Chapter 2. SFRMP Issues

2.1 Introduction

How SFRMP issues were identified
Subsection Forest Resources Management Plan (SFRMP) teams used assessment information[9], Minnesota Department of Natural Resources (DNR) policies and guidelines, local knowledge, existing plans, and public input to identify the final issues relevant to the scope of this plan. The subsection team began with a common set of issues developed from previous SFRMPs. These common SFRMP issues were refined and supplemented based on subsection-specific conditions and considerations and public comments.

Issue definition
A SFRMP issue is a natural resource-related concern or conflict that is directly affected by, or directly affects decisions about the management of vegetation on lands administered by the Minnesota DNR Divisions of Forestry, Fish and Wildlife, and Unit of Trails and Waterways-Parks and Trails Division. Relevant issues were defined by current, anticipated, or desired forest vegetation conditions and trends, threats to forest vegetation, and vegetation management opportunities. The key factor in determining the importance of issues for a SFRMP is whether the issue can be addressed in whole or substantial part by vegetation management decisions on DNR-administered lands.

Issues that cannot be addressed in whole or substantial part by vegetation management decisions on DNR-administered lands are outside the scope of the SFRMP process. For example, a SFRMP will not address recreation trails system issues or planning. However, aesthetic concerns along existing recreational trail corridors can be a consideration in determining forest stand management direction in these areas. Another example is the plan establishes wildlife habitat goals (e.g., amount of various cover types and age-class distribution) but not goals for wildlife population levels.

[9] Minnesota DNR, September 2009, *Preliminary Issues and Assessment*, Subsection Forest Resource Management Plan.

Issues
Issue topics A through N were identified as preliminary issues in the first steps of the SFRMP process. No new issues were added as a result of comments received during the public review period that was completed in October 2009.

2.2 Preliminary Issues

A. Desired age-class distribution

A1. What are the desired age-class and growth-stage distributions of forest types across the landscape?

Adequate representation of all age classes and growth stages provides a supply of wildlife habitats, timber products, and ecological values over time. A forest with a variety of stand ages and growth stages provides habitat suitable for more species and has greater potential to provide a sustainable yield of timber. A diverse forest is healthier and more resilient to widespread insect and disease outbreaks than a less diverse forest.

There are many likely consequences of managing a non-diverse forest (without adequate representation of all age classes and growth stages). A forest with too few age classes and growth stages risks epidemic insect and disease outbreaks, loss of species with age-specific habitat requirements, and the loss of forest-wide diversity. Such a forest would also provide a boom-and-bust scenario for forest industries that depend on an even supply of particular forest products over time.

A2. What are the appropriate amount, kind, and location of old forests?

Old forest, in the context of this issue, is defined as stands that exceed their normal rotation age. The distribution of old forest represents age classes and growth stages of forest beyond the normal rotation age of each cover type. Old forest provides the necessary structural complexity and habitats for many animal species, plant species, and communities that is sometimes lost in simplified, younger forests. Old forest can also reduce timber quantity and quality for some types of forest products over time by holding timber longer between harvests. Therefore, a balance is needed that considers necessary habitats, forest diversity, and timber productivity levels.

The likely consequences of managing a forest without age classes beyond the normal rotation age are:

1) The loss of individuals or populations of species with old forest-specific habitat requirements;
2) Loss of diversity;
3) Reduced recreational and economic opportunities associated with the loss of old forest values such as rare bird watching, fall color viewing, mushroom gathering, and camping;
4) Reduced ecological services associated with old forest values such as maintaining water quality, natural disturbance regimes, rare species habitat, and biodiversity; and,
5) The loss of potential for some larger-diameter forest products.

The likely consequences of managing a forest with an overabundance of age classes beyond the normal rotation age are:

1) Reduction in populations of species that use younger forest habitats;
2) Decreased timber productivity; and,
3) Decreased timber quality and quantity due to decay, disease, windthrow, and mortality.

A3. What are the appropriate amount, kind, and location of young, early successional forests?

The 0-30 age group of aspen and balm of Gilead cover types represent the majority of young, early successional forests in the context of this issue. Young, early successional forest is an issue because it provides important habitat for numerous plant and animal species that must be represented on the landscape in order to maintain an overall healthy biodiversity. Many species depend on dense young forests to provide an ample food supply, offer protection from predators, and shelter from weather. In addition, the patch size and spatial distribution of this young forest on the landscape is an important element of habitat quality. Approximately half of the aspen cover types are currently in the 0-30 age group. These cover types are currently below the long-term acreage goals of young, early successional forest in the Aspen Parklands.

If an appropriate amount of early successional forest does not occur on the landscape, the likely consequences of not addressing this issue could include:

1) Reduced populations of important game species, particularly ruffed grouse, deer, and American woodcock;
2) Reduced recreational hunting opportunities associated with these game species;
3) Reduction in some associated songbird populations;
4) Loss of social, economic, and ecological value of these species; and,
5) Loss of traditional use of the natural resources associated with these young forests (e.g., berry picking, bird watching, etc.).

A4. What are the desired growth-stage distributions of brushland and prairie types across the landscape?

