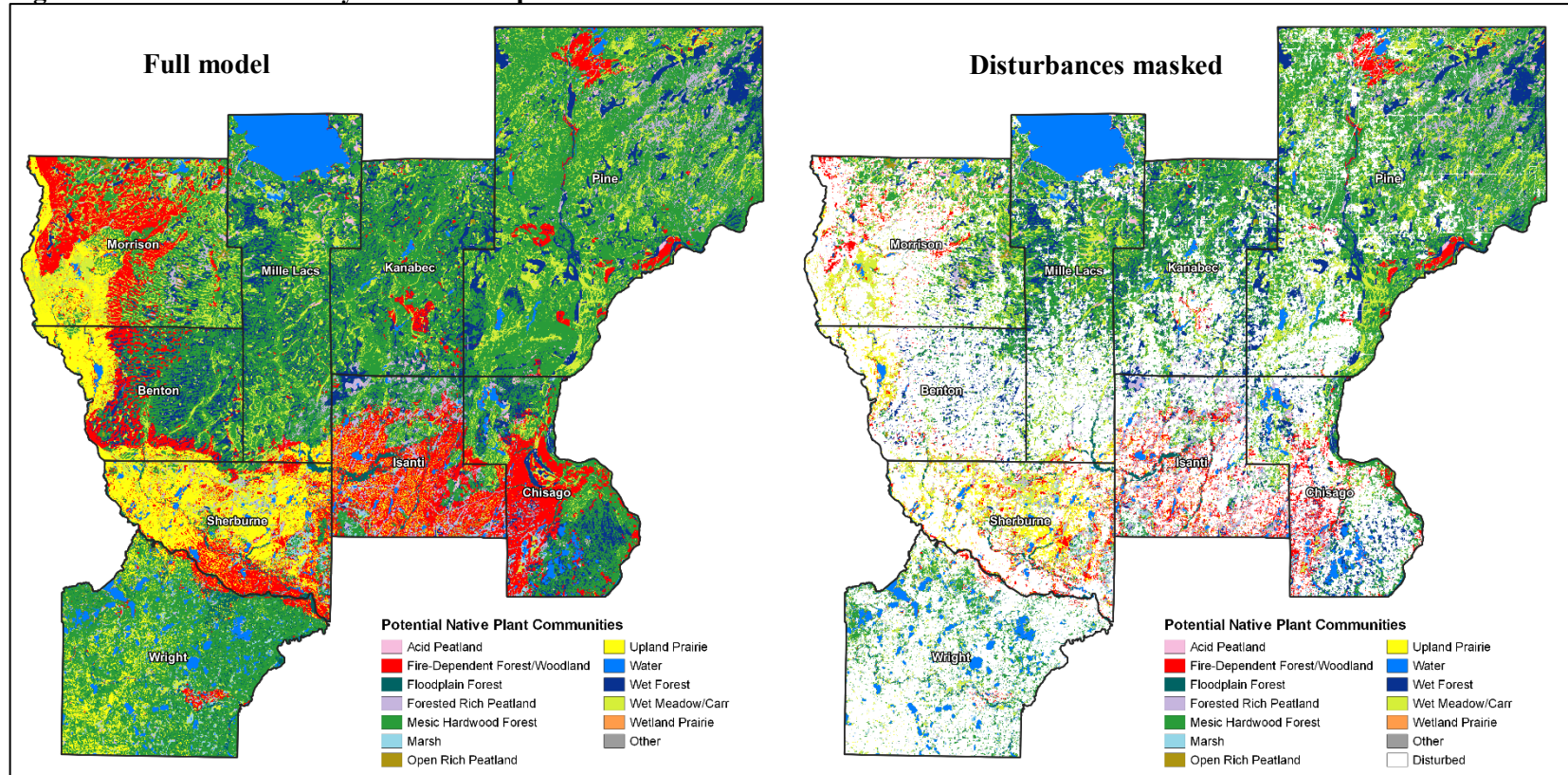
Classification Level	Dominant Factors	Example
<b>System Group</b>	Vegetation structure & geology	Upland Forest & Woodland Systems
<b>Ecological System</b>	Ecological processes	Fire-Dependent Forest/Woodland
<b>Floristic Region</b>	Climate & paleohistory	Central
<b>NPC Class</b>	Local environmental conditions	Central Dry Pine Woodland
<b>NPC Type</b>	Canopy dominants, substrate, or finer environmental conditions	Jack Pine-(Yarrow) Woodland
<b>NPC Subtype</b>	Finer distinctions in canopy dominants, substrate, or environmental conditions	Ericaceous Shrub

Source: Field Guide to the Native Plant Communities of Minnesota [www.dnr.state.mn.us/npc/classification.html](http://www.dnr.state.mn.us/npc/classification.html).

## B. Potential NPC Systems in the East Central Landscape Map

The East Central Landscape covers approximately 3.7 million acres. Within this region there are six forested NPC systems; four of which are generally represented in lowland areas and two systems that are in upland areas. The Natural Resources Research Institute integrated soil series, plant releveé, geomorphic, topographic, and other relevant geospatial data layers to spatially model the extent and distribution of Native Plant Communities at the system and class level in the region. Figure F–1 illustrates the potential NPC systems for the region.

**Figure F–1. Potential NPC system level map without and with masked disturbed areas\*.**



Source: Natural Resources Research Institute and MN Geospatial Commons.

\*Disturbed areas included the following 2012 NLCD classes: cultivated crops, pasture/hay, and developed (open, low, medium, and high intensity).

## C. Land Management Characteristics

In many cases land ownership and management or administration are the same; however there are several situations where this distinction can make a dramatic difference in understanding trends on the landscape. Therefore the tables below display NPC Systems and Classes by land management organizations. Private landowners manage the largest areas of all NPC Systems in the East Central Landscape.

**Table F-2. Potential NPC System area estimates by land management category in the East Central Landscape.**

Code	NPC Systems	Federal	State	County	Tribal	Industrial	Private	Other	Total	% of EC Landscape
<b>Upland Systems</b>										
FD	Fire Dependent	4,399	23,144	170	114	3,610	433,088	913	465,438	12.6%
MH	Mesic Hardwood	4,571	180,465	2,431	2,922	5,386	1,444,787	536	1,641,098	44.6%
UP	Upland Prairie	16,782	6,422	149	0	2,694	263,051	113	289,211	7.9%
CT	Cliff/Talus	0	5	0	0	0	1	0	6	0.0%
RO	Rock Outcrop	0	19	0	0	0	58	0	77	0.0%
LK	Lakeshore	0	0	0	0	0	2	0	2	0.0%
RV	River Shore	0	6	0	0	0	7	0	12	0.0%
	<b>Subtotal</b>	<b>25,752</b>	<b>210,061</b>	<b>2,750</b>	<b>3,036</b>	<b>11,690</b>	<b>2,140,995</b>	<b>1,561</b>	<b>2,395,845</b>	<b>65.1%</b>
<b>Lowland Systems</b>										
AP	Acid Peatland	1	9,848	50	111	129	22,909	81	33,128	0.9%
FF	Floodplain Forest	1,074	3,277	280	58	226	60,152	0	65,068	1.8%
FP	Forested Rich Peatland	3,318	28,704	117	360	601	89,525	803	123,427	3.4%
WF	Wet Forest	655	62,257	540	306	1,499	297,258	508	363,022	9.9%
OP	Open Rich Peatland	275	1,268	46	0	39	9,136	6	10,771	0.3%
WM	Wet Meadow	13,630	64,194	571	905	1,310	388,979	345	469,934	12.8%
MR	March	3,035	5,098	124	12	18	45,241	56	53,583	1.5%
WP	Wetland Prairie	156	24	0	0	0	767	0	948	0.0%
Wa	Water	1,955	5,502	205	182	847	157,293	35	166,018	4.5%
	<b>Subtotal</b>	<b>Subtotal</b>	<b>24,099</b>	<b>180,172</b>	<b>1,932</b>	<b>1,933</b>	<b>4,668</b>	<b>1,071,261</b>	<b>1,835</b>	<b>1,285,899</b>
	<b>Total</b>	<b>Total</b>	<b>49,850</b>	<b>390,233</b>	<b>4,682</b>	<b>4,969</b>	<b>16,358</b>	<b>3,212,256</b>	<b>3,396</b>	<b>3,681,743</b>

Source: Natural Resources Research Institute - potential native plant community data. Area estimates are for the full model (i.e., disturbed areas such as agriculture and development were not masked) which is an estimate of the NPC systems if no land use conversion/disturbance had occurred.

Note: More information on NPC Classes can be found in the 'Field Guide to the Native Plant Communities of Minnesota' or at:

[www.dnr.state.mn.us/npc/classification.html](http://www.dnr.state.mn.us/npc/classification.html).

**Table F-3. Potential NPC Class area estimates by land management category in the East Central Landscape.**

Code	NPC Class	Federal	State	County	Tribal	Industrial	Private	Other	Total
FD	Fire-Dependent Forest/Woodland	0	2	0	0	0	10	0	12
FDc23	Central Dry Pine Woodland	291	3,277	1	0	741	63,788	0	68,098
FDc24	Central Rich Dry Pine Woodland	336	1,899	64	0	42	120,530	0	122,871
FDc25	Central Dry Oak-Aspen (Pine) Woodland	218	7,934	0	85	0	1,398	205	9,839
FDc34	Central Dry-Mesic Pine-Hardwood Forest	8	923	3	30	224	31,638	0	32,825
FDn12	Northern Dry-Sand Pine Woodland	0	1	0	0	0	23	0	25
FDn22	Northern Dry-Bedrock Pine (Oak) Woodland	0	605	0	0	0	84	0	690
FDn33	Northern Dry-Mesic Mixed Woodland	0	131	0	0	30	1,471	0	1,632
FDn43	Northern Mesic Mixed Forest	0	1,201	0	0	3	401	0	1,605
FDs37	Southern Dry-Mesic Oak (Maple) Woodland	3,519	7,171	102	0	2,570	213,732	708	227,802
FDw44	Northwestern Wet-Mesic Aspen Woodland	27	0	0	0	0	13	0	40
MH	Mesic Hardwood Forest	0	38	0	0	0	28	0	66
MHc26	Central Dry-Mesic Oak-Aspen Forest	2,557	65,988	72	2,225	3,767	502,471	129	577,209
MHc36	Central Mesic Hardwood Forest (Eastern)	265	37,777	372	677	278	377,905	353	417,627
MHc37	Central Mesic Hardwood Forest (Western)	0	15	0	0	0	20	0	36
MHc47	Central Wet-Mesic Hardwood Forest	299	15,090	268	0	0	174,296	1	189,953
MHn35	Northern Mesic Hardwood Forest	0	44,118	377	4	1,143	119,141	5	164,789
MHn44	Northern Wet-Mesic Boreal Hardwood-Conifer Forest	0	12,878	101	5	198	23,023	48	36,253
MHn46	Northern Wet-Mesic Hardwood Forest	0	2,755	0	10	0	611	0	3,376
MHn47	Northern Rich Mesic Hardwood Forest	0	209	0	0	0	14	0	223
MHs37	Southern Dry-Mesic Oak Forest	0	0	0	0	0	684	0	684
MHs38	Southern Mesic Oak-Basswood Forest	606	872	829	0	0	66,083	0	68,391
MHs39	Southern Mesic Maple-Basswood Forest	826	708	383	0	0	175,673	0	177,589
MHs49	Southern Wet-Mesic Hardwood Forest	17	16	29	0	0	4,839	0	4,901
UPs13	Southern Dry Prairie	73	91	28	0	1	5,582	0	5,775
UPs14	Southern Dry Savanna	16,320	5,717	53	0	2,540	210,855	111	235,596
UPs23	Southern Mesic Prairie	390	610	68	0	153	46,614	1	47,837
UPs24	Southern Mesic Savanna	0	3	0	0	0	0	0	3
CTn11	Northern Dry Cliff	0	1	0	0	0	0	0	2
CTn24	Northern Scrub Talus	0	4	0	0	0	0	0	5
RO	Rock Outcrop	0	11	0	0	0	9	0	20
ROs12	Southern Bedrock Outcrop	0	8	0	0	0	49	0	58
LKi32	Inland Lake Sand/Gravel/Cobble Shore	0	0	0	0	0	2	0	2
RVx32	Sand/Gravel/Cobble River Shore	0	6	0	0	0	7	0	12
	<b>Upland Subtotal</b>	<b>25,752</b>	<b>210,061</b>	<b>2,750</b>	<b>3,036</b>	<b>11,690</b>	<b>2,140,995</b>	<b>1,561</b>	<b>2,395,845</b>

