DEPARTMENT OF NATURAL RESOURCES:

Blufflands/Rochester Plateau
Subsection Forest Resource Management Planning

ADDENDUM

High Biodiversity Area Management Plan

West Indian Creek

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Minnesota
DEPARTMENT OF NATURAL RESOURCES

Division of Forestry Planning Document
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This document is on the Internet at http://www.dnr.state.mn.us/forestry/subsection. Information about the Division of Forestry Subsection Resource Management Plan (SFRMP) process can be found at the same web address. This information is available in an alternative format upon request.

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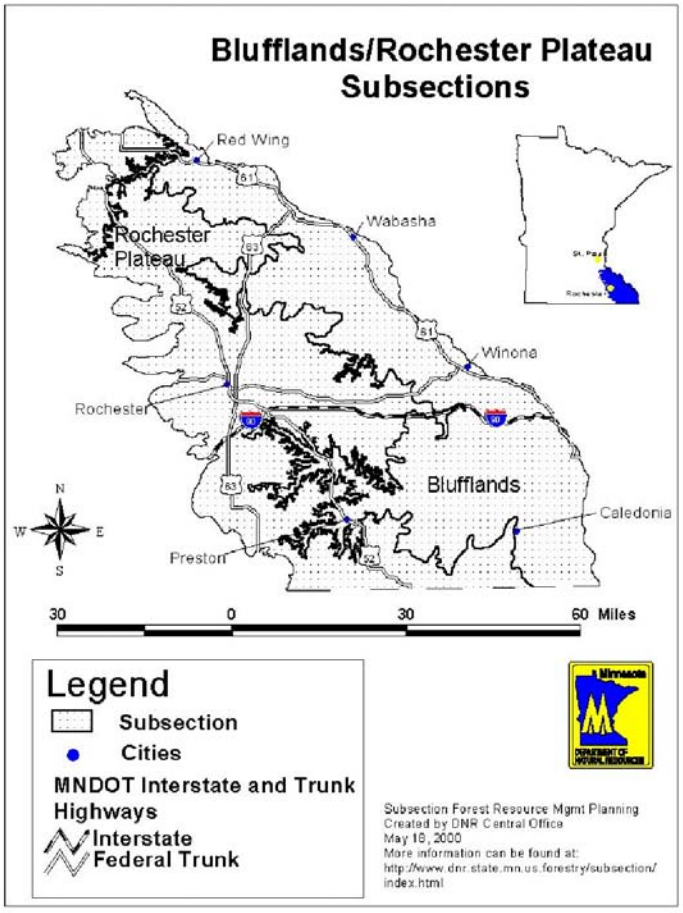
Introduction



This plan will guide management decisions and practices within the Upper West Indian Creek Valley. Upper West Indian Creek Valley is one of 13 areas of high biodiversity identified within the Blufflands and Rochester Plateau subsections.

During the development of the Blufflands/ Rochester Plateau Subsection Forest Resource Management Plan (SFRMP), DNR forest stands within the high biodiversity areas were reserved from treatment pending completion of area-specific management plans. This is the second of such area-specific management plans and is presented as an addendum to Blufflands/Rochester Plateau SFRMP.

SFRMP plans are scheduled for revision every seven years. It is expected that management plans for high biodiversity areas will also be revisited every seven years, or sooner if need be, as part of an adaptive management process.

The Upper West Indian Creek Valley proposed project boundary consists of 950 acres of which 315 acres are Forestry acquired land. Within the overall project boundary, DNR staff have identified a "critical habitat zone" of 460 acres of which 260 are state forest land.

The main body of the area in section 21 was acquired in 1978 with the balance of the land in section 28 being acquired through a land exchange in 1993. Both areas were heavily grazed at the time of acquisition. Photos taken at the time of acquisition are available for viewing at the Lake City DNR Forestry office (651.345.3216).

The management philosophy for the state forest land within this area is the same as for all other forestry lands within the Richard J. Dorer Memorial Hardwood Forest and is based on the landscape level perspective of ecosystems and the species that use those ecosystems. The goals are to maintain natural communities while providing the multiple uses that healthy forest ecosystems can provide.

The resource managers who work in and manage the area developed the management plan for this area cooperatively. It will be an adaptive management plan. As scientific knowledge increases regarding management of ecosystems, plant communities, and individual species, some management recommendations within this plan may change.