Providing sufficient differing growth stages of brushland and prairie communities can provide diverse wildlife habitats, biomass, and many other ecological values over time. A landscape with a variety of brushland and prairie growth stages provides habitat suitable for more species and has greater potential to provide a sustainable yield of biomass.

There are consequences of not managing for a diverse brushland or prairie community (without adequate representation growth stages). Brushland and prairie landscapes with few growth stages risk loss of plant and animal species richness.

B. Desired mix of vegetative composition, structure, spatial arrangement, growth stages, and Native Plant Communities (NPCs)

B1. What is the appropriate composition and spatial arrangement of vegetation across the landscape?

Existing landscape patterns are a consequence of large scale conversion of native prairie to agriculture. Remaining native habitat has also been influenced by a lack of fire. In addition, natural drainage patterns and wetland function across the landscape have been altered by ditching. This has resulted in:

1) Loss of habitat connectivity at the landscape scale;
2) System simplification;
3) Fewer available habitat complexes and associations which has reduced habitat for native animals and plants.

The likely consequences of not addressing this issue are:

1) Increased isolation of wildlife and plant populations;
2) Species loss or decline;
3) Reduced resilience of ecosystems to climate change and disturbance events;
4) Increase in exotic and undesirable species;
5) Increase of certain populations to undesirable levels resulting in negative impacts; and,
6) Continued loss of ecologically intact landscapes.

B2. What is the appropriate composition, structure, and spatial arrangement of vegetation at the stand scale?

Composition, structure, and growth stages of prairie, brushland and forest stands once demonstrated diversity and complexity, but stands in this Subsection have experienced a simplification and movement away from ecological diversity. Lost representation of stand diversity, growth stages, and native plant community distributions impacts sustainability goals for biodiversity, ecosystem health, and productivity across the Subsection.

The likely consequences of not addressing this issue are:

1) Further loss or decline of native species;
2) Reduced ability to adapt to climate change;
3) Increase in exotic and undesirable species; and,
4) Continued loss of ecologically intact representative areas.

B3. How will we ensure restoration, maintenance, and enhancement of important native plant species and communities that have declined?

Many important plant species and communities are rare in this Subsection. The rarity of these species and communities is partially due to land development, ditching, harvest activity, insect infestations, disease, drought, and herbivory. Thus, many communities have

lost their ability to regenerate and sustain important species due to their loss of composition, structure, and function.

Certain native plant communities in this Subsection are outstanding for their uniqueness, species diversity, known association with rare species, and limited occurrence. Examples of these types of communities are floodplain forest, lowland hardwood forest, calcareous fens, wet prairie, dry oak savannah, and a variety of oak woodlands. Like with individual species, these native plant communities have declined due to land development, fragmentation, harvest, insect infestations, disease, drought, and herbivory. The result is that these native plant communities are no longer self-sustaining and are simplified in composition, structure, and function.

The likely consequences of not addressing these issues are:

1) Loss of native species diversity;
2) Loss of habitat for rare species;
3) Loss of native plant community composition, structure, and function;
4) Loss of associated wildlife to these communities;
5) Simplified stands and landscapes;
6) Loss of examples of high-quality intact native plant communities used as controls to compare and monitor the effects of management; and,
7) Loss of the social, economic, and ecological values of these species and communities

B4. How can intensive management of plant communities be applied to retain some of the characteristics of natural disturbance events?

Catastrophic disturbance events can have significant impacts on native plant communities, depending upon their scale, frequency, and intensity. Management activities applied across a large area or too frequently, can result in the fragmentation and loss of individual species, species assemblages, and whole communities. Communities that are adapted to large scale disturbances, such as fire dependant ones, are often impacted in a manner that results in a mosaic of undisturbed islands where plants and animals persist during the disturbance event and initial regeneration period. If a disturbance occurs on too frequent a cycle, these refugia can also be lost. Management activities which are quite intensive often result in native plant community simplification and fragmentation at the stand and landscape scale. These “stand replacing events” such as brush removal or forest clear-cuts, may cause ground disturbance from heavy equipment. Regeneration and stand maintenance activities often disturb the sites further, and if herbicides are applied, additional plant species and structural diversity is lost. This activity may result in disruption of the soil profile, soil compaction, loss of native herbaceous species diversity, reduced structural complexity, and an increase in exotic and aggressive plants.

The likely consequences of not addressing this issue are increasing:

1) Simplification of stand and landscape communities;
2) Fragmentation of high-quality native plant communities, and,
3) Loss and fragmentation of habitat for associated wildlife species, and,
4) Increased disturbance by invasive species.

B5. How do we limit fragmentation and maintain connectivity between habitats?

Management activities such as timber harvest, road and trail construction and maintenance, constructed drainage systems, and a private land base dominated by agriculture have all contributed to a reduction in patch size, composition, structure, and age, as well as a disruption in hydrologic connectivity. These changes represent a movement away from biodiversity and sustainability, and natural resources able to produce a range of products. This fragmentation results in a loss of the viable economic base for timber and recreational resources, habitats lost, and reductions in the populations associated with those habitats. Lost connectivity results in the loss of ecologically intact landscapes and the ability of the landscape to be self-sustaining.