**Table F-3. Continued – lowland NPC classes.**

Code	NPC Class	Federal	State	County	Tribal	Industrial	Private	Other	Total
AP	Acid Peatland	1	6,174	48	82	89	12,606	0	18,999
APn80	Northern Spruce Bog	0	305	0	0	34	153	0	492
APn81	Northern Poor Conifer Swamp	0	1,821	1	23	0	2,436	70	4,351
APn90	Northern Open Bog	0	44	0	0	0	9	0	52
APn91	Northern Poor Fen	1	1,505	0	6	5	7,706	11	9,234
FF	Floodplain Forest	0	0	0	0	0	14	0	14
FFn57	Northern Terrace Forest	24	1,003	9	58	0	1,295	0	2,388
FFn67	Northern Floodplain Forest	0	487	0	0	0	354	0	842
FFs59	Southern Terrace Forest	976	854	71	0	222	37,895	0	40,018
FFs68	Southern Floodplain Forest	74	933	200	0	5	20,595	0	21,807
FP	Forested Rich Peatland	175	24,019	58	310	599	56,016	141	81,317
FPn72	Northern Rich Tamarack Swamp (Eastern Basin)	0	1,017	23	0	0	1,084	0	2,124
FPn73	Northern Rich Alder Swamp	340	1,740	2	50	0	5,575	577	8,283
FPn82	Northern Rich Tamarack Swamp (Western Basin)	0	17	0	0	0	1,053	0	1,070
FPs63	Southern Rich Conifer Swamp	2,802	1,911	34	0	2	25,797	86	30,632
WF	Wet Forest	482	50,050	528	151	1,499	282,265	157	335,131
WFn53	Northern Wet Cedar Forest	0	30	0	0	0	29	246	305
WFn55	Northern Wet Ash Swamp	21	8,040	11	135	0	8,749	9	16,964
WFn64	Northern Very Wet Ash Swamp	152	3,267	1	20	0	4,841	93	8,374
WFn74	Northern Wet Alder Swamp	0	391	0	0	0	137	4	532
Wfs55	Southern Wet Aspen Forest	0	24	0	0	0	26	0	49
Wfs57	Southern Wet Ash Swamp	0	455	0	0	0	1,212	0	1,667
OPn81	Northern Shrub Shore Fen	0	377	12	0	0	1,075	0	1,464
OPn92	Northern Rich Fen (Basin)	259	891	34	0	39	7,815	6	9,044
OPp91	Northern Rich Fen (Water Track)	16	0	0	0	0	246	0	262
WM	Wet Meadow/Carr	733	30,252	296	632	1,225	277,948	153	311,238
WMn82	Northern Wet Meadow/Carr	12,443	33,148	118	273	79	82,096	192	128,348
WMs83	Southern Seepage Meadow/Carr	455	794	157	0	6	28,935	0	30,347
MRn	Marsh	0	0	0	0	0	1	0	1
MRn83	Northern Mixed Cattail Marsh	2,786	2,873	53	12	4	27,009	47	32,785
MRn93	Northern Bulrush-Spikerush Marsh	249	1,788	61	0	14	17,812	9	19,932
MRp83	Prairie Mixed Cattail Marsh	0	436	10	0	0	419	0	865
WPs54	Southern Wet Prairie	156	24	0	0	0	767	0	948
Water	Water	1,955	5,502	205	182	847	157,293	35	166,018
	<b>Lowland Subtotal</b>	<b>24,099</b>	<b>180,172</b>	<b>1,932</b>	<b>1,933</b>	<b>4,668</b>	<b>1,071,261</b>	<b>1,835</b>	<b>1,285,899</b>
	<b>Total</b>	<b>49,850</b>	<b>390,233</b>	<b>4,682</b>	<b>4,969</b>	<b>16,358</b>	<b>3,212,256</b>	<b>3,396</b>	<b>3,681,743</b>

Source: Natural Resources Research Institute - potential native plant community data. Area estimates are for the full model (i.e., disturbed areas such as agriculture and development were not masked) which is an estimate of the NPC systems if no land use conversion/disturbance had occurred.

Note: More information on NPC Classes can be found in the 'Field Guide to the Native Plant Communities of Minnesota' or at: [www.dnr.state.mn.us/npc/classification.html](http://www.dnr.state.mn.us/npc/classification.html).

## D. Interpreting NPC System Descriptions and the Tree Suitability Table

Subsections F through K provide summaries of the six NPC systems in the East Central Landscape. A general overview is provided first along with a listing of the NPC classes and then followed by a silvicultural description. A map of the potential NPC systems is provided on page E – 3.

For more information on NPC classes and the NPC classification methodologies, please refer to “Field Guide to the Native Plant Communities of Minnesota: The Laurentian Mixed Forest Province” at [www.dnr.state.mn.us/npc/classification.html](http://www.dnr.state.mn.us/npc/classification.html)

Each native plant community summary includes a portion of the Minnesota DNR Tree Suitability Table (<http://files.dnr.state.mn.us/forestry/ecssilviculture/treetables.pdf>). These tables were developed by the Minnesota Department of Natural Resources, Division of Forestry, Ecological Land Classification Program. Please use the following information to interpret these tables:

- Row shading: ability of tree species to compete with all vascular plants within NPC class (**GREEN** =excellent, **BLUE** =good, **YELLOW** =fair, **T-N** = poor, **WHITE**=not suitable)
- Column numbers: rank of tree species in order of competitive ability within each NPC class; 1=most suited; -- indicates trace presence
- Row shading and column numbers are based upon the importance value (IV) of a tree in each NPC Class, which is the product of percent presence and percent cover when present ( $IV = \% \text{ presence} \times \text{mean } \% \text{ cover when present}$ ). Row shading (not suited to excellent) is based upon the rank order of a tree's IV compared to the full range of IVs expressed by all plants - a rough estimate of absolute suitability. Column numbers (1,2,3, ...) are the rank order of a tree's IV compared to other trees - a rough estimate of relative suitability.
- Letters:
  - w = tree species with a warmer synecological score than the community mean.
  - d = tree species with a drier synecological score than the community mean.

## E. Climate Change Considerations

To meet the challenges brought about by climate change, a team of federal and state land management agencies, private forest owners, conservation organizations, and others were convened by researchers with the USDA Forest Service Northern Institute of Applied Climate Science to develop the Northwood's Climate Change Response Framework (CCRF). The project's overall goals are to help land managers:

- Adapt ecosystems to changing climate,
- Mitigate carbon emissions,
- Respond to climate change impacts across ownership boundaries, and
- Rapidly incorporate science and monitoring information into management activities.

This effort has led to the development of two documents which were integrated into the East Central Landscape Plan Revision.

- Forest Ecosystem Vulnerability Assessment and Synthesis (FEVAS)
- Forest Adaptation Resources: Climate Change Tools and Approaches for Land Managers (FAR)

Information from these documents provides baseline information on the potential impacts of climate change and strategies land managers can take to account for these potential changes. The East Central Landscape Committee utilized this information to guide their goal and objective development process and excerpts of the CCRF work for each forested NPC System are summarized in the tables below and in the following NPC System summaries. Please refer to [www.nrs.fs.fed.us/niacs/](http://www.nrs.fs.fed.us/niacs/) for more information.

### CCRF Vulnerability Determinations for Individual Forest Systems

Climate-induced shifts in drivers, stressors, and dominant tree species will result in different impacts to forested systems within the assessment area. Some communities may have a greater capacity to adapt to these changes than others, whereas some may be susceptible to relatively minor impacts. Therefore, it is helpful to consider these factors for individual forest systems in addition to describing general principles related to vulnerability and adaptive capacity. The table below presents a summary of major drivers and stressors for each forest community covered in the CCRF assessment.

**Table F-4. Forest systems considered in the CCRF assessment, with a summary of current major drivers and stressors for each system.**

Community Type	Major Drivers	Major Stressors
<b>Fire-Dependent Forest</b>	Coarse-textured soils or shallow soils over bedrock, fire return intervals 20 to 150 yrs.	Fire suppression, insect pests and diseases, understory hazel competition, deer herbivory
<b>Mesic Hardwood Forest</b>	Mesic soils or deep impermeable layers, consistent moisture and nutrients, gap-phase disturbances with stand-replacing events every 400 to 2000 yrs.	Exotic earthworms, invasive plants, insect pests, diseases, freeze-thaw cycles, drought, deer herbivory
<b>Floodplain Forest</b>	Alluvial soils, annual or occasional floods, connectivity to river and water table	Changes to flood regime, buckthorn and reed canary grass, drought, deer herbivory
<b>Wet Forest</b>	Wet-mesic soils, saturated in spring and dry in summer, periodic flooding	Changes to soil moisture regime, ongoing ash decline, invasive species, insect pests, drought
<b>Forested Rich Peatland</b>	Peat soils, saturated throughout growing season, moisture through precipitation and groundwater, pH greater than 5.5	Changes to water table, roads and beaver dams, insect pests and diseases, winter burn, drought, deer herbivory
<b>Acid Peatland</b>	Peat soils, saturated throughout growing season, moisture through only precipitation, pH less than 5.5, nutrient-poor environments	Changes to water table, roads and beaver dams, insect pests and diseases, winter burn, drought
<b>Managed Aspen</b>	Gradient of soil types and landforms, frequent disturbance, even-aged management on 35 to 60 yr. rotation	Forest tent caterpillar and gypsy moth, drought, deer herbivory, hypoxylon canker, exotic earthworms
<b>Managed Red Pine</b>	Sandy to mesic soils, limited by high summer temperatures, dependent on planting for regeneration, even-aged management on 60 to 120 yr. rotation	Armillaria, red pine shoot blight, understory hazel competition, deer herbivory, bark beetles, drought stress in dense stands

The following vulnerability determinations draw on information presented other chapters of the FEVAS document, as well as an expert panel assembled from a variety of organizations and disciplines across the assessment area. The 23 panelists evaluated anticipated climate trends for the assessment area and ecosystem model projections (See Chapter 5 of FEVAS), in combination with their own expertise. For each forest

system, panelists considered the potential impacts and adaptive capacity to assign a vulnerability determination and a level of confidence in that determination using the same confidence scale described above.

Overall vulnerability determinations ranged from low-moderate (Floodplain Forests) to high (Wet Forests, Forested Rich Peatlands, and Acid Peatlands). Panelists tended to rate the amount of evidence as medium (between limited and robust) for most forest systems. Incomplete knowledge of future wildfire regimes, interactions among stressors, and precipitation regimes were common factors limiting this component of overall confidence. The ratings of agreement among information also tended to be in the medium range. Contrasting information related to precipitation regimes under the high and low climate change scenarios was one factor that limited the level of agreement among information. In general, ratings were slightly higher for agreement than for evidence. This suggests that although evidence is not as robust as the experts would prefer, the information that is available leads them to reach a similar conclusion.

**Table F-5. Vulnerability determination summaries for the forest systems considered in this assessment.**

Forest System	Potential Impacts	Adaptive Capacity	Vulnerability	Evidence	Agreement
<b>Fire-Dependent Forest</b>	Negative	Moderate-High	Moderate	Medium	Medium
<b>Mesic Hardwood Forest</b>	Moderate	Moderate-High	Moderate	Medium	Medium
<b>Floodplain Forest</b>	Moderate-Positive	Moderate	Low-Moderate	Limited-Medium	Medium
<b>Wet Forest</b>	Negative	Low	High	Limited-Medium	Medium
<b>Forested Rich Peatland</b>	Negative	Low	High	Medium	Medium-High
<b>Acid Peatland</b>	Negative	Low	High	Medium	Medium-High
<b>Managed Aspen</b>	Moderate-Negative	Moderate	Moderate-High	Medium	High
<b>Managed Red Pine</b>	Moderate-Negative	Moderate-Low	Moderate-High	Medium	Medium

## F. Fire-Dependent Forest/Woodland System (FD)

### General Description

Fire-Dependent Forest/Woodland (FD) communities are common across the Laurentian Mixed Forest (LMF) Province, even after nearly 100 years of wildfire suppression. As the name implies, Fire-Dependent Forest/Woodland communities are strongly influenced by wildfires. Fires are the major source of species mortality and exert strong influence on patterns of plant reproduction by exposing mineral soil seedbeds, triggering dispersal of propagules, and increasing the amount of light reaching the ground or understory. Fires periodically remove much of the litter, duff, and other organic material from the community and can have a significant effect on nutrient cycling and nutrient availability. In the LMF Province, FD communities are characterized by prevalence of evergreen species, most visibly pines and other conifers. These species, like most of the species are adapted to survive repeated fires or to regenerate successfully following fire.



FD communities occur in the LMF Province on sites with coarse sandy or gravelly soils or with thin soils over bedrock. These sites are often drought prone, a condition that is enhanced by fire through the removal of organic material, such as litter and humus that retains soil moisture. Fires also can contribute to low nutrient availability in FD communities by releasing nutrients from plant material and making them susceptible to being leached below the plant rooting zone or carried away by runoff. In comparison with other communities, such as Mesic Hardwood Forests, in which nutrient availability changes predictably over each year and remains relatively stable from year-to-year, the random behavior of wildfires causes nutrient availability in FD communities to be episodic and unpredictable.

### East Central Landscape Area

- 465,438 acres
- 12.6% of the East Central Landscape
- 19.4% of the upland area in the East Central Landscape

### Disturbance Regime History

- High to very high rates of fire disturbances historically with return interval from 40 years to 100 years.
- The frequency and intensity of fires in fire dependent communities show a strong geographic pattern correlating to the local climate.

### Silvicultural Description

Jack pine, red pine, and white pine are the dominant species in these areas. These species are often successful due to their ability to adapt their physical conditions to these sites. Quaking aspen was also native to some of these sites but occurred naturally at lower abundance. In some areas catastrophic fires killed most canopy trees and created young forests with clear dates of origin. Other sites were abundant with young seedlings recovering from stand-regenerating fire. Often crown fires and severe surface fires left a rather clean, mineral-soil slate for tree establishment.

