Chapter 2. SFRMP Issues

2.1 How SFRMP Issues Were Identified

SFRMP teams used assessment information[1], 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.

2.2 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 Division of Forestry and Section of Wildlife. 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 substantially by vegetation management decisions on DNR-administered lands.

Issues that *cannot be addressed* in whole or substantially by vegetation management decisions on DNR-administered lands *are considered to be outside the scope of the SFRMP process*. For example, a SFRMP will not address recreational 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.

2.3 Preliminary Issues

Issue topics A through K, below, were identified as "Preliminary Issues" in the first step of the SFRMP process (*Preliminary Issues and Assessment document*).

Preliminary Issue Areas:

A. Desired age-class distribution
B. Forest composition, structure, spatial arrangement, growth stages, and plant community descriptions
C. Riparian and aquatic areas
D. Access to state lands
E. Biological diversity, native plant communities (NPCs), and structural complexity
F. Wildlife habitat
G. Managing forest impacts
H. Sustainable harvest levels
I. Timber quantity and timber quality
J. Visual quality
K. Vegetative management consistent with other statutes

From these Preliminary Issue Areas, revised and more focused Issues evolved based on public comment and continued team discussions. Identified below are the revised and more focused issues. Discussion and analysis of these more focused issues, general direction statements (GDSs), desired future forest composition (DFFCs) and strategies follows in Chapter 3.

[1] Minn. DNR, August 2006, *Chippewa Plains – Pine Moraines and Outwash Plains Preliminary Issues and Assessment*, Subsection Forest Resource Management Plan.

A. Desired Age-Class Distribution (from *Preliminary Issue and Assessment document*)

A1. What are the desired age-class and growth-stage distribution of forest types across the landscape? (revised and focused Issue)

Adequate representation of all age classes and growth stages provides a stable supply of wildlife habitats, timber products, and ecological values over time. This diversity of age classes and growth stages is important to wildlife, recreation, the forest products industry, and the local economies that depend on them. A diverse forest is healthier and more resilient to widespread insect and disease outbreaks than a less diverse forest. Therefore, a balance is needed that considers necessary habitats, forest diversity, and timber productivity levels.

Planning for desired future amounts of old forest, as well as young forests, will be a part of treatment level considerations identified in this plan, to ensure that forest of all age-classes is represented in adequate quantities and distribution in both subsections. The long-term goal is to narrow the peaks and valleys in annual harvest levels to provide a relatively stable supply of timber from state lands (i.e. balanced age-class distribution). Treatment levels may vary above or below the sustainable level until the age-classes are balanced. Adjustments will be made in some decades to reduce these variations. Moving toward, and eventually maintaining a balanced age-class distribution will ensure that old forest, as well as young forests, will exist on the landscape over time.

A2. What is the appropriate amount, type and distribution of old forest? (revised and focused Issue)

In the context of this Issue, old forest is defined as stands that exceed their normal rotation age. In most even-age managed cover types, with the exception of red pine, there is currently a surplus of acres beyond the normal and maximum rotation ages. . Old forest attributes provide diversity and necessary habitats for a variety of animal and plant species and communities. Conifer and mast tree species will be mature enough to provide winter cover and mast. Sites will contain producers of seeds/fruits/nuts used by wildlife. In some cases, it is believed that old forest can also reduce timber quantity and quality for forest products over time by holding timber longer between harvests and allowing more decay, windthrow, and mortality. Therefore, a balance is needed that considers necessary habitats, forest diversity, and timber productivity levels. Some old forest characteristics can be provided through uneven-aged management strategies.

A3. What is the appropriate amount, type and distribution of young, early successional forest? (revised and focused Issue)

The 0-30 age group of aspen, balm of Gilead, birch, and jack pine cover types represents young, early successional forest in the context of this Issue.

Maintaining acreage of young, early successional forest is an issue because it provides important habitat for several plant and animal species that must be represented on the landscape to maintain overall biodiversity. Plant, game, and nongame species associated with young, early successional forest are important to a significant number of state forest land user groups. Some species depend on dense young forests to provide cover from predation and provide an ample supply of foods. In addition, the patch size and spatial distribution of this young forest on the landscape as recommended in the CP-PMOP Plan is an important element of habitat quality.

If an appropriate amount of young, early successional forest does not occur in the landscape, the likely consequences of *not* addressing this issue are: 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) reductions 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).