The overall goal of writing the plans for this and the other 12 high biodiversity areas is to perpetuate the plant communities that support the unique flora and fauna that make these areas exceptional. Recommendations in this plan are written for state–owned land. Private landowners within the project boundary will be contacted and offered management assistance for their land if they desire it.

Background

The DNR cooperative stand assessment (CSA) forest inventory was completed on all DNR Forestry-administered land within this area in the mid to late 1980's. In addition, the DNR county biological survey (CBS) was completed for Wabasha County in the mid 1990's. The results of these two databases provide information regarding the status of plant communities and distribution of rare species in the West Indian Creek vicinity.

West Indian Creek is a designated trout stream. DNR Fisheries has invested considerable dollars to improve trout habitat on this stream. The stream receives heavy angling pressure.

At the time the land was acquired, there was a known population of Snow Trillium, a state special concern species, present in section 21. For that reason, the site was designated a Natural Heritage Registry Site shortly after its acquisition.

Site Description

"Upper West Indian Creek valley is significant for its large contiguous acreage of native plant communities, the quality of these communities, the presence of rare specialized habitats, and the large concentration of rare plants and animals all occurring in a large, intact, natural landscape setting." (from 5/23/2000 project evaluation by Michael Lee)

West Indian Creek, a designated trout stream, is the areas main natural feature. Within the block of DNR Forestry-administered land there are two forks of the creek. The DNR Division of Fisheries has invested considerable dollars doing stream improvement work. All of the work has been done downstream of the critical habitat zone but falls within the overall proposed project boundary.

Kruger Cave, one of the largest maze caves in the state, is another significant natural feature that occurs within the boundaries of state forest land in this area.

The native plant communities identified in the 6/15/2000 project evaluation are: Maple-basswood forest, Lowland hardwood forest, Mixed hardwood seepage swamp, Algific talus slopes, Moist cliffs, Dry cliffs, Oak forest (mesic subtype), White pine-hardwood forest, and Oak woodland-brushland (native plant community map available upon request). Most of these plant communities correspond with timber types identified on CSA forestry inventory maps (see appendix 1).

More detailed descriptions of these types will be presented in the implementation section of this plan. A list of rare and endangered species that are present in the area is available upon request.

Management History

Following is a summary of forest management practices that have occurred on this unit since it's acquisition in 1978:

1	Timber Sale MBF	1981	30 acres	$3777.30 income
2.	Post sale and TSI	1982	80 acres	$2010.00 expense
3.	Tree planting	1982	25 acres	$1950.11 expense
		2000 walnut		
		2500 ash		

		1500 silver maple		
4.	Release spraying	1982	25 acres	$446.46 expense
5.	Release spraying	1984	25 acres	$359.40 expense
6.	TSI (NH type)	1985	18 acres	$633.96 expense
7.	Timber Trespass	1989	10 acres	$8857.65 income
		30,255 board feet		
8.	TSI (NH type)	1991	20 acres	$590.20 expense
9.	Tree planting	1996	2 acres	$325.25 expense

As evident from the data above, forest management activities have occurred over a high percentage of the state land in this area. Nearly all of this management activity took place prior to completion of the CBS.

Long Range Goals

The long-range management goal for this area is to maintain native plant communities and plant and animal species that reside in the area. This will be done using processes that mimic the disturbances that helped to establish and maintain these communities.

The goals of biodiversity protection, timber management, understory species management, recreation, game and non-game species management, and trout stream management will all be considered in management decisions to achieve this goal. As new research or management techniques become available, they may be incorporated into management practices prescribed in this plan to achieve the long-range goals.

Implementation

Introduction

This section is organized into the major plant communities that occur within the Upper West Indian Creek Valley Area. Management goals have been shown only for state-owned land.

For each plant community a long-term goal has been set. This will be a statement that describes what managers would like the area to look like 50 or more years in the future. In most cases this will be a description of an ideal plant community of the type that is being designated for perpetuation.

Following a description of the plant community a short-term management directive is also provided that describes vegetation management activities that are prescribed over the next seven years to help achieve the long-term management goal. Short-term directives will be addressed at least every seven years when SFMRP plans are completed. Long-term goals will likely remain unchanged.