Silvicultural systems such as clear-cutting or clear-cutting with reserves best matches our impression of natural fires and skips. Quaking aspen, big-toothed aspen, and jack pine are the species with open regeneration strategies able to succeed following clear-cutting and variable seedbeds ranging from mineral (jack pine, big-toothed aspen) to rather undisturbed duff (quaking aspen).

Although fires were historically present in these areas, these silvicultural practices are often our only choice in mimicking this natural disturbance on a large-scale. When possible, however, controlled burns are a preferred option. While clear-cutting and clear-cutting with reserves mimics the light distribution in an area fairly well, components left by fires such as burned snags, tree scars and accelerated nutrient cycling are missing.

Detailed silvicultural prescriptions for Northern Dry-Sand Pine Woodland (FDn12), Northern Poor Dry-mesic Mixed Woodland (FDn32), Northern Dry-Mesic Mixed Woodland (FDn33), Northern Mesic Mixed Forest (FDn43), Central Rich Dry Pine Woodland (FDc24), and Central Dry-Mesic Pine-Hardwood Forest (FDc34) are available on the MN DNR website. Please refer to: [https://www.dnr.state.mn.us/forestry/ecs\\_silv/npc/index.html](https://www.dnr.state.mn.us/forestry/ecs_silv/npc/index.html)

**Table F-6. Suitability of tree species by Native Plant Community; Fire-Dependent.**

NPC Class	FDC23	FDC24	FDC25	FDC34	FDS37
	Central Dry Pine Woodland	Central Rich Dry Pine Woodland	Central Dry Oak-Aspen (Pine) Woodland	Central Dry-Mesic Pine-Hardwood Forest	Southern Dry-Mesic Oak (Maple) Woodland
Area Estimate (acres)*	68,098	122,871	9,839	32,825	227,802
Red pine	6d	3d	6d	1d	
Jack pine	1	1d	2	9d	
Quaking aspen	4	2d	3	3d	6d
White pine				2d	
Paper birch	5	5d	4	5d	8d
Northern red oak	2w	6wd	8w	4wd	3wd
Red maple			9w	6wd	5d
Big-toothed aspen	7wd		5wd	8wd	7d
Balsam fir					
Bur oak	3w	4wd	7w	7wd	2wd
Black spruce					
White spruce					
Northern pin oak			1wd		1wd
White cedar					
Basswood				10wd	
White oak					4wd

NPC Class	FDC23	FDC24	FDC25	FDC34	FDs37
	Central Dry Pine Woodland	Central Rich Dry Pine Woodland	Central Dry Oak-Aspen (Pine) Woodland	Central Dry-Mesic Pine-Hardwood Forest	Southern Dry-Mesic Oak (Maple) Woodland
Green ash					9w
Black cherry					10wd
American elm					11w
Box elder					12w

Source: Minnesota Department of Natural Resources, Division of Forestry, Ecological Land Classification Program; Version 2.2, 2013.

Table interpretation information is available on page F – 7.

\* Area estimates from NRRRI's potential native plant community data. Area estimates are for the full model (i.e., disturbed areas such as agriculture and development were not masked) which is an estimate of the NPC classes if no land use conversion/disturbance had occurred.

### Climate Change Projections

- Moderate Vulnerability. (medium evidence, medium agreement) Changes to the fire regime for northern Minnesota are particularly threatening for this system, in addition to the loss of suitable habitat for many key species and the potential for greater pest and disease activity. A high tolerance for disturbance increases the adaptive capacity of this system.
- Moderate-High Adaptive Capacity. Fire-Dependent Forests are generally tolerant of drought and disturbances and can contain a diversity of species, which lends these forests greater adaptive capacity to climate change. Additionally, these forests can persist on poor soils, so the possibility exists that Fire-Dependent Forests could “retreat” to favorable locations on the landscape even if overall conditions change. Southern portions of the assessment area may be more prone to shift to Mesic Hardwoods because fragmentation and broadleaf species will likely limit fire activity.
- Potential Impacts
  - Drivers. Fire-Dependent Forests are generally found on coarse-textured or shallow soils, and may be able to tolerate the projected shift toward drier soils during the summer months. Evidence indicates that wildfires may burn larger areas in northern Minnesota under climate change, and that the fire season may shift later into the growing season. Blowdown-causing wind events could also provide more fuel buildup for large fire events. Greater wildfire activity could be a positive impact for these forest types, but it is possible that too much change to the fire regime would hamper regeneration.
  - Stressors. Climate change is expected to intensify several key stressors for Fire-Dependent Forests. Insect pests and diseases may become more virulent and damaging under a warmer climate, and the possibility exists for new pests such as western bark beetles to arrive in the assessment area. The continued shift toward mesic species within Fire Dependent Forests may be encouraged by climate change if fire suppression activities continue and broadleaf species like red maple continue to spread. White-tailed deer populations are also anticipated to increase with warmer winters, so herbivory on preferred species may continue to hinder regeneration.
  - Dominant Species. Considering the range of possible climate futures, the majority of dominant species that make up Fire-Dependent Forests are expected to decline in suitable habitat and across the assessment area according to model projections (jack pine, quaking aspen, paper birch, balsam fir, and black spruce). The same modeling studies suggest red pine and white pine will remain relatively constant or experience slight increases across the assessment area, and that minor components of Fire Dependent Forests like northern red oak, bur oak, and red maple will also increase across the assessment area.

## G. Mesic Hardwood Forest System (MH)

### General Description

Mesic Hardwood Forest (MH) communities are present in the Laurentian Mixed Forest (LMF) Province on upland sites with moist soils, usually in settings protected from fire. They are characterized by continuous, often dense, canopies of deciduous trees, including sugar maple, basswood, paper birch, and northern red oak, and understories with shade-adapted shrubs and herbs.

Plants in MH communities have access to predictable supplies of water and nutrients, but they are often limited by light because of the dense forest canopy. Typical sites are buffered from seasonal drought by fine-textured, moisture-retaining soils or dense subsoil layers that perch snowmelt and rainfall. At the same time, soils are well drained and do not experience water logging or saturation except after spring snowmelt or heavy rains. Consequently, plants in MH communities rarely experience diminished respiration due to soil anoxia. Essential nutrients, especially nitrogen, are mineralized from decaying organic matter at twice the rate of that in either Fire-Dependent Forest/Woodland (FD) or Wet Forest (WF) communities. As a result, nutrients in dead plant material quickly become available again for uptake by plants.



Nutrient availability in MH communities follows an annual or seasonal pattern that is more predictable than in FD forests, where nutrients are released mainly following episodic fires. Tree mortality in MH communities is also rather constant, with stand-regenerating disturbances such as wildfires and windthrow uncommon. The death of established trees most often involves individual canopy trees or small patches that are affected by minor windthrow, disease, or other fine-scale disturbances.

### East Central Landscape Area

- 1,641,098 acres
- 44.6% of the East Central Landscape
- 50.6% of the upland area in the East Central Landscape

### Disturbance Regime History

- Low to very low rates of stand-replacing fire or wind disturbances historically with return intervals in excess of 400 years and often greater than 1,000 years.
- Moderate disturbances from light fires and patchy windthrow were frequent to occasional with return intervals ranging from 40 to 300 years.
- Many NPCs in this system, especially MHn45-47 have a very fine-grained disturbance pattern with few large patches of regenerating forest with small disturbance patches being the norm.

**Silvicultural Description**

Quaking aspen, paper birch, balsam fir, and white spruce were the dominant native trees that occupied this area historically. White pine, red maple, black ash, balsam poplar, white cedar, bur oak, and red oak are likewise native to some sites but occurred naturally at lower abundance. The consequence of fire suppression, commercial logging, and settlement in the past century has been to promote more balsam fir than usual at the expense of white spruce. Otherwise, most stands are similar to their historic counterparts, and management interpretations are not complicated by the ingress of atypical species.

Historically, senescence of the initial-cohort trees created regeneration opportunities for trees, ranging from single-tree gaps to large gaps up to an acre in size. Several silvicultural systems could be used to approximate the natural loss of initial-cohort trees and regeneration typical of transitioning forests. Selective harvesting matches best the small-gap mortality pattern, and would favor white spruce and balsam fir. Shelterwood variants or group selection would create the large-to-small openings that favor recruitment of white spruce, balsam fir, red maple, and black ash. Paper birch, red oak, bur oak, white cedar, white pine, and basswood should all do well in the larger gaps created by patch cutting or variants of seed-tree harvests.

Given that only minimal stands in the area were described as having been burned or windthrown, it is clear that destructive agents other than these obvious catastrophes were involved to create so much young, small diameter forests. We suspect chronic disease and possibly surface fire. What seems clear from the historic records is that young, re-initiated stands were patchy and offered a mixture of situations where seeding, sprouting, and release of advance regeneration worked together to initiate the next forest. It is highly unlikely that re-initiated forests resembled something as uniform as a clear-cut. Clear-cutting with reserves, patch cutting, and variants of seed-tree cutting could all approximate the natural pattern of disturbances that created young forests. Clear-cutting with reserves would favor quaking aspen and balsam poplar, which are primarily open regeneration strategists on sites. Patch cutting or variants of seed-tree harvests are silvicultural strategies that should work to re-initiate stands and favor trees that do well in the open or in large gaps such as paper birch, white cedar, and white pine.

Detailed silvicultural prescriptions for Northern Mesic Hardwood Forest (MHn35), Northern Wet-Mesic Boreal Hardwood-Conifer Forest (MHn44), Northern Mesic Hardwood (Cedar) Forest (MHn45), and Northern Rich Mesic Hardwood Forest (MHn47), Central Dry-Mesic Oak-Aspen Forest (MHc26), and Central Mesic Hardwood Forest (Eastern) (MHc36) are available on the MN DNR website. Please refer to: [https://www.dnr.state.mn.us/forestry/ecs\\_silv/npc/index.html](https://www.dnr.state.mn.us/forestry/ecs_silv/npc/index.html).

**Table F-7. Suitability of tree species by Native Plant Community; Mesic Hardwood.**

NPC Class	MHn35	MHn44	MHc26	MHc36	MHc47	MHs38	MHs39	MHs49
	Northern Mesic Hardwood Forest	Northern Wet-Mesic Boreal Hardwood-Conifer Forest	Central Dry-Mesic Oak-Aspen Forest	Central Mesic Hardwood Forest (Eastern)	Central Wet-Mesic Hardwood Forest	Southern Mesic Oak-Basswood Forest	Southern Mesic Maple-Basswood Forest	Southern Wet-Mesic Hardwood Forest
Area Estimate (acres)*	164,789	36,253	577,209	417,627	189,953	68,391	177,589	4,901
Basswood	2wd	5wd	5wd	3wd	1wd	3d	2d	1d
Sugar maple	1wd	13wd	6wd	1wd	4wd	2d	1d	2d
Paper birch	4d	4d	3d	8d	9d	11d		
Quaking aspen	5d	1d	2d	5d	8d	16d		
Northern red oak	3wd	11wd	1wd	2wd	5wd	1d	3d	14d
Red maple	6wd	3wd	4d	7d	6d			
Bur oak	10wd	12wd	7wd	4wd	3wd	4d	10d	4d
Black ash		9w		13	2	18	8	3
Yellow birch	11w							
Green ash		14w	12w	6w	7w	6w	9w	11w
Big-toothed aspen	7wd		8d	9d		15d	12d	
White cedar		7						
Balsam fir	12	2						
White spruce	-	6						
Ironwood	8wd		13wd	14wd		5d	6d	12d
White pine	9d	8d	9d			8d		
Balsam poplar		10						
American elm		-		-	10w	9w	5w	5w
Red pine		15d	10d					
White oak			11wd	11wd			11wd	
Bitternut hickory				10w		10w	7w	10w
Butternut				-	11w		14w	13w
White ash				12wd		14wd		
Red elm						17w	4w	6w
White oak						7wd		
Hackberry						12w	-	7w
Box elder						13w	13w	8w
Rock elm								9w
Black cherry						19wd	-	16wd
Black walnut								15w

Source: Minnesota Department of Natural Resources, Division of Forestry, Ecological Land Classification Program; Version 2.2, 2013.

Table interpretation information is available on page F – 7.

\* Area estimates from NRRI's potential native plant community data. Area estimates are for the full model (i.e., disturbed areas such as agriculture and development were not masked) which is an estimate of the NPC classes if no land use conversion/disturbance had occurred.