B. Forest Composition, Structure, Spatial Arrangement, Growth Stages, and Plant Community Distributions (from *Preliminary Issues and Assessment document*)

B1. What is the appropriate forest composition at the landscape level and how will the important tree species that have declined, be restored? (revised and focused Issue)

Over time forest composition in these subsections has been changed and simplified, (e.g., mature, diverse pine stands were harvested and replaced by early successional and less diverse forest types such as aspen and birch). Tree species showing a significant increase since the mid-1800s are ash, aspen, basswood, red maple, sugar maple, and balsam fir. Tree species showing a significant decline are white pine, jack pine, white spruce, red pine, and tamarack. Current vegetation management often does not replicate the characteristics of natural disturbance events and tends to favor regeneration of certain forest types. This process may not always be consistent with ecological classifications.

The likely consequences of *not* addressing this issue are: 1) loss of wildlife habitat 2) loss or reduction of wildlife and plant species associated with declining habitats 3) increase in exotic and undesirable species 4) increase in populations of desirable species to the point where they reach undesirable levels 5) dominance of a few species (i.e., loss of biodiversity) 6) loss of ecologically intact landscapes and 7) loss of ability to produce a diversity of forest products (e.g., sawtimber, aesthetics, nontimber forest products, recreation, and tourism.

B2. What is the appropriate mix of patch sizes and forest conditions on the landscape considering the impacts of fragmentation? (revised and focused Issue)

Both subsections have experienced dramatic changes in spatial arrangement of forest habitats over time. Since European settlement, harvesting, lack of large natural disturbances, and other factors have greatly reduced forest patch size and increased habitat fragmentation. Forest fragmentation is also a concern as forests are converted to other uses (e.g., residential development), resulting in a loss of ecologically intact landscapes. Existing landscape patterns do not reflect natural disturbance patterns that developed in the past over long periods of time.

The likely consequences of *not* addressing this issue are: 1) loss of native tree species diversity within forest communities, 2) simplified forest stands and landscapes, 3) loss of native plant community composition, structure, and function, 4) loss of associated wildlife to the ecosystem, and 5) loss of the social, economic, and ecological values of these species and the forest communities that sustain them.

B3. How can landscape level connectivity between forest habitats be maintained? (revised and focused Issue)

Both subsections have experienced dramatic changes in spatial arrangement of forest habitats over time. In these subsections, harvesting and other factors such as road and trail construction and forest fragmentation have reduced forest patch size, composition, structure, and age. These changes represent a movement away from biodiversity and a forest able to produce a range of forest products. Ongoing sales of large tracts of land by private landowners can lead to further fragmentation. As a result, habitat connectivity has suffered. Forest fragmentation results in a loss of habitat and loss or reduction in the population of species associated with those habitats. Loss of connectivity will lead to the loss of ecologically intact landscapes and migration corridors for wildlife species.

The likely consequences of *not* addressing this issue are: 1) loss of examples of high-quality intact native plant communities used as controls to compare and monitor the effects of management on biodiversity, 2) continued forest stand and landscape simplification, and 3) loss of habitat for rare species.

B4. What are the appropriate mixes of forest structure and growth stages for state lands within the subsections? (revised and focused Issue)

Forests will be managed for structural and plant species diversity. A forest with a variety of tree species, native plant communities, and age classes provides habitat suitable for more species and has greater potential to provide a sustainable yield of timber. A diverse forest generally is healthier and more resilient than a less diverse forest. The objective is to establish and manage towards landscape goals that provide a diversity of age classes, habitats, patch sizes, and spatial configuration.

Forest stands, with an array of functional structures distributed across the landscape provide for the social, economic, and environmental benefits called for in the management direction for these lands. This includes sustainable timber and revenue, diverse habitats for indigenous species, a landscape level contribution to properly functioning ecosystems, and a forest that provides for recreational opportunities. Structural characteristics include the remnant old growth trees, residual live trees, snags, down woody debris, multi-layered forest canopies, multiple native tree species, gaps, herbs and shrubs within a stand. Retaining large-diameter structures provides micro-sites for seed germination, cavities for nesting and den sites, and important escape cover within stands.

A diversity of stand structures will provide for a broad range of ecosystems and biodiversity, including a wide range of wildlife habitats. The structural components associated with a broad range of stand structures will benefit long-term forest productivity by maintaining the key structural linkages for nutrient cycling and soil structure. A high level of biodiversity should result in a more resilient forest that will be less prone to large-scale damage from environmental or human stresses.