Management Direction for Native Plant Communities

MAPLE-BASSWOOD FOREST (Southeast Section)

1. DESCRIPTION

Maple-basswood forests are typically mesic to wet-mesic forest on steep north-to east-facing slopes. Sugar maple (*Acer saccharum),* basswood (*Tilia americana*), and red oak (*Quercus rubra)* are the

dominant canopy trees. The maple-basswood forest in the West Indian Creek area has a well-established array of spring ephemerals in the herbaceous layer and supports populations of nine rare species. In the project site evaluation (6/15/2000), Lee states that most of the nine rare plant species along the base and lower slopes of north facing bluffs. Ecological quality of these forest ranges from B to C ranks.

This type consists of 140 acres in the project boundary area (public and privately owned). CSA forest inventory data shows that there are 10 stands totaling 78 acres of this type occurring on state forest land within the project boundary. Ages of dominant or co-dominant trees on the state land range from 47 to 124 years.

2. TYPE AND SITE MANAGEMENT

Past forest management practices in this type on state land have included harvest, a 10 acre timber trespass, a partial cut, release of sugar maple, and removal of boxelder.

Future forest management will be somewhat limited by the steep slopes present for much of this type. Any management done will be done without the construction of permanent roads. It will be done during the dormant season to minimize disturbance to the ground layer of plants.

There are well-defined forest management guidelines for Maple Basswood forests developed by North Central Forest Experiment Station in their Manager's Handbook series. The guidelines call for maintaining trees of all age classes in the stand through selective harvesting.

Research in maple-basswood plant communities in northern Minnesota has indicated that logging in this community may increase invasions of non-native species and impact some spring ephemeral plants. It is currently unclear if this is the case in SE Minnesota. Monitoring plots will be established on various sites throughout Southeastern Minnesota. The plots will study both long term and short-term effects of logging in maple-basswood types in SE Minnesota.

There were four stands that met criteria for harvest selected during the SFRMP process. They are listed below in the short-term directive summary.

Because of the sensitivity of this area, prior to setting up harvest in any of these stands, a team consisting of forestry, wildlife, non-game wildlife, fisheries, and the regional plant ecologist will walk through these stands to determine where harvest is feasible and how to proceed to protect the natural community as a whole.

3. LONG-TERM GOAL

To maintain the maple basswood cover type while retaining a diverse shrub layer and maintaining or increasing rare plants in the herbaceous layer

4. SHORT-TERM DIRECTIVE

Four stands of maple-basswood were identified as meeting the criteria for harvest over the next seven year period in the SFRMP process. (See appendix ___ for location map)

Stand 4-21-109-11 3 acres
Stand 7-21-109-11 2 acres

Stand 8-21-109-11 6 acres
Stand 3-28-109-11 18 acres

Stand 4 and stand 8 in section 21 show little disturbance and will not be logged during this seven year SFRMP. Stand 7 in section 21 and stand 3 in section 28 show more recent disturbance and may be logged using partial harvest techniques.

The regional plant ecologist will set up permanent plots in all four of these types in spring 2002 and monitor populations of spring ephemerals annually.

Monitoring sites will be established in all four stands. This data along with other research being conducted on management of northern hardwood plant communities will be used to help guide future management decisions. The study plan and results of the monitoring are available upon request.

Plots will also be instituted in the area of timber trespass to determine how spring ephemeral populations responded to that significant disturbance.

Forestry staff, the regional plant ecologist and other interested Lake City Area Biodiversity Team members will work together to design skid trails to avoid damaging any sensitive species. Logging will be restricted to winter months to further reduce any impacts to the ground. The timber sale will be set up by the team of area managers.

All maple basswood stands will be monitored for invasion of buckthorn or other non-native species. These will be removed if populations become too high. Boxelder populations will also be monitored and the numbers will be reduced if they threaten to reduce the quality of this natural community.

LOWLAND HARDWOOD FOREST

1. DESCRIPTION

Lowland hardwood forests are typically wet-mesic lowland forests on alluvial soils above the normal flood level in small valleys. The lowland hardwood forest in the West Indian Creek area are interspersed with spring-fed side channels and is a heterogeneous plant community. Basswood, black ash (*Fraxinus nigra),* sugar maple, and rock elm (*Ulmus thomasii)* dominate the canopy. The understory is a diverse array of spring ephemerals early in the year and becomes dominated by wood nettle (*Laportea canadensis)* and cleavers (*Galium aparine)* later into the summer. This area supports a variety of rare species including Goldie's Fern (*Dryopteris goldiana),* and Louisiana Waterthrush (*Seiurus motacilla).* Ecological quality of these forest ranges from AB to C rank.