The likely consequences of not addressing this issue are:

1) A loss in economic livelihood;
2) A reduction in patch size;
3) Reduced connectivity between habitats; and,
4) Reduced resilience to catastrophic events.

Addressing hydrologic connectivity is beyond the scope of this plan.

C. Riparian and aquatic areas

C1. How can we address the impacts of vegetation management on permanent wetlands, wetland inclusions, and seasonal ponds?

Site-level considerations and guidelines that are routinely applied without considering site-specific conditions may not be adequate to protect aquatic resources such as permanent wetlands, wetland inclusions, and seasonal ponds. These ecosystems may be negatively impacted if one relies strictly on existing guidelines without considering specific conditions associated with a given site (such as soils, topography, hydrology, past management, existing vegetation, and desired vegetation). These impacts include loss or degradation of these communities and loss of associated wildlife. There is also a concern for impacts to permanent wetlands from management activities in adjacent upland stands, such as skid trails along the wetland-upland boundary.

C2. What vegetative management activities will be used within the riparian management zone (RMZ)?

Vegetation and habitat management activities carried out within the RMZ can affect the functions associated with riparian areas. RMZs are areas of special concern along streams, lakes, and open water wetlands and are among the most important and diverse parts of ecosystems. They are intended to retain a relatively continuous forest, shrub, or herbaceous cover for the protection and maintenance of aquatic and wildlife habitat, aesthetics, recreation, and forest products.

This Subsection contains a variety of landscape types including forested, brushland, and open land. The vegetation composition and structure that is managed or retained within the RMZ should be appropriate to the native plant community and landscape type. Reserve areas of trees and snags may not be appropriate in many brushland or open land landscapes.

In this Subsection, rivers and streams commonly meander extensively, lakes are rare, and flooding can be a problem due to level topography. Failure to protect riparian zone functions may cause negative impacts to water quality, fisheries, and wildlife habitat.

C3. How can we address cumulative vegetation management impacts on aquatic resources at a watershed/sub-watershed level?

Management activities may affect the hydrology within any specific watershed or sub-watershed because the amount and type of vegetative cover greatly influences the rate of hydrologic change. Failure to consider the cumulative impacts to aquatic resources could result in increased run-off and stream bank erosion, more conspicuous run-off events, less stable flows, reduction or destruction of habitat for aquatic organisms, reduced water availability, and poorer water quality.

Issue is beyond the scope of this plan: This issue cannot be addressed in whole or a substantial part by vegetation management decisions on DNR-administered lands. State-administered lands comprise 12 percent of the land ownership in the Subsection. To fully evaluate cumulative impacts within watersheds, timber and biomass harvest, forest development, agricultural development, ditches, and land-use changes (current conditions and planned) need to be evaluated across all ownerships. The DNR will continue to be a participant/cooperator in watershed management planning efforts.

D. Access to state land

D1. How can we plan for access to the stands identified for management during the 10-year plan period, while protecting and minimizing the negative impacts that access development or use may have on other vegetative resources?

Permanent and temporary access routes are necessary to effectively manage sites identified for management during the 10-year planning period. These access routes will have both positive and negative attributes. They provide access for management activities, fire response, and recreation. However, the construction, maintenance, rehabilitation and abandonment of access routes has costs, i.e., land disturbance, loss of acres from the timber land base, increase in the spread of exotic species and undesirable native plants and animals, potential conflicts with adjacent private landowners, potential for user-developed trails, degradation of water quality, disruption of natural and constructed drainage systems, destruction of fish habitat, forest fragmentation, and road densities greater than needed.

The likely consequence of not addressing this issue is the lost opportunity to have a well thought-out management access plan to minimize the negative attributes.

E. Biological diversity

E1. How can management of stands within larger areas of biodiversity significance be adapted to enhance biodiversity and native plant community composition, structure, and function?

Larger areas with biodiversity significance provide reference areas to improve our understanding of these ecosystems and help us evaluate the effects of vegetation management on biodiversity. These areas present opportunities for large patch

management and the restoration of native plant communities and ecosystems. These areas have great potential for addressing forest certification, landscape level goals, and biodiversity-related goals of the Minnesota DNR and other landowners.

The likely consequences of not addressing this issue are:

1) Degradation of existing biodiversity and ecosystem function;
2) Loss of opportunities for maintaining or restoring patch relationships that are ecologically based (e.g., based on natural disturbance processes, wildlife habitat connectivity, and wildlife-habitat associations);
3) Loss of landscape level habitat connectivity, and,
4) Inability to maintain state forest certification.

E2. How do we plan to retain and restore within-stand structural complexity on actively managed lands?

The Aspen Parklands ecological subsection contains many dynamic ecosystems. Management of both public and private lands has altered the rate and direction of natural change. Some current practices tend to reduce within-stand structural complexity and diversity of species, both directly and indirectly (through substrate modification). The concern is that structure is impacted directly by management where the management objectives simplify structure by using silvicultural practices where biological legacies, existing woody debris, and finer organics are removed and micro-topographic features are reduced or eliminated. Reduced within-stand structural complexity reduces the overall biodiversity in these stands.