The likely consequences of not addressing this issue are increasing, including: 1) simplification of forest stand and landscape communities, 2) fragmentation of high-quality native plant communities, and 3) loss and fragmentation of habitat for associated wildlife species.

B5. How will native plant communities that historically occurred on the landscape be represented in the future? (revised and focused Issue)

In these two subsections, pre-settlement vegetation included a wide diversity of landscapes including: fire-dependent conifer; mesic hardwood forest; floodplain forest; wet forest; forested rich peatland; acid peatland; open rich peatland; wet meadow/carr; and marsh, river and lakeshore systems. The natural range of expected plant communities within these systems were all present and distributed depending on specific conditions such as topography, geology, soils and water table.

All of these plant communities continue to be represented in the subsections today, but to varying degrees. The two subsections are characterized by deep (200-600') glacial deposits in various glacial remnants. Certain systems, such as the peatland categories are more restricted geographically than others. Found within the subsections are mesic forests of maple-basswood birch, aspen and oak which occur on moraines or till plains, and fire-dependent communities on the sandy outwash plains. In the western portion of the subsections, mixed forests of pine, aspen and birch occur. In the lake plains of the eastern portion of the subsections (Glacial Lakes, Upham and Aitkin) are found expansive areas of acid peatland communities such as black spruce bogs, cedar and black ash. Several river border communities of alder and willow are present along the Mississippi and Leech Lake rivers. Although there have been some declines in the fire-dependent communities (such as those dominated by jack pine), due to disease and lack of fire on the landscape, these plant communities are still intact and well represented on the state lands within these two subsections.

Although all native plant communities continue to be represented, the existing landscape patterns do *not* reflect natural disturbance patterns and the composition, structure, and function of native plant community complexes that have developed historically over long periods of time. This has resulted in challenges with: 1) fragmentation and simplification of forest ecosystems at the landscape scale, 2) lowered availability of habitat complexes and associations, and 3) reduced habitat for native animals and plants.

The likely consequences of *not* addressing this issue are: 1) increasing isolation of wildlife and plant populations, 2) species loss or decline, 3) reduced resilience of forest ecosystems to disturbance events, and 4) increases of certain populations to undesirable levels resulting in negative impacts to forest communities.

C. Riparian and Aquatic Areas (from *Preliminary Issues and Assessment document*)

C1. How can the impacts of forest management on permanent wetlands, wetland inclusions, and seasonal ponds be addressed? (revised and focused issue)

Wetlands include wet forest (dominated by cedar or black ash), forested rich peatlands (including conifer swamps and alder swamps), wet meadow/carr (dominated by sedges or blue-joint grass), and marsh (dominated by cattail or bulrush), and seasonal ponds. These areas are protected using different site-level forest management guidelines than those required for riparian areas adjacent to lakes, streams, and rivers or permanent open water ponds.

Wetland functions include, but are not limited to: groundwater recharge; low flow augmentation; sediment trapping; nutrient assimilation; habitat for wildlife species including invertebrates, amphibians, reptiles, mammals, and birds; fish habitat, including northern pike nurseries; aesthetic values; outdoor recreation; outdoor education; and providing for non-timber forest products.

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.

Relying strictly on existing guidelines without considering specific conditions associated with the site (e.g. soils, topography, hydrology, past management, existing vegetation, and desired vegetation) may negatively impact these ecosystems. 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. How will the appropriate width of the riparian management zone (RMZ) be determined and what vegetation management activities will be allowed to take place? (revised and focused issue)

Riparian areas encompass the transition zone between the terrestrial and aquatic habitats that occur along lakes, streams, and open-water wetlands. A *riparian management zone* (RMZ) is that portion of the riparian area where site conditions and landowner objectives are used to determine management activities that address riparian resource needs. Riparian areas are among the richest habitats in these two subsections. The management of riparian areas can influence water quality, water temperature, erosion rates, and deposition of woody debris in lakes and streams and the overall diversity of wildlife and plant species found in the watershed. Riparian areas provide corridors and connecting links of habitat for plant and wildlife species. Well-managed riparian areas are critical to protect, maintain, or enhance aquatic and wildlife habitats, aesthetics, recreation, and forest products.