2. TYPE/SITE MANAGEMENT

The CSA data shows 33 acres as lowland hardwoods with an additional 31 acres that was harvested in 1981 as central hardwoods. The *project evaluation (6/15/00)* by Lee shows 55 acres of lowland hardwoods plus an additional 5 acres of mixed hardwood seepage swamp. The four acres difference in the total may be due to a small section of woods where the trespass occurred being typed as lowland hardwoods by Lee and as northern hardwoods by the CSA forest inventory.

Thirty-nine acres have been designated as old growth. This would correspond with the 33 acres lowland hardwood type shown on CSA forest inventory. The stand age for this type is 101 years. No

harvesting activity will occur in the old growth area.

The remaining lowland hardwood area would be the area that was harvested in 1981 and replanted. This area will continue to be managed for forest biodiversity. To provide maximum habitat for interior bird species, it will continue to be managed as a 31-acre type.

3. LONG-TERM GOAL

To maintain a quality lowland hardwood type while protecting the groundwater seepage springs and herbaceous ground cover in addition to maintaining the minimal shrub layer.

4. SHORT-TERM DIRECTIVE

No management will occur in the designated old growth area.

The remaining area will continue to be managed for forest biodiversity. No harvesting is planned over the next seven years but timber stand improvement (TSI) may be done if needed to keep box elder populations at manageable levels. Future management concerns will be similar to the maple basswood plant community and will be addressed next time this plan is updated. Plots to monitor spring ephemerals should be set up in this type for future reference.

MIXED HARDWOOD SEEPAGE SPRING

1. DESCRIPTION

Mixed Hardwood seepage spring forests are characterized as lowland forest on saturated soil in calcium-rich groundwater seepage areas at the base of slopes. This is a rare community in southeastern Minnesota and occurs on approximately five acres that occupy a seepage area at the base of a north-facing bluff in West Indian Creek along with small pockets of inclusions that occur in the lowland hardwood forest. Black ash, basswood, and bur oak (*Quercus macrocarpa)* dominate the patchy canopy. This community supports large populations of two state threatened species, smooth sheathed-sedge *(Carex laevivaginata), and* false mermaid *(Floerikea proserpinacoides),* and a variety of other rare species. Ecological quality of this forest ranges from B to C rank.

2. LONG-TERM GOAL

To maintain this sensitive natural area.

3. SHORT-TERM DIRECTION

This area falls within the old growth lowland hardwood type and will have no management activities planned on it over the next seven years.

ALGIFIC TALUS SLOPE

1. DESCRIPTION

Algific talus slopes are typically wet-mesic communities on dolomitic talus on steep north-facing

slopes and are restricted to areas continuously cooled by air draining through caves and fissures. These slopes occur in the upper most reaches of the valley of the West Indian Creek area. These slopes support vegetation typical of northern Minnesota. Yellow birch (*Betula alleghaniensis)* occurs as an understory and canopy tree. Other northern species found here include Canada yew (*Taxus canadensis)* and highbush cranberry (*Viburnum trilobum).* The algific talus slope communities are shaded by the canopy of the surrounding forests. Ecological quality of these communities ranges from BC to C rank.

2. LONG-TERM GOAL

To maintain this unique area in an undisturbed condition.

3. SHORT-TERM DIRECTIVE

Prior to any activity in adjacent forest types, the regional plant ecologist will be consulted to clearly define these areas. No activities are planned in the next seven years.

MOIST CLIFFS

1. DESCRIPTION

Moist cliffs are typically moist to wet communities on north- to east-facing dolomite cliffs. Mosses, liverworts, and lichens are common in these communities. In the West Indian Creek area these cliffs are associated with the algific talus slopes and are shaded by a canopy of white pine (*Pinus strobus*).

DRY CLIFFS

1. DESCRIPTION

Dry communities generally occur on south- to west-facing dolomite cliffs. Lichens are common and vascular plants are sparse. In the West Indian Creek area these cliffs occur on the mid to upper slopes in the northern part of the area. The state species of Special Concern, cliff golden rod (*Solidago sciaphila)* occurs on several of the drier cliffs.

2. LONG-TERM GOAL

To protect these cliffs no management activities will occur on them.

3. SHORT-TERM DIRECTIVE

When timber harvest occurs on adjacent stands, the local forester, wildlife manager, fisheries manager, non-game wildlife manager, and regional plant ecologist will meet on site to determine how close to the cliffs management may occur.