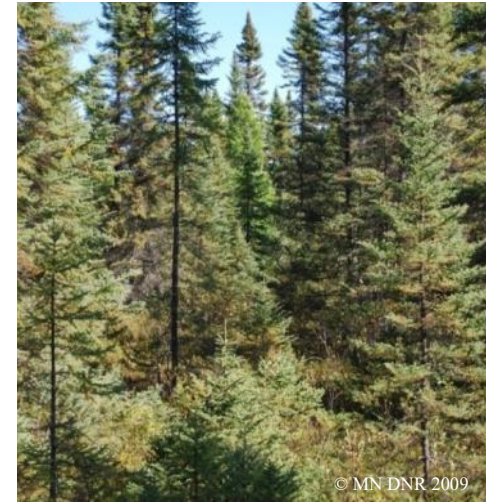
### Climate Change Projections

- Moderate Vulnerability. (medium evidence, medium agreement) Climate change may intensify several major stressors for this forest system, such as drought and forest pests. High species diversity may increase resilience to future change, and uncertainty regarding future moisture regimes and potential interactions between stressors limit the confidence in this determination.
- Moderate-High Adaptive Capacity. Mesic Hardwood Forests generally contain a large number of species, which leads to a high response diversity. These forests could also gain territory lost by other forest types under wetter or drier future conditions. This system contains several species at their northern range limits, such as sugar maple and northern red oak, which may benefit from gene flow between southern populations. Increased CO<sub>2</sub> concentrations may also increase the water-use efficiency of some species, reducing the risk of moisture stress. Stands with few species and reduced structural diversity may have lower adaptive capacity.
- Potential Impacts
  - Drivers. Mesic Hardwood Forests depend on relatively moist, nutrient-rich soils and a lack of wildfire disturbance. The potential for climate change to increase the frequency of extended droughts poses a threat to these forests for multiple reasons, including increased moisture stress, wildfire occurrence, and susceptibility to other stress agents. Hardwood forests occurring on moist, rich soils may be buffered from short-term droughts or seasonal moisture stress. Warming temperatures may also allow this system to expand into previously unsuitable areas.
  - Stressors. Climate change could amplify several major stressors to Mesic Hardwood Forests. Forest tent caterpillar and other pests may cause more frequent and severe damage in climate-stressed forests, and new pests such as gypsy moth and Asian longhorn beetle present unknown risks. White-tailed deer populations may also increase with warmer winters, which may hinder hardwood regeneration as well as the northward expansion of this system. The potential also exists for synergistic negative interactions between current stressors in this system, such as earthworms, herbivory, drought, and invasive species.
  - Dominant Species. Model projections indicate that the majority of dominant species that make up Mesic Hardwood Forests are expected to gain in suitable habitat and biomass across the assessment area (American basswood, sugar maple, red maple, green ash, bur oak). Deciduous forest types are also projected to have large potential productivity increases. Paper birch and quaking aspen are two key species anticipated to decline across the assessment area, and modeling results are mixed for northern oak and yellow birch. Several minority species in this system may also increase in biomass and suitable habitat across the assessment area (e.g., eastern white pine, ironwood, American elm, white oak, bitternut hickory). NPC Class MHn44 may be particularly vulnerable because this class contains boreal species such as quaking aspen, balsam fir, and paper birch.

## H. Acid Peatland System (AP)

### General Description

The Acid Peatland (AP) System is characterized by conifer, low-shrub, or graminoid-dominated communities that develop in association with peat-forming *Sphagnum*. AP communities are acidic (pH < 5.5), extremely low in nutrients, and have hydrological inputs dominated by precipitation rather than groundwater. These communities are floristically depauperate, with the flora composed primarily of a small subset of species characteristic of rich peatland systems that are able to survive in the harsh, low-nutrient environments typical in AP communities. The floristic differences between forested and open AP communities are subtle because of low species diversity in the AP System as a whole and because trees, when present, are usually sparse, making the boundary between forested and open AP communities diffuse. Therefore, this classification places all acid peatland communities into one System, unlike the rich peatland communities, which are divided into forested and open systems.



AP communities are widespread in the Laurentian Mixed Forest (LMF) Province because of cool climate, abundant precipitation, numerous poorly drained basins, and extensive poorly drained glacial lake plains, which produce favorable conditions for peat development across much of the Province. AP communities tend to be prevalent in basins in areas with non-calcareous soils and on lake plains underlain by impermeable clayey and loamy soils, which minimize movement of groundwater through the overlying peat.

### East Central Landscape Area

- 33,128 acres
- 0.9% of the East Central Landscape
- 2.6% of the lowland area in the East Central Landscape

### Disturbance Regime History

- Return interval of stand-replacing fires (rare) – over 1,000 years.
- Return interval of superficial or light fires – approximately 120 years.
- Return interval of catastrophic windthrows – over 700 years.

### Silvicultural Description

The canopies of forests in the AP System are typically dominated by black spruce. Trees are usually stunted (<30 ft or 10m tall) with 25-75% cover. Some sites have scattered tamarack in addition to black spruce. The vegetation in the area is composed only of bog species, with very low species diversity. This environment occurs where a buildup of peat causes the peat surface to become isolated from mineral-rich runoff or subsurface flow so that all mineral inputs come from precipitation.

Although fires can occur in spruce bogs, they are not very common. Records indicate that the historic rotation of catastrophic fires in these areas was in excess of 1,000 years. Superficial fires appear to have been more common, occurring about every 120 years. Such fires can kill black spruce trees and favor nearly continuous cover of leatherleaf. Following lighter fires, some of the characteristic shade-tolerant understory

species usually remain at the site. Severe, catastrophic fires can result in conversion of the peatland to an open bog community dominated by bog wire grass. If sufficient nutrients are released into surface waters by burning of peat and vegetation, the bog may be converted to a poor fen. Recovery to forested conditions may take decades in these peatlands. The ability of black spruce to send up new stems, or layer, from branches buried by peat has been interpreted as an adaptive trait for surviving windthrow. There is, however, little direct evidence that windthrow has a significant impact on spruce bogs. Records suggest the historic rotation of catastrophic windthrow in these areas was about 700 years. These trees are somewhat susceptible to windthrow because of structurally weak peat soils and shallow root systems, but this seems to be offset by short height (<30ft or 10m), sparse crowns, root grafting, and branch-layering.

There are several management options that are suggested to help support the conservation of particular species, and general diversity, in the area. The first is to use natural disturbance patterns to help guide rotation periods. Landscape disturbance patterns can also be mimicked by timber harvesting practices to help maintain the natural succession of these lowland species and environments. If timber is harvested in this area, regulation and monitoring of damage to the area, such as rutting and other negative impacts on the soils, vegetation and hydrology of the area need to be addressed. One advisable action is to harvest only in frozen-soil conditions to keep the impact on the environment at a minimum. Options such as harvesting spruce tops and boughs may produce extra revenue from the area.

Methods to mimic the natural disturbance of the area could be provided by several management options. The first is to leave reserve trees in the area after harvesting. While these trees leave some potential for seed dispersal they also act as future snag trees, and attempts to mimic the stratified vertical pattern natural to the landscape. Leaving downed logs in the area may also mimic the disturbance of windthrow. Regenerating the area may cause a problem due to a lack of knowledge on how to regenerate species in lowland bog areas. Some options include aerial seeding, which may only be possible if pathogens such as dwarf mistletoe aren't present in the area.

A detailed silvicultural prescription for the Northern Poor Conifer Swamp (APn81) is available on the MN DNR website. Please refer to: [https://www.dnr.state.mn.us/forestry/ecs\\_silv/npc/index.html](https://www.dnr.state.mn.us/forestry/ecs_silv/npc/index.html)

**Table F-8. Suitability of tree species by Native Plant Community; Acid Peatland.**

NPC Class	APn80	APn81	APn91
	Northern Spruce Bog	Northern Poor Conifer Swamp	Northern Poor Fen
Area Estimate (acres)*	492	4,351	9,234
Black spruce	1d	1d	
Tamarack	2	2	
White pine		3wd	
Paper birch		-	

Source: Minnesota Department of Natural Resources, Division of Forestry, Ecological Land Classification Program; Version 2.2, 2013.

Table interpretation information is available on page F – 7.

\* Area estimates from NRRRI's potential native plant community data. Area estimates are for the full model (i.e., disturbed areas such as agriculture and development were not masked) which is an estimate of the NPC classes if no land use conversion/disturbance had occurred.

**Climate Change Projections**

- High Vulnerability. (medium evidence, medium-high agreement) Acid Peatlands are not resilient to changes in water tables and are not buffered by groundwater inputs. The dominant species in these forests are expected to decline under a range of climate futures. Future precipitation trends are the primary uncertainty for this system.
- Low Adaptive Capacity. Acid Peatlands receive water inputs through precipitation only, so these systems may be particularly susceptible to shifts in precipitation patterns and droughts. Increased winter and spring precipitation could possibly be retained in low-lying areas on the landscape and compensate for summer droughts. Acid Peatlands are more widely distributed across the assessment area than Forested Rich Peatlands, but are typically smaller and more confined to particular hydrologic regimes. These systems are slower to recover from disturbances like fires and blowdown events than Forested Rich Peatlands. Because of their acid conditions, however, these forests may face less competition from other forest types.
- Potential Impacts
  - Drivers: Acid Peatlands typically occur on perched water tables without connection to groundwater. Therefore, these systems are likely even more vulnerable to water level changes than Forested Rich Peatlands. Higher water levels could result in a transition to open peatland systems and lower water levels could cause greater drought stress and mortality in shallow-rooted forests.
  - Stressors: Roads, beaver dams, drainage ditches, or other watershed modifications that change flood regimes or water tables are already a negative impact in some parts of the assessment areas. These modifications may be intensified by climate change. Additionally, higher growing season temperatures may increase evapotranspiration rates and reduce the rate of peat accumulation in these systems as a result of increasing decomposition rates. Warmer winters may also increase the occurrence of winter burn in Acid Peatlands, and allow for more frequent outbreaks of pests like tamarack sawfly.
  - Dominant Species: The dominant tree species in Acid Peatlands, black spruce and tamarack, are projected to experience significant declines in suitable habitat and biomass across the landscape according to ecosystem models. Declines may be most severe for black spruce. These species are at the southern edge of their ranges in Minnesota, and therefore may not tolerate warmer conditions. The assessment area is also the southern range limit for sphagnum moss. Acid peatlands also contain a suite of rare and endemic plant species that are adapted to acidic, nutrient-poor conditions. These associated species are also presumably vulnerable to changes in water table level and the peat substrate.

## I. Forested Rich Peatland System (FP)

### General Description

Forested Rich Peatland (FP) communities are conifer- or tall shrub-dominated wetlands on deep (>15in [40 cm]), actively forming peat. They are characterized by mossy ground layers, often with abundant shrubs and forbs. FP communities are widespread in the Laurentian Mixed Forest (LMF) Province. The cool climate of the region, abundant precipitation, and presence of poorly drained basins and glacial lake plains result in extensive peat development relative to other parts of Minnesota. These communities are particularly prominent in the Northern Minnesota and Ontario Peatlands and the Minnesota Drift and Lake Plains sections within Minnesota.

### East Central Landscape Area

- 123,427 acres
- 3.4% of the East Central Landscape
- 9.6% of the lowland area in the East Central Landscape

### Disturbance Regime History

- Return interval of stand-replacing fires (very rare) – 400 to 1,000 years.
- Return interval of catastrophic windthrows – over 600 years.
- Return interval of patchy windthrows – approximately 80 years.

### Silvicultural Description

This area's understory is comprised mostly of white cedar, balsam fir, black spruce, tamarack and paper birch, with a few elm and black ash. The canopy is made up by the same species composition with a variable 25-100% canopy cover.

This area very rarely experiences catastrophic fire disturbance, with an estimated rotation of about 400 years in some areas and up to almost 1,000 years in other areas. The areas that are more susceptible to fire disturbance are those with more poorly drained landscapes paralleled with extreme draught.

Because of structurally weak peaty soils and shallow root systems, trees in this area are susceptible to windthrow, resulting in somewhat shorter rotations for both stand-regenerating catastrophic windthrow (about 600 years) and windthrow of small patches of canopy trees (about 380 years). Smaller disturbances resulting in partial mortality of the canopy were somewhat common, with a rotation of about 80 years, and are presumed to have involved both patchy windthrow and surface fires. Hummocks of soil and peat are also somewhat common due to the presence of tip-up-mounds found from fallen and wind-thrown trees. Recommended silvicultural methods in this area are similar to the Acid Peatland system, with a high presence of downed woody debris as well as snags.



A detailed silvicultural prescription for the Northern Rich Tamarack Swamp (Western Basin) (FPn82) is available on the MN DNR website. Please refer to: [https://www.dnr.state.mn.us/forestry/ecs\\_silv/npc/index.html](https://www.dnr.state.mn.us/forestry/ecs_silv/npc/index.html)

**Table F-9. Suitability of tree species by Native Plant Community; Forested Rich Peatland**

NPC Class	FPn72	FPn73	FPn82	FPs63
	Northern Rich Tamarack Swamp (Eastern Basin)	Northern Rich Alder Swamp	Northern Rich Tamarack Swamp (Western Basin)	Southern Rich Conifer Swamp
Area Estimate (acres)*	2,124	8,283	1,070	30,632
Tamarack	1		1	1
Black spruce	2		2d	2
White cedar			3d	
Balsam fir				4d
Paper birch	3wd			3d
White spruce	-			5d

Source: Minnesota Department of Natural Resources, Division of Forestry, Ecological Land Classification Program; Version 2.2, 2013.

Table interpretation information is available on page F – 7.

\* Area estimates from NRRI's potential native plant community data. Area estimates are for the full model (i.e., disturbed areas such as agriculture and development were not masked) which is an estimate of the NPC classes if no land use conversion/disturbance had occurred.

### Climate Change Projections

- High Vulnerability. (medium evidence, medium-high agreement) Forests in peat systems have limited tolerance to changes in water tables. Additionally, the dominant species in these forests are expected to decline under a range of climate futures. Low agreement on future precipitation trends is the primary uncertainty for this system.
- Low Adaptive Capacity. Forested Rich Peatlands typically receive water inputs through groundwater as well as precipitation, so these forests may be somewhat buffered from seasonal or short-term moisture deficits. Increased winter and spring precipitation could also be retained in low-lying areas on the landscape and compensate for summer droughts. Forested Rich Peatlands are widely distributed across the assessment area, but are confined to particular hydrologic regimes, soil types, and landscape positions. Therefore, they are unlikely to expand to new territory within the assessment area or out-compete other forest types. In some locations Forested Rich Peatlands occur within a matrix of Fire-Dependent Forests like jack pine systems, so they may be exposed to more frequent wildfire if climate change results in extended droughts and more active wildfire regimes in the assessment area.
- Potential Impacts
  - Drivers. Climate change has the potential to alter the water tables in low-lying areas across the assessment area. Forested Rich Peatlands function in a relatively narrow window of water table conditions, because higher water levels could result in a transition to open peatland systems and lower water levels allow other forest types to invade as peat layers dry and decompose.