Management of riparian areas along streams, lakes, and other lentic habitats is extremely important from a fisheries and wildlife perspective in these two subsections. Riparian areas maintain streambank, channel, and shoreline stability; stream temperature; and water quality. They provide water storage and conservation, nutrient and food input to the aquatic system, in-stream structure of coarse woody debris, a moderated microclimate, and important habitat for many species of fish, mammals, birds, reptiles, amphibians, and insects. Riparian areas are also important for recreation, tourism, forest products, hunting, fishing, biological diversity, and other human values.

These two subsections include many lakes, rivers, and streams. Failure to protect riparian zone functions may cause negative impacts to the water quality, fisheries, and wildlife habitat within the CP and PMOP subsections.

C3. How can the cumulative impacts of forest management on aquatic resources and surface water quality at the watershed and sub-watershed level be addressed? (revised and focused issue)

The current rate and cumulative impacts of land clearing or structural development on non-state administered lands further emphasizes the importance of protecting sensitive riparian areas on state lands.

The cumulative impacts of forestry management activities on aquatic resources must be considered. Forest management activities on all forest lands can 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 adequately assess the cumulative impacts can result in reduction or destruction of habitat for aquatic organisms. Factors which must be considered cumulatively include any vegetative management practice that increases run-off, leads to more conspicuous run-off events and causes stream bank erosion, or causes less stable flows over time. Further, as stand prescriptions are implemented too much or too little woody debris can have destabilizing effects on aquatic communities. Increases in acreage of open areas and young age class timber can increase the rate of overland flow of precipitation, including: snow melt. This increased flow can and destabilize streamflow, leading to erosion of streambanks; increased turbidity; and scouring. These potential impacts must be considered cumulatively as stand prescriptions are planned.

C4. How can adequate safeguards be implemented to provide old forest characteristics, including nesting cavities, in riparian areas? (revised and focused Issue)

Forest vegetation in riparian areas varies greatly in species composition and age. As a result, only some riparian areas can provide old forest habitat.

These old forests provide critical habitat for many organisms. Many bird species, including wood ducks, hooded mergansers, and common goldeneyes use cavities in old trees for nesting. Other wildlife species, including raccoons, porcupines, fishers, northern flying squirrels, pine martens, and red squirrels use cavities found in old trees for shelter. Old forests provide more niches than do young forests, including habitat for fungi, bacteria and lichens, as well as wildlife species.

C5. How can the adverse impacts of forest management activities on aquatic plant species, fisheries, and wildlife habitat be minimized? (revised and focused issue)

Forest management activities have the potential for impacting water quality. Loss of shading can increase water temperatures, impacting aquatic species. Forest activities can also change the oxidative state of aquatic minerals and nutrients. Sedimentation resulting from erosion also carries with it nutrients in excess of normal nutrient budgets and increases water turbidity. Changes in water quality affect species at all trophic levels.

D. Access to State Timberlands (from *Preliminary Issues and Assessment document*)

D1. How can new access to stands identified for management during the 10-year planning period be established without negative impacts on forest resources? (revised and focused Issue)

Access routes are necessary to effectively manage forest stands identified for management during the 10-year plan implementation period. These routes provide access for forest management activities, insect and disease control, fire response, and recreation. However, the development, construction, and maintenance of forest access routes may result in high costs, land disturbance, loss of acres from the timber land base, increase in the spread of exotic species and undesirable native plants and animals, conflicts with adjacent private landowners, potential for user-developed trails, degradation of water quality, destruction of fish and wildlife habitat, forest fragmentation, and road densities greater than needed. The likely consequences of *not* addressing this issue is the lack of a well thought-out forest access plan, potentially leading to negative impacts on forest, wildlife, and ecological resources.

E. Diversity and Complexity (from *Preliminary Issues and Assessment document*)

E1. Within stands, how are biodiversity, native plant community composition and structural complexity maintained or enhanced? (revised and focused Issue)

Diverse forest stands are more resilient than less diverse forest stands. A forest stand with a mix of tree species and ages provides habitat for a wider variety of associated species while providing a diversity of forest products. The net economic, social, and ecological values and functions of most forest stands is related to the composition of trees, shrubs, ground flora, and structural characteristics. Structural characteristics include the sizes of over story trees (diameter and height), the variety of understory vegetation, and their arrangement (scattered or clumped) within the stand. Structural characteristics also include the presence or absence of snags and coarse woody debris. Retaining large-diameter structures provide micro-sites for seed germination, cavities for nesting and den sites, and important escape cover within stands.