OAK FOREST (mesic subtype)

1. DESCRIPTION

Oak Forest (mesic subtype) are typically dry-mesic to mesic forests, often on gradual west and east-facing slopes and broad ridge crests. Dominant canopy trees include red oak and white oak (*Quercus alba).* These communities transition to maple-basswood in wetter areas and oak woodland in drier areas. Understory species include summer-blooming species such as wild geranium (*Galium concinnum)* and elm-leaved goldenrod (*Solidago ulmifolia).*

WHITE PINE-HARDWOOD FOREST (southeast section)

1. DESCRIPTION

White pine-hardwood forests are typically dry to mesic forest on steep slopes, often associated with cliffs and bedrock outcrops. This community occurs on the upper portion of a steep west to northwest-facing slope in the southern portion of the West Indian Creek area. White pines dominate the canopy of this area with deciduous trees in the sub-canopy. The understory is similar to the mesic oak forest in the area.

2. TYPE/SITE MANAGEMENT (Oak Forest and White Pine-Hardwood Forest)

CSA data show 110 acres of oak type in State Forest ownership. 5 acres of this is planted and the balance is natural. The 6/15/200 project evaluation shows 15 acres of White Pine-Hardwood Forest plant community. (southeast section). This is included in the 110 acres of oak that the CSA forest inventory shows.

This native plant community varies in moisture across the site. Areas that are more mesic, have well established maple regeneration, and grade into maple-basswood will be allowed to succeed to the maple-basswood community type. Other areas, such as those in the southern end of the site, that are drier, have invasive species problems, or are not regenerating to maple will be managed to retain oak using various silvicultural techniques.

As with the other hardwood plant communities, research from the DNR as well as other agencies will be used to determine the best management technique to achieve the desired natural community.

CSA data shows oak stand ages to be between 82 and 101 years old. Stands of this age are quite manageable and can be retained as oak fairly easily. Retention of the oak type will be done where it is feasible. There are not too many box elder and elm in the understory or sugar maple in the overstory so management costs to retain oak will not be prohibitive in at least some portions of this plant community.

3. LONG-TERM GOAL (Oak Forest and White Pine-Hardwood Forest)

As oak forest (southeast section) mesic subtype is designated as an S2 natural community, it should be actively managed to ensure its perpetuation.

Manage, where possible, to retain these types as oak types. In areas where white pine is present management will be done to protect and increase the white pine component. In areas where maple-basswood succession is inevitable, the stands will be allowed to succeed. Winter logging will be done to minimize ground disturbance.

4. SHORT-TERM DIRECTIVE (Oak Forest and White Pine-Hardwood Forest)

No oak stands were identified in the SFRMP process for harvesting over the next seven years. Because of the advancing stand ages, an addition to the annual timber harvest plan may need to be looked at while the probability of regenerating oak remains high.

The oak old growth stand should be re-evaluated.

OAK WOODLAND-BRUSHLAND (southeast section)

1. DESCRIPTION

Oak woodland-brushland are typically dry woodlands on south to west-facing slopes in the northern part and as small inclusions in the oak forests of the West Indian Creek area. Short open grown bur oak and northern pin oak (*Quercus ellopsoidalis)* dominate the canopy. Where the canopy is open, species typical of dry bluff prairies are found in the understory. In areas where the shrub layer is dense the understory herbaceous diversity is typically low.

2. TYPE/SITE MANAGEMENT

This is another type that would have been identified as an oak type in the CSA forest inventory. Canopy cover is 50-70% and is dominated by pin oak, black oak and bur oak. Paper birch, red oak, and red cedar are also present.

3. LONG-TERM GOAL

Manage to encourage regeneration of oak savanna and oak woodland-brushland communities through use of understory treatments, fire and logging.

4. SHORT-TERM DIRECTIVE

Manage to encourage restoration of oak savanna communities through the use of prescribed fire and/or understory treatments. No stands were identified for treatment in the next seven years. Burning may be done when staff and weather conditions permit. Selective logging will be done in combination with better quality oak stands with the objective of restoring examples of the oak savanna natural community

ASPEN

1. DESCRIPTION

Aspen was not recognized as a natural community in Mike Lee's site write-up.

2. TYPE/SITE MANAGEMENT

Two stands of aspen were identified in CSA forest inventory. Type 7 in section 28 was selected for treatment during the SFRMP process.

Markets are now available for traditionally non-marketable species. This will give managers an opportunity to utilize current wood fiber on the land and to regenerate the site to better quality aspen, possibly mixed with more mast species.