The likely consequences of not addressing this issue are:

1) Loss of composition and vertical structure necessary to sustain native plant and animal species;
2) Loss of regeneration sites for some species;
3) Loss of native plant community composition, structure, and function; and,
4) Loss of associated wildlife.

F. Wildlife habitat

F1. How do we manage vegetation to provide for the habitat needs of game and nongame species?

Both game and nongame wildlife species depend on healthy ecosystems. Legal mandates, the expectations of stakeholders, and the Minnesota DNR internal policies require the ecological integrity of these ecosystems to be maintained and enhanced. A variety of advocacy groups exist today that also work towards protecting wildlife species and the natural resources. Practical reasons to maintain ecological integrity include:

1) The economic vitality of forest, biomass, and tourism industries;
2) The maintenance of recreational opportunities for the public;
3) The health of wildlife species and their populations;
4) Public health; and,
5) The control of insects and disease.

Loss of important habitat in our forests, brushlands and prairies is a reason for concern for a number of wildlife species. *Tomorrow's Habitat for the Wild and Rare: An Action Plan for Minnesota Wildlife*[10] lists 85 Species in Greatest Conservation Need (SGCN) that are known or predicted to occur within the Subsection. Of these, 30 species are federal or state endangered, threatened, or of special concern. A wide range of factors from timber and biomass harvest practices, to development have an effect on wildlife species and the ecosystems in which they inhabit. Best Management Practices (BMPs) can and should be implemented to minimize impacts that could have a negative effect on habitat.

The likely consequences of not addressing this issue are:

1) Loss of wildlife habitat;
2) Loss or reduction of species associated with declining habitats;
3) Economic losses resulting from a decline in recreational activity associated with wildlife viewing and hunting; and,
4) Social losses because of a decline in enjoyment associated with wildlife viewing, hunting, and aesthetics.

G. Forest, brushland, and prairie health

G1. How do we address the impacts of forest insects and disease?

Forest insects and disease organisms influence forest ecosystem dynamics. These influences have both positive and negative impacts. What is perceived to be beneficial from one perspective may be viewed as detrimental from another. Insects and diseases can reduce timber production and lumber grade and increase fire hazard. Alternatively, they can promote diversity of tree species, direct forest development and forest structure and generate dead wood, which provides important habitat and soil nutrients.

Native insects and disease organisms are usually well-balanced with their respective host trees. A few trees may die while the insect and disease populations are sustained; basically, they co-exist. Where climate or management has altered the natural disturbance regime (e.g., prolonged drought or fire control), insects and disease organisms can 'take over' the role of fire in a fire-dependent forest. An example would be the increasing impact of jack pine budworm on senescing jack pine stands in the absence of wildfires, which normally would have caused stand re-initiation.

Non-native insect and disease organisms have not co-evolved with our tree species, so they can cause a range of problems once they become established. Effects can range from non-discernable effects to widespread and rapid tree mortality, depending on the organisms involved. For example, Dutch elm disease spread through Minnesota in the 1970's killing elms and altering riparian ecosystems. Emerald ash borer is our newest immigrant. Emerald ash borer, from eastern Asia, is expected to cause 99.99% mortality of black and green ash and cause deforestation of our Wet Forest sites as it spreads into our forests. We anticipate that it will take more than a few decades to accomplish the infestation of the 950 million ash trees that are currently growing in Minnesota.

[10] Minnesota Department of Natural Resources, 2006.*Tomorrow's Habitat for the Wild and Rare: An Action Plan for Minnesota Wildlife*, Comprehensive Wildlife Conservation Strategy. Division of Water & Ecological Resources, Minnesota Department of Natural Resources.

G2. How will we respond to threats by invasive plant species in the Subsection?

Natural resource managers are concerned about invasive species that are introduced and become established on public land. Aggressive native plants and exotic invasive species have the potential to displace native plants, reduce habitat, change soil chemistry, and disrupt natural community functions. Increased use of public lands results in greater risk for the transport of invasive species of all kinds. Failure to address the invasive species issue could result in permanent changes to native communities.

G3. How will natural disturbances be considered in vegetative management decisions?

Catastrophic events such as floods, large-scale insect infestations, and fire may have a negative impact on the amount of forest and brushland "harvested" during the 10-year stand treatment time frame. They may also impact the long-term desired future condition of the subsection plan. It is difficult to predict when and where a catastrophic event may occur. However, failure to consider the possibility of natural disturbances occurring within the Subsection, and what management practices might be allowed within these disturbed areas, could result in a loss of marketable materials available for sale and an increase in fire danger in the vicinity of the catastrophic event.

G4. How do we manage vegetation to reduce negative animal impacts?

Vegetation management directly affects wildlife populations. Undesirable increases in certain wildlife populations can have adverse impacts on plant communities resulting from the browsing and grazing by wildlife (herbivory), crop depredation, nuisance animal complaints, potential spread of wildlife disease (e.g., Bovine Tuberculosis), and possible human health issues.