F. Wildlife and Plant Species Habitat (from *Preliminary Issues and Assessment document*)

F1. How can habitat for all wildlife and plant species be provided? (revised and focused Issue)

Wildlife species, both game and nongame, and a diversity of plant species are important indicators of the biological health of the forest. These forest characteristics are also important to society for their recreational, economic, and inherent values. Statutes, public expectations, the desires of interest groups, and the DNR internal policies require the consideration of wildlife species in the management of state-administered forestlands. The *DNR Strategic Plan, Directions 2000*, states the "objective is healthy, self-sustaining populations of all native and desirable introduced plant, fish, and wildlife species." This document also states an objective to maintain "populations of fish, wildlife and plant species to sustain recreational opportunities."

These two subsections are particularly important for wildlife-related recreational and economic values due to the abundance of lakes and rivers, and the related seasonal and permanent lake homes that exist as well as the abundance of public forestlands that draw many people to observe wildlife and/or hunt and trap. Recreational enthusiasts and tourists appreciate and seek out opportunities to observe nongame species found in these subsections, including species that are rare elsewhere, such as the timber wolf, bald eagle, trumpeter swan, and red-shouldered hawk. In addition, these subsections draw many hunters and trappers each fall to pursue white-tailed deer, black bear, ruffed grouse, and beaver. Both wildlife observation and hunting/trapping have long-standing traditions and are important to local economies.

Ecologically, there have been historic and more recent changes to these subsections that have affected wildlife species and their habitats, including:

- changes in the abundance of tree species, age structure of the forest, and structural and species diversity;
- loss of larger patches and connections between patches;
- increased habitat fragmentation from roads, trails, and development; and
- alteration of natural fire disturbance.

Both natural events and forest vegetation management through stand treatments, and their location, can potentially impact (negative or positive) wildlife species.

There are 250 wildlife species (14 amphibians, 9 reptiles, 174 birds, and, 53 mammals) that are either permanent residents or regular migrants that utilize habitats in these two subsections. Each species has different habitat requirements, some of which conflict. Accommodating the unique habitat management needs for each species is impossible to accomplish with a single approach across the planning area.

G. Wildlife Populations Management (new issue added as result of public comment on the *Preliminary Issues and Assessment document*)

G1. How can sustainable wildlife populations be provided at levels that are acceptable to user groups?

Wildlife (plants, game, and non-game animals) is important to society, contributes significantly to local and state economies, is critical to functioning ecosystems, and is fundamental to the Department's *Strategic Conservation Agenda and Sustainable Forest Management Act*. Statutes, public expectations and DNR internal policies require the consideration of wildlife in the management of state-administered lands. The *DNR Strategic Plan, Directions 2000* includes an objective of "healthy self-sustaining populations of all native and desirable introduced plant, fish, and wildlife species, especially those species listed as threatened or endangered."
As stated above, there are 250 wildlife species known or predicted to occur within these two subsections. Each species has different temporal and spatial habitat requirements. Individual consideration of management needs for each species to maintain sustainable populations is impossible to accomplish with a single DFFC or criteria within either subsection.

The amount of public forestland in these subsections provides recreational opportunities and supplemental income for many recreational enthusiasts. Ruffed grouse, woodcock, black bear, and white-tailed deer hunting traditions are long-standing and important to local economies.

Ecological changes resulting from residential and commercial development are affecting wildlife and plant communities, species and their habitats. Examples are: changes in the abundance of tree species, age structure of the forest, structural and species diversity, the loss of larger patches and connections between such patches, increased habitat fragmentation from roads and trails and development, and, the alteration of natural fire disturbance events.

Natural disturbance events and planned forest vegetation management can impact (both negative or positive) wildlife abundance and distribution. The likely consequences of *not* addressing wildlife habitat and wildlife populations 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.

H. Harvest Level (from *Preliminary Issues and Assessment document*)

H1. What is the appropriate timber harvest level on state lands with consideration for the sustainability of all forest resources? (revised and focused Issue)

Sustainability is the goal of forest management. It means, meeting the basic needs of the present generation without compromising the ability of forests to meet the needs of future generations.

The timber products industry, including small independent loggers, industrial loggers, locally owned sawmills, small and large wood products industries all help sustain the economy of the state and these

subsections. A dependable and predictable supply of timber products is necessary to maintain these industries.

Demand for most timber types has been increasing. However, due to market fluctuations, over time, some cover types show pronounced age-class imbalances where shortages of certain timber types could occur.