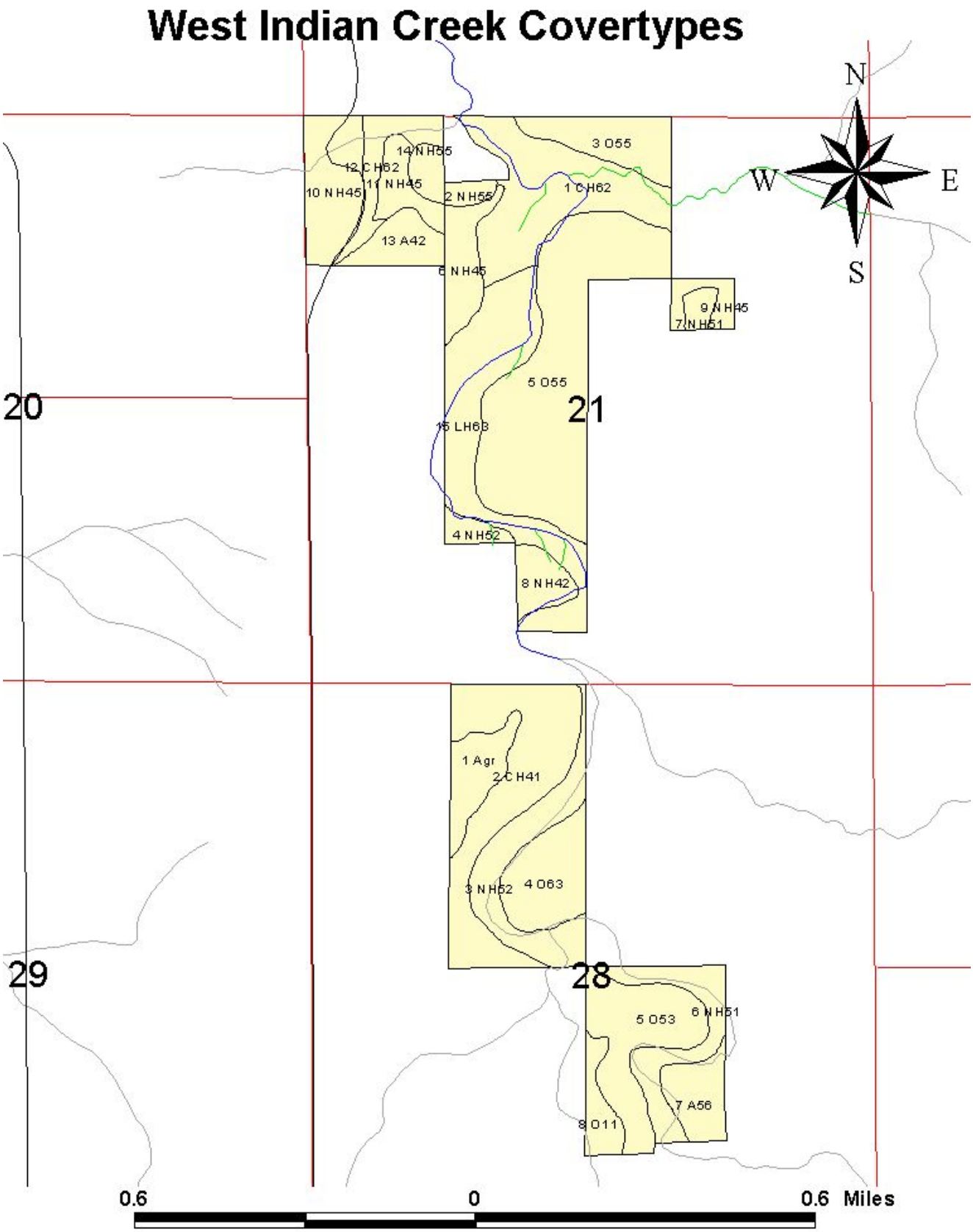
3. LONG-TERM GOAL

To maintain aspen stands for biological diversity in the area and to provide wildlife habitat.