Resource managers should coordinate management activities to benefit wildlife populations while protecting native plant communities and forest health. A good example is to avoid planting white cedar seedlings adjacent to an area being managed for a deer wintering area or vice versa.

The likely consequences of not addressing this issue are:

1) Loss of public support for management programs;
2) Undesirable competition between species;
3) Increased exotic and undesirable species;
4) An increase in populations to the point they become a nuisance;
5) Negative economic impacts; and,
6) Negative impacts to native plant communities.

G5. How should vegetation management respond to global climate change within the planning period?

Canadian and Hadley climate model predictions for the Midwest (*MacCracken et al. 2000*[11]) suggest that the average temperature will have increased two to five degrees Fahrenheit by 2030 and five to twelve degrees Fahrenheit by 2095. In Minnesota uncertainty exists on how or if average annual precipitation will change. Seasonal precipitation patterns are predicted to change, however, with precipitation concentrated in fewer storm events leading to longer more intense droughts (*MNDNR-Section of Wildlife*[12]*, Galatowitsch et al. 2009*[13]).

Scientists believe that predicted climate change will affect the size, frequency, and intensity of disturbances and stresses such as fires, windstorms (blowdown), and droughts. It will affect the survivorship of existing plant and animal species and the distributions of plants and animals. Increases in the reproductive capability and survivorship of exotic species, insect pests, and pathogens will impact forests and wildlife.

Large-scale mortality due to a combination of drought stress, blowdown, fire, and insect damage is likely, and has led to rapid and widespread forest change in the past (*Galatowitsch et al. 2009*). Moisture is the most important limiting factor and fire is the most important disturbance in the forest-prairie transition zone which includes the Aspen Parklands Subsection. Certain tree species, such as black spruce, balsam fir, and birch will respond negatively to increased soil warming, decreased soil moisture, etc.

Because Minnesota is situated on the prairie-forest border, summer precipitation is already marginal for forests on some soils. Many contemporary forests are projected to become savannas, with forests restricted to cooler, wetter refuges, such as silty soils, lowlands, and north slopes. Although many of Minnesota's existing grasslands may persist, a gradual shift in composition to drier species (e.g. mesic prairie to dry prairie; dry oak savannah to prairie) will likely occur in response to higher temperatures and evapotranspiration (*Galatowitsch et al. 2009*). Carbon sequestration by forests and wetlands may be affected.

The likely consequences of not addressing this issue are:

1) Acceleration and exacerbation of climate change impacts to all communities in this landscape;
2) Lost opportunity to begin directing management toward mitigating and slowing the effect of climate change on the most vulnerable species and native plant communities;
3) Species and community losses; and,
4) Reduced habitat for native wildlife and plants.

[11] MacCracken M., E. Barron, D. Easterling, B. Felzer, and T. Karl. 2000. Scenarios for climate variability and change: the potential consequences of climate variability and change for the United States. U.S. Global Change Research Program, National Science Foundation, Washington, D.C.

[12] Climate Change: Preliminary Assessment for the Section of Wildlife of the Minnesota Department of Natural Resources

[13] Galatowitsch, S., et al. Regional climate change adaptation strategies for biodiversity conservation in a midcontinental region of North America. Biol. Conserv. (2009), doi:10.1016/j.biocon.2009.03.030

H. Timber and biomass harvest level

H1. What is the appropriate timber and biomass harvest level considering resource sustainability?

One of the primary outcomes of this plan is to develop a treatment plan to identify harvest levels on State lands in the Subsection for the next 10 years. The harvest level will determine the future age-class distribution of the forested lands. Some of the cover types in the planning area have a pronounced age-class imbalance and the harvest level will be the primary tool used to correct this imbalance.

Establishing an appropriate harvest level will require the successful integration of economic, social, and ecological factors. Timber and biomass harvest provides forest products for society and jobs for those in forest products related industries. Managing for sustainability requires that timber and biomass harvests be balanced with other forest benefits. Sustainably managed forests can support a healthy and competitive forest products industry, provide the diversity of habitats needed by plant and animal species, maintain water quality, and provide a wide array of recreational opportunities.

The likely consequences of not addressing harvest levels and age-class imbalance are:

1) An unpredictable supply of timber and biomass for industry;
2) Reduced diversity of habitat for use and occupation by native plants and animals; and,
3) Continued age-class imbalance across the landscape.

H2. How can we ensure adequate and sustainable “non-timber products” for the future?

Demand for most of these types of products has been light in this Subsection but it could be expected to increase. Collecting and using non-timber products (e.g., sweetgrass, beargrass and sage in the prairies, red willow and diamond willow in the brushlands, birch bark in the forests) is a traditional harvest practice for some groups and can provide welcome diversification for local economies. Non-timber products are particularly important in areas where employment opportunities in the mainstream economy are limited. They help support local individuals, families, and cottage industries in an expanding worldwide market.

The consequences of not addressing this issue include:

1) The possible unsustainable harvest of these resources;
2) Inadvertent harvest of rare species;
3) Adverse impacts to wildlife habitat and native plant communities; and,
4) Loss of economic diversity in rural areas

I. Timber and biomass productivity

I1. How can we increase timber productivity in forested areas?