H2. How can an adequate and sustainable supply of non-timber forest products be ensured for the future? (revised and focused Issue)

Demand for non-timber forest products has been increasing. Non-timber forest products are a traditional harvest for some groups and provide diversification of local economies.

Non-timber forest products, also known as Special Forest Products (SFPs), can be categorized into five general areas: decoratives, foods, herbs, medicinals, and specialty items. Non-timber forest products include, but are not limited to: boughs, decorative trees, birch tops, lycopodium, diamond willow, bark, burls, conks, mushrooms, berries, Labrador tea, rose hips and blossoms, seedlings, cones, nuts,, native plant seed, aromatic oil,; and extractives.

Until recently, SFP inventory and monitoring efforts have been minimal, but a significant body of knowledge is emerging to guide research, policy and management of SFPs.

Demand for some of these types of forest products has been light, for others it is increasing. Nontimber forest products (e.g., balsam boughs and decorative trees) provide diversification for local economies and are a traditional harvest for some groups. Nontimber forest 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. For example, the Christmas wreath industry is a multi-million dollar enterprise in Minnesota that relies on thousands of individuals who collect boughs from forest lands.

The consequences of *not* addressing this issue include the possible unsustainable harvest of these resources, adverse impacts to wildlife habitat and native plant communities, and inadvertent harvest of rare species.

I. Timber Quality / Quantity (from *Preliminary Issues and Assessment document*)

I1. How can timber productivity be increased on state lands? (revised and focused Issue)

Within any forest land base, there is a broad continuum of forest management options available to achieve a range of forest management objectives, ranging from reserve prescriptions to intensive management. Along that continuum, the application of various techniques at various levels of intensity to increase timber productivity on DNR-administered timberlands is desirable and appropriate. For example, on the majority of DNR timberlands, generally accepted and proven silvicultural techniques (e.g., harvest at rotation age, intermediate thinning or selective harvesting, reforestation with proper species and stocking levels) can be applied to significantly increase timber productivity (both quality and quantity). This approach is consistent with multiple resource values and the sustainable management of a healthy, diverse forest.

Listed below are statements contained in the DNR *Conservation Agenda* that provide a context for efforts to increase timber productivity on state-administered lands.

- DNR currently increases wood fiber production by regenerating vigorous young forest stands through harvest; planting and seeding harvested and damaged sites; thinning overcrowded stands to improve vigor and reduce competition; monitoring and reducing the impacts of harmful insects, diseases, and exotic species; and matching tree species

and management techniques to individual sites through its Ecological Classification System (ECS).

- The "1994 Generic Environmental Impact Statement on Timber Harvesting and Forest Management in Minnesota" recommended increasing the wood fiber productivity of timberlands to help mitigate the potential effects of current and increased harvest levels. The "2003 Governor's Task Force on the Competitiveness of Minnesota's Primary Forest Products Industry" also listed increasing wood fiber productivity while conserving Minnesota's forestlands as a priority.

J. Visual Quality (from *Preliminary Issues and Assessment document*)

J.1. How will the impacts of forest management activities on visual quality be minimized? (revised and focused Issue)

Scenic beauty is a primary reason people choose to spend their recreation and vacation time in or near forested areas. Where recreational trails, lakes, waterways, public roads, and highways, are located in proximity to working forests, forest management must consider impacts on the visual quality of the site during and after management activities.

The DNR Strategic Plan document *Directions* 2000 states in *Objective 3*.3 that the "DNR will apply the appropriate guidelines so that visual quality is not adversely impacted during forest management activities."

The landscapes of these two subsections are a source of everyday enjoyment for residents, and a foundation for the tourism industry. The public and the Department recognize scenic landscapes as an integral component of the forest resource base. Visual resources are characterized as scenic areas and visual quality objectives.

Four essential planning components, which must be implemented to ensure visual qualities are taken into consideration. They include: stand selection resulting from the SFRMP planning, road layout and design, timber sale layout and design, and the selection of the appropriate silvicultural prescription.

Six of the nine counties in the CP-PMOP subsections have assigned visual sensitivity classifications to roads. These classifications are available to field foresters as stands are site visited and prescriptions planned.

In addition to individual county visual classifications, there are four state and two national scenic byways in the CP-PMOP:

- Lake Country Scenic Byway
- Otter Trail Scenic Byway
- Paul Bunyan Scenic Byway
- Avenue of Pines Scenic Byway
- Great River Road National Scenic Byway
- National Scenic Hwy County 10 (Cass County) and 39 (Beltrami County)

The likely consequences of *not* addressing this issue are visual impacts resulting from vegetative management on state lands that have negative impacts and lead to negative experiences for the public living who are driving, vacationing, and recreating in these subsections.