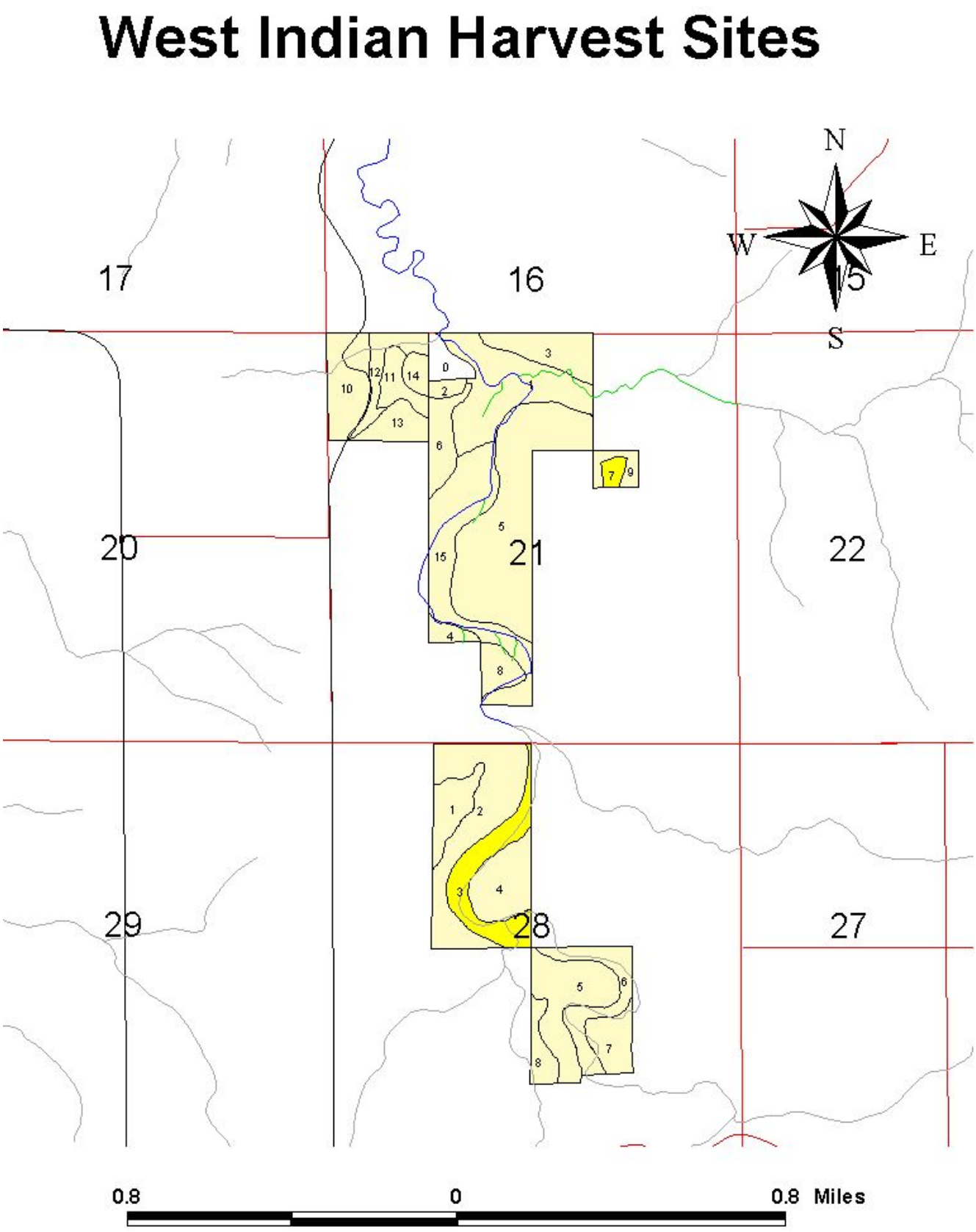
4. SHORT-TERM DIRECTIVE

Stand 7 in section 28 (7 acres) should be harvested within the next seven years. Because of the amount of old growth the West Indian Creek area contains, having areas of regeneration will be critical to healthy wildlife populations. Harvesting will be done to increase populations of mast trees.

Appendix 1. CSA Forest Inventory Type Map



Appendix 2. Types Scheduled for Treatment Over Next Seven Years



Appendix 3. Glossary

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

Adaptive Management: A dynamic management approach in which the effects of treatments and decisions are continually monitored and used, along with research results, to modify management on a continuing basis to ensure that objectives are being met.

Age Class: An interval into which the age range of trees or forest stands is divided for classification or use.

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).

All-aged: Describes an uneven-aged stand that represents all ages or age classes from seedlings to mature trees.