State Wildlife lands, which make up the abundance of acreage in this Subsection, are managed exclusively for the benefit of wildlife species. Treatment is widely varied and may include timber harvest, prescribed burning or biomass harvest, but it must be primarily for the benefit of wildlife.

State Forestry lands are required to be managed for multiple uses and therefore must find compromises and middle ground between many demands on the forested land base. Society continues to demand forest products, but also demands wildlife habitat, recreational opportunities, watershed protection and scenic views from the same public land base. Although demand for forest products has increased, some lands previously available for harvest are now being managed with reduced emphasis on timber production. Increasing timber productivity on selected forest lands is a way to continue to provide consistent levels of harvest and improved timber quality from fewer acres.

Managing state forest lands without regard for increasing timber productivity would result in further decline in timber quality and quantity as older age classes lose merchantable volume to decay and mortality. This would:

1) Negatively impact logging and forest products industries as stumpage rates increased due to the reduction of useable volumes;
2) Increase procurement, chemical, and waste management costs for the forest products industries, reducing their competitiveness in the global marketplace; and,
3) Require harvesting additional acreage of over-mature timber to produce constant levels of merchantable timber volume.

I2. How can sustainable biomass production be integrated into vegetation management?

Biomass harvesting has recently become a potential source of sustainable energy. Both grass and woody biomass resources on state owned lands can be a viable alternatives to petroleum based fuels. Land managers within the Subsection have been maintaining open land and brushland communities by shearing, mowing, and prescribed burning. Biomass harvesting can be another tool to accomplish this maintenance.

Recently, a Brushland Biomass Harvesting chapter was added to the *MFRC Site-Level Guidelines* due to increased demand for woody biomass and recent biomass power legislation (M.S. § 216B.2424). These guidelines are best management practices for sustainably managing woody biomass harvest and are intended to be a tool for maintaining brushland and open land habitat on public and private lands.

The level of biomass production from lowland and upland brushland sites is directly correlated with the nutrient levels in the soils. The biomass guidelines state that high production sites have the greatest nutrient loss, but also have the greatest nutrient capital and highest rates of nutrient replenishment—lost nutrients are usually replaced within 10

years. Less productive sites have lower nutrient replenishment rates, but biomass and thus nutrient removal are also lower.

These guidelines should not replace site-specific evaluations of woody biomass management techniques. Ongoing research will continue to quantify and qualify what level of woody biomass harvest is sustainable without adversely impacting these brushland and open land habitat.

J. Visual quality

J1. How will vegetation management activities minimize impacts on visual quality?

Scenic beauty, or visual quality, is one primary reason people choose to spend their recreation and vacation time in or near forested areas. Where forested communities lie adjacent to recreational trails, lakes, waterways, or near public roads and highways there is a need to consider the impacts of management activities to the visual quality of the site after the management activity has been completed.

Failure to be sensitive to the visual quality impacts of any management activity may result in a negative experience for the vacationing or recreating public visiting forested areas of the state. These negative experiences may result in increased regulations for most future forest management activities.

K. Statutory & policy requirements

K1. How will resource managers achieve desired results and continue to uphold various state and federal statutes?

Divisions within the DNR must follow legal mandates, while fulfilling both Department and Division missions and policies. For example, State Trust Fund lands must generate income for various trust accounts under state law, and timber sales are currently the primary tool for this process. Wildlife habitat management and preservation, not timber sales, is the mandate for acquired Wildlife Management Area (WMA) lands. Another related example is the DNR commitment to certified sustainable forests, which requires the department to manage all MCBS sites of outstanding biodiversity significance as well as some areas of high biodiversity significance as High Conservation Value Forest (HCVF), which may require practices that reduce the near term income derived from timber harvest on these lands.

The vegetation management planning process will take administrative land status, relevant statutes, and departmental policies into consideration during the planning process. Failure to follow these mandates and legislative intent may be a violation of federal or state law.

L. Cultural resources

L1. How will cultural resources be protected during vegetation management activities?

Cultural resources are scarce, non-renewable features that provide physical links to our past. A cultural resource is an archaeological site, cemetery, historic structure, historic area, or traditional use area that is of cultural or scientific value. Cultural resources are remaining

evidence of past human activities. To be considered important, a cultural resource generally has to be at least 50 years old. A cultural resource may be the archaeological remains of a 2,000- year-old Indian village, an abandoned logging camp, a portage trail, a cemetery, food gathering sites (e.g. ricing camps and sugarbushes), or a pioneer homestead. They often possess spiritual, traditional, scientific, and educational values and should be treated as assets rather than liabilities. In addition to federal and state laws that protect certain types of cultural resources, the *MFRC Site-Level Guidelines* provide information and recommendations to assist private and public land managers in taking responsible actions when cultural resources are encountered. Failure to follow the recommended management practices to protect cultural resources could result in loss of or damage to the cultural resource.

M. Rare features

M1. How will rare plants and animals, their habitats, and other rare features be protected?