- Stressors. Roads, beaver dams, drainage ditches, or other watershed modifications that change flood regimes or water tables are already a negative impact in some parts of the assessment areas. These effects may be intensified by climate change. Additionally, higher growing season temperatures may increase evapotranspiration rates and reduce the rate of peat accumulation in these systems as a result of increasing decomposition rates. Warmer winters and reduced snowpack may also increase the occurrence of winter burn in these systems, and allow for more frequent outbreaks of pests such as tamarack sawfly and eastern larch beetle.
- Dominant Species. Most species in this system are at the southern edge of their ranges in Minnesota, and therefore may not tolerate warmer conditions. The dominant species in Forested Rich Peatlands, tamarack and black spruce, are projected to experience declines in suitable habitat and biomass across the landscape. Declines may be most severe for black spruce. Other minor species like balsam fir and paper birch are also expected to decline under the hotter, drier climate scenario. The assessment area is also the southern range limit for sphagnum moss. Red maple, white pine, and speckled alder may become larger components of this system in the future, but it is unclear if Forested Rich Peatlands will maintain their inherent identity if that shift occurs.

## J. Wet Forest Systems (WF)

### General Description

Wet Forest (WF) communities occur commonly in narrow zones along the margins of lakes, rivers, and peatlands; they also occur in shallow depressions or other settings where the groundwater table is almost always within reach of plant roots but does not remain above the mineral soil surface for long periods during the growing season. Because of a cool climate characterized by regular precipitation and slow rates of evaporation, WF communities are common across the Laurentian Mixed Forest (LMF) Province. They are dominated most often by black ash or white cedar, with understories characterized by patches of shrubs such as speckled alder or mountain maple, mosses and upland forest herbs on raised hummocks, and sedges and wetland forbs in wet or mucky hollows.

WF communities are strongly shaped by steady fluxes of water and nutrients supplied to deep soil layers by moving groundwater. In basins or depressions connected to annually recharged shallow aquifers, the supply of groundwater peaks early in the growing season but persists at some level through much of the summer. In settings connected to deeper aquifers that discharge groundwater throughout the year, the supply of water and nutrients is steady through the growing season. The groundwater moves laterally below the surface but often upwells to create springs, seeps, or spring runs within and adjacent to WF communities. Varied micro-topography and variation in groundwater supply on sites fed by shallow aquifers result in the alternating presence of water-logged and dry conditions in upper soil layers. This variability in soil moisture in both space and time is a hallmark of the WF System and controls the availability of the oxygen needed for roots to respire, for decomposition of organic litter, and for release of nutrients in forms usable by plants.



### East Central Landscape Area

- 363,022 acres
- 9.9% of the East Central Landscape
- 28.2% of the lowland area in the East Central Landscape

### Disturbance Regime History

- Return interval of catastrophic fires – 800 to >1,000 years.

### Silvicultural Description

Species present in the sub-canopy of this area include white cedar, balsam fir, black ash, basswood, red maple, yellow birch quaking aspen, paper birch sugar maple and green ash. The canopy is composed mostly of the same species with a small component of black spruce, white spruce and tamarack.

In the past, catastrophic disturbances were infrequent in WFn53. An analysis of Public Land Survey records indicates that the rotation of catastrophic fires was more than 800 years, and the rotation of catastrophic windthrow was more than 300 years. Events that result in partial loss of trees, such as patchy windthrow or light surface fires, were also rare, with a rotation of about 340 years.

Succession is evident in this system, with various species growing at varying times under the canopy. Different sites differ by species located within the canopy and sub-canopy at any point in time. In order to preserve the species diversity in the area and mimic natural selection, harvesting while leaving reserves and underplanting other species at certain time intervals would best replicate the natural growth and establishment in the area.

Detailed silvicultural prescriptions for Northern Wet Cedar (WFn53) and Northern Very Wet Ash Swamp (WFn64) are available on the MN DNR website. Please refer to: [https://www.dnr.state.mn.us/forestry/ecs\\_silv/npc/index.html](https://www.dnr.state.mn.us/forestry/ecs_silv/npc/index.html)

**Table F-10. Suitability of tree species by Native Plant Community; Wet Forests.**

NPC Class	WFn53	WFn55	WFn64	WFn74	WFn57
	Northern Wet Cedar Forest	Northern Wet Ash Swamp	Northern Very Wet Ash Swamp	Northern Wet Alder Swamp	Southern Wet Ash Swamp
Area Estimate (acres)*	305	16,964	8,374	532	1,667
Black ash	2w	1wd	1w		1
White cedar	1	4	4		
Quaking aspen	9d	2d	3d		
Paper birch	3d	8d	7d		5d
Yellow birch	8wd	3wd	5wd		4
Balsam fir	4d	9d	9d		
Red maple		6wd	6wd		
Balsam poplar	7d	7d			
Green ash		5wd			7w
Tamarack	-	-	2		
White spruce	6d	15d	-		
American elm		11wd	8wd		6w
Black spruce	5	13			
Basswood		10w			2wd
White pine		12d			
Bur oak		14wd			8wd
Red elm			10wd		9w
Sugar maple		-			3wd

Source: Minnesota Department of Natural Resources, Division of Forestry, Ecological Land Classification Program; Version 2.2, 2013.  
Table interpretation information is available on page F – 7.

\* Area estimates from NRRI's potential native plant community data. Area estimates are for the full model (i.e., disturbed areas such as agriculture and development were not masked) which is an estimate of the NPC classes if no land use conversion/disturbance had occurred.

### Climate Change Projections

- High Vulnerability. (limited-medium evidence, medium agreement) On-going ash decline and emerald ash borer present serious existing threats to this system. These stressors may be exacerbated by climate change impacts to the precipitation regime. Limited research and management history and uncertainty for future precipitation reduce confidence in this determination.
- Low Adaptive Capacity. There is a lack of knowledge and management history in these forests compared to other forest systems in the assessment area, so we know less about how they function and respond to disturbance. Many species that exist in Wet Forests can tolerate intermittent wet and dry conditions, so this system might be adaptable to short-term floods and droughts. Extended droughts would likely cause significant damage to these shallow-rooted forests. Increased winter and spring precipitation could buffer summer moisture stress if excess water is retained in low-lying areas on the landscape. Additionally, Wet Forests often exist as large complexes of a single species or few species, so they have low response diversity. These forests also exist as isolated pockets on the landscape in some areas, so they may be disconnected in terms of migration and gene flow.
- Potential Impacts
  - Drivers. Wet Forests depend on wet-mesic soils with saturated conditions in the spring and dry conditions in the summer months. Climate change has the potential to alter precipitation patterns across the assessment area, particularly during the growing season. The regeneration requirements of several species within this system are also linked to the timing of these wet and dry periods. Shifts in the timing or amount of precipitation could disrupt the function of these forests.
  - Stressors. The ongoing decline in black ash in the assessment area already presents problems for the health of Wet Forests. Invasive species such as reed canary grass and European buckthorn are existing threats to these forests, and invasive species have the potential to increase in abundance in the assessment area under climate change. White-tailed deer populations are expected to increase with warmer winters, which may hinder regeneration of northern white-cedar in particular. Dutch elm disease will also likely limit the potential increase in American elm.
  - Dominant Species. The potential for emerald ash borer to spread throughout the assessment area presents a serious risk to black ash and green ash in Wet Forests. Considering the range of possible climate futures, the majority of dominant species that make up Wet Forests are expected to decline in suitable habitat and biomass across the assessment area, particularly under the GFDL A1FI scenario (black ash, northern white-cedar, balsam fir, balsam poplar, and black spruce). Model projections indicate that red maple may become a larger component of this system, and that minor species within Wet Forests like American elm and American basswood will also increase across the assessment area. Elm/ash/cottonwood forests could experience large potential productivity gains under a range of climate futures.

## K. Floodplain Forest Systems (WF)

### General Description

Floodplain Forest (FF) communities are present on occasionally or annually flooded sites along streams and rivers. FF communities are dominated by deciduous trees tolerant of saturated soils, prolonged inundation, and frequent erosion and deposition of sediment. Active floodplains, which are inundated most years, have forests dominated by silver maple mixed with green ash and some American elm, cottonwood, hackberry, black willow, peach-leaved willow, red willow, and river birch. Sites such as river or stream terraces that flood less frequently or severely support mixed stands of American elm, box elder, silver maple, green ash, hackberry, cottonwood, basswood, black ash, red elm, and swamp white oak. The understories of FF communities characteristically are open, with few shrubs or saplings. Ground-layer cover is highly variable, ranging from areas of bare silt or sand to dense patches of wood nettle (*Laportea canadensis*) or impatiens (*Impatiens capensis* or *I. pallida*). Woody vines are important in FF communities in the Eastern Broadleaf Forest (EBF) Province, with wild grape (*Vitis riparia*), Virginia creeper (*Parthenocissus* spp.), moonseed (*Menispermum canadense*), and greenbrier (*Smilax tamnoides*) the most common species. Pools or mucky depressions in old channels are often present on actively flooded sites. FF communities are associated with streams and rivers throughout the EBF Province and are extensive along the Mississippi, Minnesota, and St. Croix rivers, contributing significantly to the native habitat available to plants and animals in the province.



In general, the flooding that occurs along streams and rivers is fed by water flowing over the ground surface (surface flow) as well as by water that enters stream and river beds as groundwater (base flow). Much of the surface flow reaches streams or rivers over frozen or saturated ground in the spring, initiating flooding in the lower reaches of watersheds. After spring flooding, base flow maintains river levels as well as stable, high water tables on river terraces and floodplains. Flooding imposes several physical challenges on plants in FF communities, including inundation, erosion, sedimentation, and severe scarring of tree trunks by flood-transported ice and debris. Flooding also results in chemical and physiological stresses, especially lack of the oxygen necessary for plant metabolism and for decomposition of litter. Although the annual pattern of flooding is predictable, the timing, duration, and energy vary from year to year. Flooding during the growing season due to unusually heavy rains is highly unpredictable and the most destructive to plants, which are far less tolerant of inundation when leafed out than when dormant or not fully developed. Flooding causes fairly constant shifting of sediment and features such as point-bars, meander scrolls, levees, and backwaters that influence the distribution of understory plants in FF communities.

### East Central Landscape Area

- 123,427 acres
- 3.4% of the East Central Landscape
- 9.6% of the lowland area in the East Central Landscape

### Disturbance Regime History

- Occasional to annual flood events causes the death of many understory plants and leaves behind exposed mineral substrate with abundant moisture and nutrients for plant regeneration.

### Silvicultural Description

The canopy is interrupted to continuous (50–100% cover) and strongly dominated by silver maple, with occasional green ash, black ash, or American elm. The understory shrub and sub-canopy layer is sparse to patchy (5-50% cover) and is comprised of silver maple, green ash and American elm.

Due to the limited extent of this community, Public Land Survey data are insufficient to reliably calculate natural disturbance regimes. Windthrow and fire were not explicitly referenced at any survey corners along northern rivers, and their influence on the community is believed to have been much less than that of flooding. The data are also too sparse to determine historic tree composition or define growth stages. The most frequent trees in modern floodplain forests—silver maple, green ash, black ash, American elm, and bur oak— were also the most common bearing trees along rivers. The historic notes indicate that ash and American elm occurred more frequently than silver maple, in contrast to modern forests, where silver maple is dominant, with ash and American elm occurring less frequently and mainly in the understory.

With the forest lowland-deciduous systems, there are several management options to help support species conservation. One is promoting the management of uneven aged stands of mature trees. Managing stands to help retain biological legacies at the site level, such as promoting large trees with cavities, is beneficial. Therefore, harvesting with reserves is one option for the area. Due the lowland, and often-saturated soils, harvests should be scheduled when the soils are frozen, leaving a smaller chance for sited to be damaged during harvesting operations.

Detailed silvicultural prescriptions for the Southern Terrace Forest (FFs59) are available on the MN DNR website. Please refer to: [https://www.dnr.state.mn.us/forestry/ecs\\_silv/npc/index.html](https://www.dnr.state.mn.us/forestry/ecs_silv/npc/index.html)

**Table F-11. Suitability of tree species by Native Plant Community; Floodplain Forests.**

NPC Class	FFn57	FFn67	FFs59	FFs68
	Northern Terrace Forest	Northern Floodplain Forest	Southern Terrace Forest	Southern Floodplain Forest
Area Estimate (acres)*	2,388	842	40,018	21,807
Silver maple	1w	1w	1w	1w
American elm	6w	4wd	2w	4wd
Green ash	4w	2wd	9w	2wd
Black ash	2	3	8	
Cottonwood			3w	3w
Basswood	3wd			6d
Box elder	7w	5wd	4w	6wd
Swamp white oak			5w	7wd

NPC Class	FFn57	FFn67	FFs59	FFs68
	Northern Terrace Forest	Northern Floodplain Forest	Southern Terrace Forest	Southern Floodplain Forest
Hackberry			7w	8wd
Red elm			11w	
Black walnut			10w	
Bur oak	5wd	6wd	14d	
Bitternut hickory			12w	
Paper birch	8d			
River birch				5d
Balsam fir	9			
Rock elm			15w	

Source: Minnesota Department of Natural Resources, Division of Forestry, Ecological Land Classification Program; Version 2.2, 2013.