K. Other Statutes (from *Preliminary Issues and Assessment document*)

K.1 How will foresters and wildlife managers achieve the goals of this plan and remain consistent with state and federal statutes? (revised and focused issue)

The department is obligated and the public expects forest management activities to comply with all applicable statutes, policies and department guidelines as to how forest management is practiced.

Differences in land administration among divisions and the intent of the various land acquisition and land management statues results in higher levels of complexity for land managers who are charged with planning and implementing management for multiple resource purposes. Coordination policy such as the *Interdisciplinary Forest Management Coordination Framework, 2007* provides the Department's framework and process for resolving differences among Divisions concerning the application of management practices and treatments on different classes of DNR lands.

Land managers have a responsibility to be versed in all applicable directives that can affect forest management. Assuring that all applicable directives, and public review and input are considered is accomplished by implementation of multi-disciplinary long range planning through this CP-PMOP Plan. The SFRMP planning teams are charged with coordinating among the divisions and maintaining a working knowledge of other state and federal statues that may affect subsection planning.

L. Cultural Resources (from *Preliminary Issues and Assessment document*)

L1. How will cultural resources be protected during forest management activities on state-administered lands? (revised and focused issue)

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 such as ricing camps and sugar bushes, or a pioneer homestead. Sites may 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 *Voluntary Site-Level Forest Management 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 (from *Preliminary Issues and Assessment document)*

M1. How can rare plants and animals, their habitats, and other rare features be protected? (revised and focused Issue)

Minnesota's list of endangered, threatened, and special concern species created under Minnesota's Endangered and Threatened Species Statute, draws attention to species that are at greatest risk of extinction within the state. By definition, all species occurring on the federal endangered species lists are included on the Minnesota list. Special regulations are then applied to those listed as endangered or

threatened. By alerting resource managers and the public to species in jeopardy, vegetation management can be reviewed and prioritized to help preserve the diversity and abundance of Minnesota's flora and fauna. In addition, the Statewide Heritage Conservation Status Ranks for native plant community types lists, in terms of rarity, the native plant communities found in Minnesota.

The Minnesota County Biological Survey (MCBS) conducts systematic surveys for rare features and sites of biological diversity importance statewide. Six of the counties within these two subsections have MCBS fieldwork completed, although only two counties (Morrison and Mahnomen), are published. Five counties are currently being surveyed, and two counties (Beltrami and Koochiching) have not had any MCBS surveys started. In addition to information on rare plant and animal species as contained in MCBS survey information, some of the known locations of rare features from all counties in the two subsections are included in the Natural Heritage Database.

Appendix O (*Areas of High or Outstanding Biodiversity*) identifies unique resources requiring special consideration during SFRMP planning and during field site visits to plan vegetation management prescriptions.

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 landscape levels.

N. Managing Impacts (from *Preliminary Issues and Assessment document*)

N.1. How should the impacts of forest insects and disease on forest ecosystems be addressed?

Forest insects and disease organisms influence forest ecosystem dynamics. At acceptable levels, they promote diversity of tree species and generate important elements of forest structure that are important as habitat and in nutrient cycling, such as snags and coarse (large) woody debris. However, epidemic populations of insect pests can cause high levels of tree mortality, and can have significant ecological and economic consequences. Native and introduced diseases can cause significant species-specific losses in volume and mortality. Forest management will not attempt to eliminate native insects and diseases or their processes from the landscape, but rather to limit their impact on individual sites to a level that allows goals for timber production, water quality, aesthetics, recreation, wildlife, and biodiversity to be realized.

N.2. How will threats and invasions of exotic species be managed? (revised and focused Issue)

Natural resource managers are concerned about the introduction and establishment of exotic insect, disease, and plant species on public land. Invasion of forest ecosystems by exotic species can cause significant economic losses and expenditures for control. Once they become established, they can destroy or displace native plants and animals, degrade native species habitat, reduce productivity, pollute native gene pools, and disrupt forest ecosystem processes (e.g., hydrological patterns, soil chemistry, moisture-holding capability, susceptibility to erosion, and fire regimes). Examples of exotics with known adverse effects on Minnesota forest resources include: white pine blister rust, gypsy moth, Western larch beetle, exotic earthworms, and, European buckthorn (all of which have been documented in these subsections). There is potential for significant adverse impacts from other species present in these subsections, such as: tansy, spotted knapweed, garlic mustard, purple loosestrife, and leafy spurge. Management will seek to minimize impacts from these species, limit the introduction of new exotic species, and minimize the impact of control measures on vulnerable native species.