Protecting rare features on state lands is a key component of ensuring species, community, and forest-level biodiversity in this subsection. In 1978, the Minnesota Legislature, through the Legislative Committee on Minnesota Resources (LCMR), established requirements for the DNR (Natural Heritage Program) to collect and disseminate data on Minnesota's significant biological resources. Information on the distribution, abundance, and ecology of rare species, their habitats, and other rare features gathered by the DNR (Minnesota County Biological Survey and Natural Heritage and Nongame Research Program) provides much of the basis for determining the status of rare features in the state. The DNR acknowledges this leadership role in advocating for maintaining habitat for rare features throughout the state, regardless of ownership, and in protecting and providing habitat for rare and threatened species on state lands (DNR - Directions 2000).

In 2006, the DNR published *Tomorrow's Habitat for the Wild and Rare: an Action Plan for Minnesota Wildlife* which was established as part of the U.S. Fish and Wildlife Service's State Wildlife Grants program established by Congress in 2001. This plan identifies 292 "Species of Greatest Conservation Need" (SGCN) and their habitats by ecological subsection in Minnesota. A SGCN is defined as: "a wildlife species whose populations are rare, declining, or vulnerable in Minnesota". The Aspen Parklands Subsection is home to 85 SGCN and their habitats. The DNR is committed to protection of the species and habitats outlined in the plan.

Minnesota's List of Endangered, Threatened, and Special Concern Species (ETS List) was created in 1984 and was last revised in 2007. Created under Minnesota's Endangered and Threatened Species Statute, the ETS List draws attention to species that are at greatest risk of extinction within the state; special regulations are applied to those listed as endangered or threatened. By alerting resource managers and the public to species in jeopardy, activities can be reviewed and prioritized to help preserve the diversity and abundance of Minnesota's flora and fauna.

Note that the federal Endangered Species Act of 1973, as amended (16 USC 1531 _1544) requires the U.S. Department of the Interior to identify species as endangered or threatened according to a separate set of definitions, and imposes a separate set of restrictions

pertaining to those species. Three species on the federal list are known to occur in the Subsection. They are the western prairie-fringed orchid, gray wolf, and piping plover.

The possible consequences of not addressing this issue are:

1) Rare species extirpation at the local and state level;
2) Rare species declines leading to status changes, (e.g., special concern species changed to a threatened or endangered species);
3) Rare species habitat loss or degradation; and,
4) Loss of biodiversity at the species (genetic), community, and/or landscape level.

N. Other jurisdictions

N1. How will vegetation management objectives be coordinated across ownership boundaries?

Vegetation management across ownership boundaries must be a multidisciplinary collaboration to ensure that we reach landscape level ecological benefits. Fragmentation of habitat across the landscape as a result of split ownership boundaries may pose a challenge as we attempt to meet future management objectives in the Aspen Parklands. Through coordination with adjoining landowners we can minimize the reduction of patch sizes and maintain or enhance wildlife corridors between existing habitat patches. This effort will involve communication and organization between local government units, private landowners, federal and state agencies, and local conservation organizations.

A number of conservation plans and agendas currently exist that include goals towards meeting this challenge. *A Strategic Conservation Agenda 2009-2013* outlines goals and management directions for the Minnesota Department of Natural Resources (DNR) as we move forward with integrated management of private and public lands. *Tomorrow's Habitat for the Wild and Rare: An Action Plan for Minnesota Wildlife* was written in cooperation with a wide range of conservation organizations in Minnesota. The documents' main focus is on Minnesota's animal "species in greatest conservation need" (SGCN) and suggests priority conservation actions for these species within the Subsection. The *Conservation Area Plan for the Tallgrass Aspen Parkland* is a document produced by The Nature Conservancy (TNC) as a collection of expertise from both Canada and Minnesota. These examples highlight only a few of the available tools that will help guide the effort for coordinated vegetation management across the Subsection.

The likely consequences of not addressing this issue are:

1) Continued fragmentation of habitat;
2) Loss or reduction of species and their populations as a result of fragmentation;
3) Reduced recreational hunting opportunities for the public;
4) Reduction in patch sizes across the landscape;
5) Potential loss of species diversity as patch size decreases; and,
6) Delayed habitat work because of lack of coordination.

2.3 From Issues to General Direction Statements (GDSs) and Strategies

Table 2.1a provides a linkage between the issues described in Chapter 2 and the associated GDSs and their strategies in Chapter 3.

Table 2.3a. General Direction Statements Generated from SFRMP Issues.

Major Category (from Chapter 3 of draft plan)	Issues	General Direction Statement(s) that address the issue(s)
	B1. What is the appropriate composition and spatial arrangement of vegetation across the landscape?	**1A.** Old forest is located primarily along riparian areas and traditionally forested areas in the eastern portion of the Subsection.
	B2. What is the appropriate composition, structure, and spatial arrangement of vegetation at the stand scale?	**1B.** Species in greatest conservation need and key habitats are maintained or enhanced in the Subsection.
	B3. How will we ensure restoration, maintenance, and enhancement of important native plant species and communities that have declined?	**1C.** Vegetation composition will be managed according to ecological classifications to more closely reflect vegetation that developed under natural disturbance regimes.
	B4. How can intensive management of plant communities be applied to retain some of the characteristics of natural disturbance events?	**1D.** Patch management will maintain or enhance existing large patches and increase the average patch size over time while considering natural spatial patterns.
	B5. How do we limit fragmentation and maintain connectivity between habitats?	**1E.** Rare native plant communities are protected, maintained, or enhanced.
	M1. How will rare plants and animals, their habitats, and other rare features be protected.	**1F.** Maintain or enhance biodiversity on MCBS sites of biodiversity significance.