Table interpretation information is available on page F – 7.

\* Area estimates from NRRI's potential native plant community data. Area estimates are for the full model (i.e., disturbed areas such as agriculture and development were not masked) which is an estimate of the NPC classes if no land use conversion/disturbance had occurred.

### Climate Change Projections

- Low-Moderate Vulnerability. (limited-medium evidence, medium agreement) Climate change is expected to affect the flow regimes in riparian systems, which will have unknown consequences for this system. Low agreement on future precipitation and stream flow regimes is the primary uncertainty for this system, in combination with a lack of research and management experience.
- Moderate Adaptive Capacity. Floodplain Forests are adapted to periodic disturbances and fluctuating soil moisture, so they might be capable of tolerating future changes to the hydrologic cycle. There is a lack of knowledge and management history in these forests compared to other systems in the assessment area, so it is unknown if there are certain disturbance thresholds that are excessive or beneficial for Floodplain Forests. It is not expected that other forest species will outcompete and replace these species in riparian settings, so Floodplain Forests may be at low risk for transition to other forest types. Conversely, these forests are confined to floodplains and are not expected to expand to new territory in the future.
- Potential Impacts
  - Drivers. Climate change has the potential to alter the flow regimes in riparian systems across the assessment area. Floodplain Forests are particularly adapted to withstand annual and seasonal floods. The regeneration requirements of several species within this system are also linked to these floods. If climate change results in shifts in the timing or volume of stream flows, this forest system could be impaired.
  - Stressors. Hydrologic alteration of river systems through dams and river channelization has already had negative impacts on Floodplain Forests. Invasive species such as reed canary grass and European buckthorn are existing threats to these forests, and invasive species have the potential to increase in abundance in the assessment area under climate change. White-tailed deer populations are expected to increase with warmer winters, which may hinder regeneration of this system. If the trend continues toward more-

intense precipitation events, extreme floods may present risk to this system through excessive waterlogging and downcutting of riverbanks.

- Dominant Species. Under a range of possible climate futures, most of the dominant species within Floodplain Forests are expected to gain in suitable habitat across the assessment area (silver maple, American elm, American basswood, black willow, eastern cottonwood). LANDIS-II is not suited to simulate lowland forest systems, but this tool projects large biomass increases for American basswood, American elm, and green ash in upland areas under both climate scenarios. Elm/ash/ cottonwood forests could experience large potential productivity gains under a range of climate futures. Emerald ash borer is expected to reduce the amount of green and black ash in future Floodplain Forests.

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## Appendix G

### Committee Operations Guide

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#### A. Introduction

The East Central Regional Landscape (EC) Committee is the organizational structure supported by the Minnesota Forest Resource Council (MFRC) as established by Minnesota Sustainable Forest Resources Act of 1995 (SFRA) to guide landscape level planning and coordination of forest resources in the East Central Landscape.

##### **Purpose and Goal**

The goal of this operations guide is to help the EC Committee become more efficient and effective in its operations and enhance coordination amongst partners to increase the implementation of the EC Landscape Plan. The guide is intended to help make better use of committee member's time, energy and efforts as well as that of the Council and staff.

#### B. Committee Roles and Functions

The EC Committee supports a range of forest and related natural resource initiatives through a variety of approaches and methods. The EC Committee will serve as a catalyst to initiate the development of sustainable forest management projects as envisioned in the East Central Landscape Plan, especially where the issues to be addressed are cross boundary in nature or in scope. Projects should be designed to support implementation of resource management plans of partners in the region.

##### **Committee Membership and Leadership**

###### Committee Membership

The EC Committee consists of members representing public and private stakeholder groups and interests of the region. Committee membership is reviewed periodically to ensure adequate representation of the region's diverse stakeholder groups.

###### Leadership

The Committee has the following leadership positions:

- Chair
- Vice chair

- Subcommittees or working groups as needed

### **Committee Meeting Operations and Protocols**

Meeting Guidelines – Committee meetings will be run according to the following guidelines:

- The chair will preside over committee meetings with the vice chair as an alternate. If the chair and vice chair are absent, MFRC staff will facilitate.
- Consensus is the preferred approach to make decisions. Committee will use Robert’s Rules of Order (only if needed) to guide meeting procedures.
- Staff will assist chair/vice chair in preparing agendas and materials for committee meetings.
- All committee, subcommittee and work group meetings are open to the public.
- Public is encouraged to participate in committee meeting dialogue as guided by the chair.
- Information brought to and shared at regional committee meetings is considered public.
- Committee members are expected to keep their respective agencies/organizations informed of the discussions, decisions and programs of the Committee and seek input from their parent agency/organization.

### Committee Decision Making Protocol

Consensus is the preferred approach to make decisions. The chair or staff facilitator may refer to Roberts Rules of Order if needed to help make decisions. Following is the decision-making protocol:

1. Decide. Make a decision on the matter in the following order of preference.
  - a. Reach Consensus. This is the preferred method of decision-making that will be sought after discussion and a proposal to make a decision on a matter.
  - b. If no consensus, a majority of the members present will decide the matter.
  - c. If strong dissenting perspectives are expressed, staff will record the item and concerns raised. This information will be forwarded to the full EC Committee.
2. Table. Move the item or matter to the next meeting so committee members and staff can do further research.
3. Form Working Teams. Create a work group or subcommittee to work on the item further and bring it back to the Committee for further discussion/decision.
4. Outside the Scope. Determine that the item or matter is outside the scope of the landscape coordination or implementation process.

A final opportunity to resolve a stalled or controversial decision is to refer the decision to the MFRC Landscape Committee or the Council.

### Committee Operating Costs

The MFRC will cover committee member’s out-of-pocket costs (e.g., mileage reimbursement, food, lodging) resulting from their participation in regional committee activities. Agency and organization members will be asked to cover their own expenses given limited program budgets.

### **Working Teams – Work Groups and Subcommittees**

The Committee may decide to create teams to work on specific aspects relating to and supporting the enhanced coordination, implementation and monitoring of the Landscape Plan. People not formally serving on the Committee may serve on these working teams. The two types of teams include:

- Work Groups – small ad hoc groups of the full committee that focus work on specific topic or project over a relatively short period of time (Example – Biomass for Landowners education event).
- Subcommittees – group of the full committee that is created to work on a more complicated tasks over longer period of time or an ongoing basis (Example – Monitoring Subcommittee or Education & Outreach Subcommittee).

## **C. Council Guidance on Landscape Planning and Coordination**

### **Landscape Management Goals and Principles**

#### Landscape Goals

Goals are conditions or outcomes that are desired for a region’s forested landscape. They are the conditions that an engaged community of forestry interests would agree are desirable for the forests, economies and communities within a region. Goals provide a sense of direction, especially with regard to outcomes that will be accomplished over the long-term. The Forest Resources Council has established the following broad goals for use by regional committees as they carry-out their landscape-level planning and coordination responsibilities:

1. Land area covered by forests within a region’s landscape will be the same or larger.
2. Forests within a region’s landscape will be in a variety of ownerships, serving both public and private interests.
3. Within forested landscapes, healthy, resilient, and functioning ecosystems will be maintained within appropriate mixes of forest cover types and age classes to promote timber production, biological diversity, and viable forest dependent fish and wildlife habitats.
4. Forests within a region’s landscape will be providing a full range of products, services, and values, including timber products, wildlife and tourism that are major contributors to economic stability, environmental quality, social satisfaction, and community well-being.
5. Forests within a region’s landscape will be viewed by citizens as integral contributors to the quality of life enjoyed by current as well as future generations. The citizenry will be knowledgeable about forest conditions and opportunities within the region and actively engaged in their stewardship.
6. Forest conditions and issues within the region’s landscape will be better understood by the Minnesota Forest Resources Council through its regional committees.

#### Principles Guiding the Selection of Landscape Level Planning Strategies

Principles are standards or guidelines that guide the selection of actions that might be used to accomplish agreed to goals. They help decide which of many actions or activities will be most useful in accomplishing a region’s landscape-level goals. They are not set forth as actions (or policies or programs), but simply provide a structure for the way decisions about landscape-level planning and coordination might occur.

Principles are also useful in guiding the process that is used to identify certain actions. The Forest Resources Council has established the following principles for use by regional committees as they carry-out their landscape-level planning and coordination responsibilities:

1. Effectively address the major forest resource issues identified in the region to achieve the goals established by the regional committees.
2. Respect differences in goals and objectives of public and private owners and users within a forested landscape, as well as the rights and responsibilities of forest land ownership.
3. Reflect a regional landscape's broad diversity of interests and perspectives in the use, management and protection of forest resources.
4. Are selected after thoughtful deliberation and careful review of a variety of potential actions (policies/programs) that might be voluntarily undertaken by landowners.
5. Are guided by the most currently available, science-based information about the condition of the region's forests, economies, and communities.
6. Reflect adaptive management processes that involve opportunity for continuous learning experiences.
7. Are capable of being fully implemented with existing (or forthcoming) financial and professional resources.
8. Promote forest practices that improve forest ecosystem health, resiliency and productivity within forested landscapes which, when aggregated, will achieve statewide goals.

#### Principles Guiding the Landscape Coordination Process

1. Result from cooperation and coordination among and between landowners, agencies and organizations responsible for forested landscapes.
2. Result from open and continuous communication and dialogue among all parties interested in sustaining regional forested landscapes.
3. Result from an engaged public that supports and has confidence in the effectiveness of the landscape-level planning and coordination process being implemented by the Minnesota Forest Resources Council through its regional committees.

## **D. Landscape Coordination Strategies**

By continuing to participate in landscape coordination efforts on an ongoing basis, partners in the MFRC regions experience significantly increased benefits through the collaborative management of the forest resources they are responsible for. Over the past fifteen or so years, the MFRC regional landscape committees have developed six coordination strategies that have evolved to enhance the successful implementation of the landscape plans including:

1. Information Sharing and Networking.
2. Landscape Plan Outreach.
3. Promote Integration of the Landscape Plan into Partners' Plans.
4. Actively Support Forest Policy and Research Development Processes.
5. Develop Regional Priorities to Guide Investment in the Region.
6. Promote Cross Boundary Demonstration Projects.
7. Support Monitoring Efforts.

**Coordination Strategy 1: Information Sharing and Networking**

Regional committees meet on a quarterly basis to provide an open public forum for diverse interests to cooperatively promote forest sustainability. By bringing together representative interests from landscape regions, the committees serve as springboards for effective forest management activities that address specific needs and challenges in each region.

Regional committees are encouraged to maintain a list of potential speakers and topics appropriate to their needs and concerns. The speakers are encouraged to provide copies of the presentation materials for distribution at the meeting, and should be comfortable with sharing information and its availability to the public. Speakers are also encouraged to share copies of their Power Point presentations for placement on the MFRC website.

**Coordination Strategy 2: Landscape Plan Outreach**

Regional committees actively promote the benefits of sustainable forest resource management to landowners, resource managers and stakeholders through coordinated outreach and education efforts with a broad range of partners. Some of the ways the Committee will support outreach include:

- Landscape plan distribution.
- Public relations summary documents – brochure; plan summary; list of DFCs, goals, objectives
- MFRC website, partner websites.
- Key contacts – develop inventory of key people to contact and who will contact them.
- Presentations to local officials and stakeholder groups.
- Webinars – SFEC.
- Pathway documents – ecological, economic and social.

**Coordination Strategy 3: Promote Integration of the Landscape Plan into Partners' Plans**

Committees support the integration of goals and strategies in the landscape plans into forest resource management plans prepared by landowners and managers in the region. By integrating landscape plan concepts, landowners and managers can save time and money as well as reduce conflicts in their planning processes.

A primary way that MFRC landscape plans are implemented is through the integration of goals and strategies from the landscape plans into forest management and related natural resources plans developed by partners in the region. The EC Committee should actively encourage all agencies, organizations, industry, and private landowners to integrate the goals from the landscape plan into their resource management plans and implementation projects. To support this integration effort, the EC Committee should:

- Serve as a “sounding board” for agencies and organizations when they are looking to amend or revise their current management plans and are seeking ideas on how to best incorporate EC Landscape goals into their plans and projects.
- Look for ways to cooperate and coordinate on the ground management activities to achieve landscape goals.

- Consider the cumulative effects of current and planned activities across the landscape.
- Assist MFRC staff in collecting necessary information to support monitoring and evaluation activities described in the “Monitoring Framework” of the EC Landscape Plan.

#### **Coordination Strategy 4: Actively Support Forest Policy and Research Development Processes**

Regional committees actively advise the Council and other forestry interests and decision makers on the development of forest policy and research initiatives. These recommendations further promote the implementation of landscape plans. As established in the SFRA, regional committees are to provide regional perspectives to the Council on sustainable forestry matters. With this assigned responsibility, the regional committees play a critical role in shaping forest policy in Minnesota. The EC Committee should:

- Submit recommendations to the MFRC as a part of the Council’s strategic forest policy development program.
- Provide recommendations on forest policy matters as requested by the Council.
- Provide recommendations to the Council as matters the Committee deems appropriate arise.