Annual Plan Additions: Stands on state-administered forest lands that are proposed to be or have been added to the Annual Timber Harvest Plan. These adjustments to annual harvest plans are needed at times because of new information from field surveys, changes in resource conditions, or nearby harvest activities. They are additional stands recommended by field personnel for timber harvest during the current fiscal year (July 1 - June 30).

Annual Timber Harvest Plan: A work plan that consists of the pool of stands, each tagged with a management prescription (e.g., regeneration harvest, re-inventory, etc.) that will be field-checked in a given year.

Biodiversity: 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.

Canopy: The foliar cover in a forest stand consisting of one or several layers.

Cooperative Stand Assessment (CSA): The forest stand mapping and information system used by the Minnesota Department of Natural Resources to inventory the approximately 5 million acres (7800 sq. mi.) owned and administered by the state.

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.

Disturbance: Any relatively discrete event that disrupts the stand structure and/or changes resource availability or the physical environment.

Dominant trees: Trees that are in the upper layer of the forest canopy.

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.

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).

Forest Stand: A contiguous group of trees similar in age, species composition, and structure, and growing on a site of similar quality, to be a distinguishable forest unit. A forest is comprised of many stands. A **pure stand** is composed of essentially a single species, such as a red pine plantation. A **mixed stand** is composed of a mixture of species, such as a northern hardwood stand consisting of maple, birch, basswood, and oak.

Habitat: Place where an animal or plant normally lives, often characterized by a dominant plant form or physical characteristic

High Biodiversity Sites: High biodiversity sites are sites with significant populations of federal or state-listed species; or large or high-quality examples of native plant communities; or larger areas in the ECS subsection composed of relatively undisturbed native plant communities.

High quality native plant community: A community that has experienced relatively little human disturbance, has few exotic species, and supports the appropriate mix of native plant species for that community. A high quality native plant community may be unique or have a limited occurrence in the subsection, have a known association with rare species, or an exemplary representative of the native plant community diversity prior to European settlement.

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

Mast: Fruits or nuts used as a food source by wildlife. **Hard mast** is the fruit or nuts of trees such as oaks. **Soft mast** includes the fruits and berries of dogwood, viburnums, elderberry, grape, raspberry, and blackberry

Mesic: Moderately moist.

Native plant community: A group of native plants that interact with each other and the surrounding environment in ways not greatly altered by humans or by introduced plant or animal species. These groups of native plants form recognizable units, such as an oak forest, a prairie, or a marsh, that tend to repeat across the landscape and over time. The classification of native plant communities currently used by MCBS is described in: *Minnesota's native vegetation: a key to natural communities* version 1.5. 1993. Biological Report No. 20. Minnesota Department of Natural Resources Natural Heritage Program. 111 p.

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).*

Overstory: The tallest trees in a stand of trees.

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

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.

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

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

Release: Freeing a tree, or group of trees, from competition that is overtopping or closely surrounding it.

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

Shade tolerance: Relative ability of a tree species to reproduce and grow under shade; the capacity to withstand low light intensities due to shading by surrounding vegetation. Tolerant species are tolerant of shade, intolerant species require full sunlight.

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

Skid trail: An access route established for hauling logs from the point of harvest to a collection point.

Slope: A measure of change in surface value over distance, expressed in degrees or as a percentage (e.g., a rise of 2 feet over a distance of 100 feet describes a 2 percent slope.

Spring ephemerals: Short-lived plants that occur primarily in the spring.

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).

Subsection Forest Resource Management Plans (SFRMP): A DNR plan for vegetation management on forest lands administered by DNR Forestry and Wildlife that uses ECS subsections as the basic unit of delineation. Initial focus will be 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.

Succession: The gradual supplanting of one plant community by another, e.g., a cover-type of one species gradually changing over to a different cover-type over time.

Thinning: A silvicultural treatment made to reduce the density of trees within a forest stand primarily to

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

Timber stand improvement (TSI): A practice in which the quality of a residual forest stand is improved by removing less desirable trees, vines, and occasionally, large shrubs to achieve the desired stocking of the best quality trees or to improve the reproduction, composition, structure, condition, and volume growth of a stand.

Tolerant: A plant cable of becoming established and growing beneath overtopping vegetation. A tree or seedling capable of growing in shaded conditions.

Underplant: The planting of seedlings under an existing canopy or overstory.

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

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

Uneven-aged management: Forest management that results in forest stands comprised of intermingling trees or small groups, which have three or more distinct age-classes. Best suited for ***shade tolerant*** species.