		2C. Native Plant Communities will be managed to include representation of all historically occurring growth stages.
Major Category (from Chapter 3 of draft plan)	**Issues**	**General Direction Statement(s) that address the issue(s)**
3.1 Biological diversity, forest composition, and spatial distribution (cont.)		**3A.** Species, age, and structural diversity within stands will be representative of the native plant community and growth stage.
3.2 Age-class Distribution	**A1.** What are the desired age-class and growth-stage distributions of forest types across the landscape? **A2.** What is the appropriate amount, kind, and location of old forests? **A3.** What is the appropriate amount, kind, and location of young, early successional forests? **E1.** How can management of stands within larger areas of biodiversity significance be adapted to enhance biodiversity and native plant community composition, structure, and function?	**1A.** Old forest is located primarily along riparian areas and traditionally forested areas in the eastern portion of the Subsection. **1E.** Rare native plant communities are protected, maintained, or enhanced. **2D.** Young, early-successional forest will be represented as it historically occurred. **3A.** Species, age, and structural diversity within stands will be representative of the native plant community and growth stage.
3.3 Within-stand Composition and Structure	**E2.** How do we plan to retain and restore within-stand structural complexity on actively managed lands?	**3A.** Species, age, and structural diversity within stands will be representative of the native plant community and growth stage.
3.4 Timber & Biomass Productivity	**I1.** How can we increase timber productivity in forested areas?	**4A.** Timber and biomass productivity is increased.

3.5 Harvest Levels	**H1.** What is the appropriate timber and biomass harvest level considering resource sustainability? **H2.** How can we ensure adequate and sustainable "non-timber products" for the future?	**5A.** Treatment levels move cover types toward the desired age-class structure. **5B.** Harvest of non-timber products will be managed to maintain biodiversity and sustainability.
Major Category (from Chapter 3 of draft plan)	**Issues**	**General Direction Statement(s) that address the issue(s)**
3.6 Wildlife Habitat	**C1.** How can we address the impacts of vegetation management on permanent wetlands, wetland inclusions, and seasonal ponds? **F1.** How do we manage vegetation to provide for the habitat needs of game and nongame species?	**1B.** Species in greatest conservation need and key habitats are maintained or enhanced in the Subsection. **6A.** Vegetation will be managed at multiple scales to provide habitat for nongame species. **6B.** Vegetation will be managed at multiple scales to provide habitat for game species. **7B.** Vegetation management will protect or enhance wetlands.
3.7 Riparian and Aquatic Areas	**C2.** What vegetative management activities will be used within the riparian management zone (RMZ)? **C3.** How can we address cumulative vegetation management impacts on aquatic resources at a watershed/sub-watershed level?	**7A.** Vegetation management will protect or enhance riparian areas **7B.** Vegetation management will protect or enhance wetlands. *Cumulative impacts are beyond the scope of this SFRMP.*
3.8 Pests, Pathogens, Exotic Species, and Climate Change	**G1.** How do we address the impacts of forest insects and disease?	**8A**. Limit damage to native plant communities from insects, disease and invasive species to acceptable levels where feasible.

	G2. How will we respond to threats by invasive plant species in the Subsection? **G4.** How do we manage vegetation to reduce negative animal impacts?	**8B**. Minimize the negative impacts caused by wildlife on forest communities. **8C.** Vegetation will be managed to promote resilient communities in an attempt to mitigate the effects of global climate change.
Major Category (from Chapter 3 of draft plan)	**Issues**	**General Direction Statement(s) that address the issue(s)**
3.8 Pests, Pathogens, Exotic Species, and Climate Change (cont.)	**G5.** How should vegetation management respond to global climate change within the planning period?	
3.9 Visual Quality	**J1.** How will vegetation management activities minimize impacts on visual quality?	**9A.** Minimize management impacts on visual quality in sensitive areas.
3.10 Access to State Land	**D1.** How can we plan for access to the stands identified for management during the 10-year plan period, while protecting and minimizing the negative impacts that access development or use may have on other vegetative resources?	**10A.** Access routes are well planned and minimize new construction.
3.11 Cultural Resources	**L1.** How will cultural resources be protected during vegetation management activities?	**11A.** Cultural Resources will be protected.
3.12 Natural Disturbance Events	**G3.** How will natural disturbances be considered in vegetative management decisions?	**12A.** Natural disturbance events will be promptly evaluated to determine the management needed to address their impacts.
3.13 Other Jurisdictions	**N1.** How will vegetation management objectives be coordinated across ownership boundaries?	**13A.** Vegetation management will be coordinated across ownership boundaries.