As a part of the development of the second generation East Central Landscape Plan, the EC Planning Committee developed an outline of recommendations to assist people from these entities in finding specific strategies that apply to their organizations or personnel interests (see “Recommendations to Agencies and Organizations”). Many of these recommendations will require efforts beyond the scope and capacity of the EC Committee to implement. The EC Committee should refer to this list as a starting point when making policy recommendations.

#### **Coordination Strategy 5: Develop Regional Priorities to Guide Investment in the Region.**

Committees develop and advocate regional conservation investment priorities for wide variety of funding resources in ways that bolster and advance implementation of the landscape plans through collaborative projects.

The EC Committee has participated in several priority setting efforts related to the initial EC landscape plan and operations of the MFRC. Priorities for several of the below listed forest policy initiatives will need to be updated over the next ten years and new initiatives and programs may need the committee’s attention. Priority setting efforts taken by EC Committee in the past:

1. Landscape Plan Priorities - prioritized desired future conditions, goals and strategies in the plan.
2. Committee Annual Work Programs and Budgets - developed annual work program and budget guiding the \$5,000 seed moneys per committee per year.
3. Committee Projects – the EC Committee developed and prioritized list of potential collaborative projects: 1) outreach and education, 2) research and development, 3) on the ground pilot or demonstration projects.
4. Forest Policy Priorities - submit letters to the Council outlining recommendations for their consideration in the MFRC’s strategic Forest Policy Development process.
5. Research Priorities - provided recommendations on topical areas needing research to the MFRC and the Research Advisory Council (RAC) as created by the Sustainable Forest Resources Act.
6. MFRP Timber Productivity Process - prioritized the list of action areas, strategies, action steps and tasks developed for this Minnesota Forest Resource Partnership (MFRP) process. These regional priorities have been shared with the MFRC and MFRP.

7. Lessard-Sams Outdoor Heritage Council (LSOHC) - 25-Year Forest Habitat Implementation Vision - identified key resource topics and geographic areas where LSOHC funds should be targeted within the Landscape.
8. Minnesota State Forest Action Plan - commented on inventory and assessment documents, edited implementation matrices, and prioritized ten major issues listed in the FAP.
9. MFRC Parcelization Study Implementation - Prioritized the study's policy options and strategies in order to support their successful implementation.
10. Private Forestland Study (HF 2164) - provided input on report due to the legislature.

### **Coordination Strategy 6: Promote Cross Boundary Demonstration Projects**

Committees lead, support and/or advocate cross-boundary collaborative projects that support the implementation of the landscape plans. Types of committee projects include: 1) outreach and education, 2) research and development, and 3) on-the-ground collaborative projects. Committee projects are designed to demonstrate effective ways to implement landscape plans that address cross boundary issues.

The EC Committee supports demonstration projects to promote collaborative or cross boundary efforts. These projects are intended to support the implementation of goals and objectives in the East Central Landscape Plan. The following narrative provides an initial set of guidelines to help the EC Committee and partners identify and select opportunity areas, pilots, and/or demonstration projects.

#### Project Development

Sustainable forestry projects where EC Committee coordination or funding support is desired may be initiated by any person or entity. All stakeholders in the region are encouraged to work with the EC Committee to seek increased collaborative opportunities with other partners in the region, especially on cross boundary types of forest management projects. Stakeholders are encouraged to refer to the EC Landscape Plan concurrently with the State Forest Action Plan as starting points for initiating new forestry projects. They are also encouraged to review the priorities set by the EC Committee (see narrative above). Partners are further encouraged to seek ways to integrate the goals of multiple plans with the implementation of the EC Landscape Plan.

Formal project ideas to be considered by the EC Committee involvement and discussion at quarterly committee meetings need to be submitted to the Chair and the MFRC Landscape Program Manager three weeks prior to the meeting. An application form shall be prepared for each project proposal. Preliminary project ideas can be brought up at the Committee meetings with no advance notice but formal action on the use of Committee funds will not occur until the project idea has been developed through this process.

#### Collaborative Project Topics

- Forest management
- Timber sales
- Recreation management
- Fish and wildlife management
- Water resource management
- Land management

- Forest based economic development
- General public awareness/education
- Coordinated public conservation policies/investments

#### Collaborative Project Types

- Outreach and education
- Research and development
- Other projects

#### Committee Involvement

Regional committees have established three levels of involvement to support the implementation of the Plan:

- **Committee Led Projects:** Committee members take the lead in the developing and implementing the project. The Committee looks for partners to help support these projects. (Example – Wadena Pilot Forestry Project)
- **Joint Projects:** EC Committee is a financial, technical and/or administrative partner, but not leading (Example – Minnesota Women’s Woodland Network).
- **Supporting Projects:** EC Committee supports a project from direct to indirect approaches, but not leading. (Examples: letters of support; and information sharing [GIS data, maps, desired future conditions, goals, and objectives from the East Central Landscape Plan]).

#### Guidelines to Select Opportunity Areas and Demonstration Projects

1. Major Players. Two or more partners who want to work in a given area or on a specific forest management or research topic.
2. Project Size. Project size should vary according to the opportunity.
3. Geographic Considerations. Boundaries could be based on natural features such as watersheds, Land Type Associations (LTAs), riparian corridors, etc.; or could be based on socio-political boundaries such as townships, portions of counties, major transportation corridors, or other geo-political jurisdictional areas.
4. Land Ownership Considerations. Project areas can be defined or shaped by landownership patterns. For example, one approach could focus on areas dominated by public lands. The Committee could design the boundaries of a project to minimize privately owned lands within a given area. For private land based projects, the focus could be directed on areas with larger tracts or parcels of private lands.
5. Ecological Significance. The project areas could have some ecological significance in the Landscape. Sources to help identify ecological significance may include: county biological surveys, Natural Heritage Information Database, National Forest Management Areas, existing Scientific and Natural Areas (SNAs), state parks, Wildlife Management Areas (WMAs), etc.
6. Economic/Social Significance. The project area could be designed to focus on for areas with special economic and/or social significance such as shoreland, industry lands, etc.
7. Consistency with East Central Landscape Plan Recommendations. The demonstration project should be consistent with the recommendations to agencies and organizations in Section 11 of this Plan.

**Coordination Strategy 7: Support Monitoring Efforts.**

Monitoring and evaluation are fundamental components of landscape-level management and are identified in Minnesota Statute 89A.07 of the Sustainable Forest Resources Act as:

*“The DNR Commissioner shall maintain a program for monitoring broad trends and conditions in the state's forest resources at statewide, landscape, and site levels. To the extent possible, the information generated under the monitoring program must be reported in formats consistent with the landscape regions used to accomplish the planning and coordination activities specified in section 89A.06.”*

The SFRA further states, *“To the extent possible, the program must incorporate data generated by existing resource monitoring programs.”* The SFRA also calls for compliance and effectiveness evaluation of forest management activities.

The Committee will support existing monitoring efforts by working with research organizations and other partners to identify potential monitoring metrics and datasets.

**E. Funding and Letters of Support****Funding**

The Committees will prepare an annual budget to guide the use of available MFRC moneys and present it to the Council’s Landscape Committee for approval. Staff will periodically update the Committee on available funds for the Committee budget efforts. The budget should be prepared for review by the Committee at the first meeting in each fiscal year (typically September).

**Collaborative Funding Efforts**

While the Landscape Program budget has not been designed to be a primary source of implementation dollars, the seed funding has helped to leverage additional funds for sustainable forest projects in the region. Securing additional funding will be critical to the successful implementation of the EC Landscape Plan. The members of the EC Committee are encouraged to bring project ideas and funding proposals for cross boundary projects to quarterly meetings to seek partners to support the projects. The Committee will discuss project funding efforts as needed.

**Letters of Support**

Procedures for processing letters of support from the Committee are addressed below.

## **F. Letters of Support**

1. When requested, the EC Committee may provide letters of support (LOS) to project proposals by regional partners. The chair will sign the LOS on behalf of the Committee.
2. To request an LOS:
  - For review at a committee meeting, the request must be submitted to the Chair and staff one week prior to the meeting.
  - For LOS needed in between quarterly meetings, the request to the Chair and staff should include a needed by date and request for an email or conference call discussion and vote.
  - Request should briefly describe the proposed project and show ties to DFCs, Goals and/or Strategies of the EC Landscape Plan.
  - Requester should make presentation to Committee to support their reasons for obtaining a LOS, using the criteria below.
3. Criteria for obtaining an LOS include:
  - The project supports a goal and strategy outlined in the EC Landscape Plan.
  - The project seeks to increase public and private benefits through sustainable forestry.
  - The LOS is agreed to by a majority of committee members attending a meeting, responding to an in an email or participating in a conference call.
4. The chair will sign the letters on behalf of the Committee.
5. Staff will document input from committee members, including any dissenting views on the letters of support.

## Appendix H

### Spatial Planning Categories



This appendix reports the number of acres by organizational planning category for several of the major public land owners in the East Central Landscape. These acre estimates are from the organization's Land Management Plan.

#### A. Minnesota DNR Forestry – Mille Lacs Uplands SFRMP

Forest Cover Types on Division of Forestry and Section of Wildlife Lands		
Cover Type	Acres	% of Total
Ash and Lowland Hardwoods	18,537	8.0%
Aspen/Balm of Gilead	99,109	42.7%
Birch	9,934	4.3%
Northern Hardwoods	46,147	19.9%
Oaks and Central Hardwoods	21,101	9.1%
White Pine	551	0.2%
Red Pine	6,770	2.9%
Jack Pine	2,010	0.9%
Scots Pine	25	0.0%
White Spruce	2,705	1.2%
Balsam Fir	2,983	1.3%
Norway Spruce	5	0.0%
Lowland Black Spruce	11,375	4.9%
Tamarack	10,342	4.5%
White Cedar	235	0.1%
Upland Black Spruce	124	0.1%
Red Cedar	9	0.0%
Other species	393	0.2%
<b>Total</b>	<b>232,355</b>	<b>100%</b>
Adapted from 2008 Mille Lacs Uplands Subsection Forest Resource Management Plan ( <a href="http://www.dnr.state.mn.us/forestry/subsection/millelacs/index.html">http://www.dnr.state.mn.us/forestry/subsection/millelacs/index.html</a> )		

## B. Minnesota DNR Forestry – Anoka Sand Plain SFRMP

Forest Cover Types on Division of Forestry and Section of Wildlife Timberlands			
Cover Type	Typical NPC	Acres	% of Total
Aspen	MHc26, FDs37	1,819	12.9%
Oak	FDc25, MHs37, FDs37	6,260	44.4%
Red Pine	FDc34	2,402	17.0%
Northern Hardwoods	MHs49, WFn55, FDs37	1,176	8.3%
Tamarack	APn81, FPs63	729	5.2%
White Pine	FDc25, FDc34	692	4.9%
Ash/Lowland Hardwoods	WFn55, WFn64, MHs49, FFs68	568	4.0%
Jack Pine	FDc23, FDc34	223	1.6%
Birch	FDs37	149	1.1%
<b>Total</b>		<b>14,104</b>	<b>100%</b>
Adapted from 2012 Anoka Sand Plain Subsection Forest Resource Management Plan ( <a href="http://www.dnr.state.mn.us/forestry/subsection/anoka/index.html">http://www.dnr.state.mn.us/forestry/subsection/anoka/index.html</a> )			

## Appendix I

### Annual Work Plan Template



The following table provides an example of the template that the East Central Landscape Committee will utilize to create Annual Work Plans. Annual Work Plans will prioritize objectives for a given fiscal year and will be used to identify leadership, partners, resource and staffing needs, and potential barriers to implementing action items and achieving objectives.

**Economic Goal 1:** Promote sustainable timber production and expanded use of forest products harvested from the East Central Landscape.

Objectives	Lead/ Partners	Resources Available / Resourced Needed	Potential Barriers	Estimated Cost	Staffing Needs
<b>Objective 1: Improve Forest Productivity.</b> Work with landowners, foresters, loggers, agencies, and others in the forest products industry to improve forest productivity consistent with landowner objectives and consideration for the site's ecology.					
<b>Objective 2: Increase Cover Type and Age-Class Diversity.</b> Manage for a mix of age classes and site appropriate cover types across ownerships to maintain or increase sustainable harvest levels and support forest based economies.					
<b>Objective 3: Enhance Forest Health and Resilience.</b> Work with landowners to identify and mitigate threats to forest health and timber quality such as invasive species, pests, diseases, drought, wildfire, windthrow, etc.					
<b>Objective 4: Advance Research and Development.</b> Support research and development projects that promote sustainable forest management specific to the East Central Landscape.					
<b>Objective 5: Strengthen Markets and Utilization.</b> Support existing industries and develop and/or expand wood product markets to improve utilization of forest resources, including brushland. Ensure that economic development efforts include the secondary forest products industry and niche markets.					

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## Appendix J

### Monitoring Indicators Table



The following tables provides monitoring indicators and potential data sources for the East Central Committee to utilize during development, implementation, coordination, and monitoring of committee work plans. These tables are only a starting point for the Committee and should be refined as needed.

Ecological indicators are categorized according to two basic monitoring questions:

1. Resource Trend Monitoring (long term): Are management efforts moving the East Central Landscape towards the forest resource management goals outlined in the Plan and fulfilling the requirement of the SFRA?
2. Implementation Monitoring (short term): Are management actions being carried out in a manner that is consistent with the Plan goals and strategies?

The monitoring indicators for the economic, social, and administration/coordination/financial goals could not be categorized as resource trend/implementation monitoring indicators.

### Ecological Goals

Goals	Potential Monitoring Indicators	Potential Data Sources
Goal 1: Protect, maintain, and increase ecologically sound and climate resilient forests in the East Central Landscape.	<u>Resource Trend Monitoring</u> <ul style="list-style-type: none"> <li>• Acres of total forest.</li> <li>• Acres of tree species anticipated to increase or decrease with climate change according to the USDA (2014) Forest Ecosystem Vulnerability and Assessment and Synthesis report.</li> <li>• Acres of forest impacted by invasive species, pests, and pathogens.</li> <li>• Tree species diversity</li> <li>• Number of rare species and acres of rare communities in the landscape.</li> <li>• Acres of core and high-integrity forest.</li> <li>• Acres and numbers of forested blocks exceeding some threshold sizes (e.g., DNR Section Forest Resource Management Plan patch size definitions).</li> </ul>	<ul style="list-style-type: none"> <li>• FIA</li> <li>• NLCD</li> <li>• DNR Eco Resources</li> <li>• DNR Wildlife</li> <li>• DNR Forestry</li> <li>• MDA</li> <li>• Spatial Integrity Index (Northern Research Station)</li> <li>• BWSR</li> <li>• SWCD</li> <li>• DNR PFM program</li> </ul>

Goals	Potential Monitoring Indicators	Potential Data Sources
	<u>Implementation Monitoring</u> <ul style="list-style-type: none"> <li>• Acres of forest protected by conversion by SFIA, conservation easements, or fee title purchase.</li> <li>• % and acres of private lands being actively managed.</li> <li>• Number of registered forest stewardship plans.</li> <li>• Acres of forest management activities (e.g., harvests, TSI, planting, etc.).</li> <li>• Number of mailings sent, workshops held, or other public outreach activities with the intent to increase awareness on the importance of forest resources and their management.</li> </ul>	
Goal 2: Improve water quality and storage capacity through forest management.	<u>Resource Trend Monitoring</u> <ul style="list-style-type: none"> <li>• Restoration of forested riparian corridors.</li> <li>• Number of impaired water features in the landscape.</li> <li>• Water quality conditions of the lakes and rivers.</li> <li>• Downstream water treatment costs or requirements.</li> </ul> <u>Implementation Monitoring</u> <ul style="list-style-type: none"> <li>• Acres of conservation easements on private forested lands.</li> <li>• Number of 1W1Ps and watershed-based landscape stewardship plans developed.</li> <li>• Use of forest best management practices and site-level guidelines by landowners in the region.</li> </ul>	<ul style="list-style-type: none"> <li>• WRAPs reports</li> <li>• BWSR</li> <li>• MPCA</li> <li>• DNR PFM program</li> <li>• DNR Resource Assessment</li> <li>• SWCD</li> <li>• Forest Management Guideline Implementation Monitoring Program</li> </ul>
Goal 3: Increase the knowledge and understanding among natural resource professionals and landowners about forest resources within the East Central Landscape to help coordinate management efforts and improve outcomes.	<u>Resource Trend Monitoring</u> <ul style="list-style-type: none"> <li>• Changes in trends of forest land cover, composition, and age-class</li> </ul> <u>Implementation Monitoring</u> <ul style="list-style-type: none"> <li>•</li> </ul>	<ul style="list-style-type: none"> <li>• FIA</li> <li>• NLCD</li> </ul>

## Economic Goals

Goals	Potential Monitoring Indicators	Potential Data Sources
Goal 1: Promote sustainable timber production and expanded use of forest products harvested from the East Central Landscape.	<ul style="list-style-type: none"> <li>• Value of primary forest products produced in the region.</li> <li>• Value of secondary forest products produced in the region.</li> <li>• Facility expansion and diversity.</li> <li>• Cords harvested.</li> <li>• Treated acres across ownerships.</li> </ul>	<ul style="list-style-type: none"> <li>• DNR Forestry</li> <li>• MN DEED</li> <li>• UMD BBER</li> <li>• MN DOT</li> <li>• Mill surveys</li> <li>• TPO database</li> </ul>
Goal 2: Integrate sustainable forest management into land use planning and decision-making processes.	<ul style="list-style-type: none"> <li>• Forestry element in county and municipal comprehensive plans.</li> <li>• Forest protection provisions in local ordinances.</li> <li>• Number of Forest Stewardship Plans completed, acres covered by plans.</li> <li>• Use of forest best management practices and site-level guidelines by landowners in the region.</li> </ul>	<ul style="list-style-type: none"> <li>• LGU partners</li> <li>• DNR PFM program</li> <li>• Forest Management Guideline Implementation Monitoring Program</li> </ul>
Goal 3: Promote forestry-based recreation and tourism.	<ul style="list-style-type: none"> <li>• Annual revenues generated in the region from tourism and recreation.</li> <li>• Use of state forests, state parks, and wildlife management areas, number of visitor days.</li> </ul>	<ul style="list-style-type: none"> <li>• DNR Parks and Trails</li> <li>• MN DOR</li> <li>• Explore Minnesota</li> </ul>

## Social Goals

Goals	Potential Monitoring Indicators	Potential Data Sources
Goal 1: Increase the public awareness, including private landowners, about the importance of sustainable forest management.	<ul style="list-style-type: none"> <li>• Public opinion survey results.</li> <li>• Number of active school forest programs.</li> <li>• Environmental learning center activities and visitor numbers.</li> <li>• Other natural resource workshops (Native Plan Communities, Sustainable Forests Education Cooperative).</li> <li>• Number of registered stewardship plans.</li> <li>• Acres enrolled in 2C and SFIA.</li> </ul>	<ul style="list-style-type: none"> <li>• U of MN</li> <li>• UMN Extension</li> <li>• SFEC</li> <li>• MN Forestry</li> <li>• MN Parks and Trails</li> <li>• Local environmental learning centers</li> <li>• DNR PFM program</li> <li>• BWSR</li> <li>• SWCD</li> </ul>
Goal 2: Promote the wellbeing of the people living, working, and recreating in the region through sustainable forest management.	<ul style="list-style-type: none"> <li>• Number of cities participating in community design programs such as Tree City USA.</li> <li>• Number of community forestry programs.</li> <li>• Number of local organizations and outdoor/sportsmen organizations that participate and/or support in the management and use of publicly owned forested lands.</li> <li>• Miles of scenic byways</li> <li>• The amount of forested open space in each community and county in the region.</li> <li>• Forestry element in county and municipal comprehensive plans.</li> </ul>	<ul style="list-style-type: none"> <li>• MN DOT</li> <li>• LGU partners</li> </ul>
Goal 3: Promote diverse forest uses.	<ul style="list-style-type: none"> <li>• Number of mailings sent, workshops held, or other public outreach activities with the intent to increase awareness of opportunities and uses of forests.</li> </ul>	<ul style="list-style-type: none"> <li>• UMN Extension</li> <li>• DNR Forestry</li> </ul>

### Administration/Coordination/Financial Initiatives Goals

Goals	Potential Monitoring Indicators	Potential Data Sources
Goal 1: Increase coordination of sustainable forest management in the East Central Landscape.	<ul style="list-style-type: none"> <li>Preparation of a committee work plan</li> <li>Completion of tasks in the work plan</li> </ul>	<ul style="list-style-type: none"> <li>EC committee</li> </ul>
Goal 2: Promote public involvement in sustainable forest management throughout the East Central Landscape and build leadership capacity to maintain sustainable forest management.	<ul style="list-style-type: none"> <li>Number of volunteer projects completed.</li> <li>Number of volunteer hours donated per year.</li> <li>Monetary value of the volunteer time donated each year.</li> <li>Number and amounts of grants received in the East Central Landscape.</li> </ul>	<ul style="list-style-type: none"> <li></li> </ul>
Goal 3: Expand and improve assistance to stakeholders regarding sustainable forest management.	<ul style="list-style-type: none"> <li>Acres of land with forest stewardship plans.</li> <li>Number and acres of cost-share projects.</li> <li>Total value of cost-share projects.</li> </ul>	<ul style="list-style-type: none"> <li>DNR PFM program</li> <li>BWSR</li> <li>SWCD</li> </ul>
Goal 4: Expand the financial resources available to support the implementation of this Plan and to enhance the quality of technical assistance provided to landowners in the region on sustainable forest management.	<ul style="list-style-type: none"> <li>Amount of technical and financial assistance provided to private forest landowners in the East Central Landscape.</li> <li>Value of outside funding brought to landscape stewardship projects.</li> </ul>	<ul style="list-style-type: none"> <li>DNR PFM program</li> <li>BWSR</li> <li>SWCD</li> </ul>

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## Appendix K

### Private Landowner Assistance Programs



The following is a list of programs to provide private landowners with technical and financial assistance:

Program Name	Level	Agency	Website
Environmental Quality Incentives Program (EQIP)	Federal	NRCS	<a href="https://www.nrcs.usda.gov/wps/portal/nrcs/mn/programs/financial/eqip/nrcs142p2_023506/">https://www.nrcs.usda.gov/wps/portal/nrcs/mn/programs/financial/eqip/nrcs142p2_023506/</a>
Conservation Stewardship Program	Federal	NRCS	<a href="https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/csp/">https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/csp/</a>
Wetlands Reserve Program	Federal	NRCS	<a href="https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/home/?cid=STELPRDB1049327">https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/home/?cid=STELPRDB1049327</a>
Forest Legacy Program MN Forests for the Future Program	Federal State	USFS MN DNR	<a href="https://www.fs.usda.gov/managing-land/private-land/forest-legacy">https://www.fs.usda.gov/managing-land/private-land/forest-legacy</a> <a href="https://www.dnr.state.mn.us/forestlegacy/index.html">https://www.dnr.state.mn.us/forestlegacy/index.html</a>
Forest Stewardship Program	Federal State	MN DNR	<a href="https://www.fs.usda.gov/detail/r9/communityforests/?cid=stelprdb5341688">https://www.fs.usda.gov/detail/r9/communityforests/?cid=stelprdb5341688</a> <a href="https://www.dnr.state.mn.us/foreststewardship/index.html">https://www.dnr.state.mn.us/foreststewardship/index.html</a>
Conservation Reserve Program (CRP)	Federal State Local	USDA FSA NRCS BWSR Local SWCDs	<a href="https://www.fsa.usda.gov/programs-and-services/conservation-programs/conservation-reserve-program/index">https://www.fsa.usda.gov/programs-and-services/conservation-programs/conservation-reserve-program/index</a> <a href="https://www.nrcs.usda.gov/wps/portal/nrcs/mn/technical/ecoscience/agronomy/nrcs142p2_023675/">https://www.nrcs.usda.gov/wps/portal/nrcs/mn/technical/ecoscience/agronomy/nrcs142p2_023675/</a> <a href="https://bwsr.state.mn.us/conservation-reserve-program">https://bwsr.state.mn.us/conservation-reserve-program</a>
Minnesota Conservation Reserve Enhancement Program (MN CREP)	Federal State Local	USDA FSA NRCS BWSR Local SWCDs	<a href="https://bwsr.state.mn.us/mn-crep-landowners">https://bwsr.state.mn.us/mn-crep-landowners</a>
MN DNR Cost-Share Program	State	MN DNR	<a href="https://www.dnr.state.mn.us/woodlands/cost-share.html">https://www.dnr.state.mn.us/woodlands/cost-share.html</a>

Program Name	Level	Agency	Website
Sustainable Forest Incentive Act (SFIA)	State	Dept. of Revenue MN DNR	<a href="https://www.dnr.state.mn.us/foreststewardship/sfia/index.html">https://www.dnr.state.mn.us/foreststewardship/sfia/index.html</a>
2C Managed Forest Land	State	Dept. of Revenue MN DNR	<a href="https://www.revenue.state.mn.us/sites/default/files/2018-12/fact%20sheet%2012%202c%20Managed%20Forest%20Land.pdf">https://www.revenue.state.mn.us/sites/default/files/2018-12/fact%20sheet%2012%202c%20Managed%20Forest%20Land.pdf</a>
Reinvest in Minnesota (RIM) Reserve Program	State Local	BWSR Local SWCDs	<a href="https://bwsr.state.mn.us/reinvest-minnesota-overview">https://bwsr.state.mn.us/reinvest-minnesota-overview</a>
Master Woodland Owner Program	University	U of MN	<a href="https://mwop.umn.edu/">https://mwop.umn.edu/</a>
Boots On Your Ground	Private	MN Forestry Association	<a href="https://www.minnesotaforestry.org/professional-help/">https://www.minnesotaforestry.org/professional-help/</a>
Call Before You Cut	Private	MN Forestry Association	<a href="https://www.minnesotaforestry.org/minnesota-call-before-you-cut/">https://www.minnesotaforestry.org/minnesota-call-before-you-cut/</a>
MN Women's Woodland Network	Private	MN Women's Woodland Network	<a href="http://www.mnwwn.org/">http://www.mnwwn.org/</a>
My St. Croix Woods	Private	St. Croix River Association	<a href="https://www.mystcroixwoods.org/">https://www.mystcroixwoods.org/</a>