Local introductions and spread of harmful exotic plants can happen through many activities. Forest recreation, especially campers, motorized trail riders, and road building activities as management activities and land uses have significant potential as avenues for unintentional introductions of exotic

plants, especially in less developed portions of the subsections. Establishing and promoting practices that minimize these introductions will slow the spread of harmful exotics and reduce the associated losses.

N3 How will natural disturbances such as fire and blow down be considered in forest management decisions? (revised and focused Issue)

Wildfires and windstorms effect change on the landscape. Fire and wind are important naturally occurring events that recycle nutrients, contribute coarse woody debris to the forest floor, and open a forest to sunlight necessary for regeneration.

These events can also leave forests susceptible to damaging insect population buildups. In addition, these events reduce tree merchantability and create barriers to movement of large mammals.

N4. How can vegetation be managed to reduce animal damage, crop depredation, nuisance animals, potential spread of animal disease, and human health impacts (e.g., Lyme disease)? (revised and focused Issue)

High populations of wildlife species such as deer, snowshoe hare, porcupine, beaver, and mice impact forests and plant regeneration through browsing, stem damage, and girdling. Solutions require an understanding of the dynamics of herbivory, seasonal wildlife movements, population structure, population control tools and their effectiveness, and proven repellents or exclusion methods.

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.

N5. How should forest management respond to global climate change within the planning period? (revised and focused issue)

Several climate models (e.g., atmospheric-ocean general circulation models, or AOGCM[1]) in use around the world predict global climate change. The Intergovernmental Panel on Climate Change (IPCC) refers to climate change as any change in climate over time, whether due to natural variability or as a result of human activity. The models agree that average temperatures are increasing and predict more variable changes in precipitation. This global warming will affect forests and wildlife in Minnesota.[2,3]

Scientists believe the predicted climate change will affect the size, frequency, and intensity of disturbances such as fires and windstorms (blowdown). It will affect the survivorship of existing plant and animal species and the distributions of plants and animals. Even at modest levels, independent studies are finding mounting evidence that the current climate change influences plant and animal ranges and behavior[4]. Some plant and animal species may not be able to adapt to the rate of change. Increases in the reproductive capability and survivorship of exotic species, insect pests, and pathogens will impact forests and wildlife. Certain tree species, such as black spruce, balsam fir, birch, and jack pine will respond negatively to increased soil warming and decreased soil moisture. Carbon sequestration by forests and wetlands may be affected because of accelerated decomposition rates.

Most tree species in Minnesota reach the limit of their geographic range somewhere within the boundaries of the forested portion of the state. Predictions have been made on the potential future distributions of trees.[5] There is a need to facilitate species adaptation to change in response to possible rapid climatic changes.

The likely consequences of *not* addressing this issue are 1) acceleration and exacerbation of climate change impacts to forest communities; 2) lost opportunity to begin directing management toward mitigating and slowing the effect of climate change on most vulnerable species and native plant

communities; 3) species and community losses; and, 4) reduced habitat for use and occupation by native wildlife and plants.

2.4 From Preliminary Issues to General Direction Statements, DFFCs, and Strategies

Table 2.1a provides linkage between the Issues described in this chapter and the associated general direction statements, DFFCs, and strategies as discussed in Chapter 3.

[1] IPCC. 2001. Climate Change 2001: The Scientific Basis. Contribution of Working Group I to the Third Assessment Report of the Intergovernmental Panel on Climate Change (IPCC). [Houghton, J.T., et al. (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA. 881pp.

[2] Weflen, K., *The Crossroads of Climate Change*. Minnesota Conservation Volunteer, January-February 2001, Minnesota Department of Natural Resources, St. Paul, MN.

[3] Pastor, John, personal communication at March 13, 2003 SFRMP meeting. Natural Resources Research Institute, University of Minnesota-Duluth.

[4] Root, T. et al., *Fingerprints of Global Warming on Wild Animals and Plants*, Stanford University, Nature- January 2, 2003; and Parmesan, Camille, A Globally Coherent Fingerprint of Climate Change Impacts Across Natural Systems, University of Texas.

[5] Iverson, L, et al. 1999. *An Atlas of Current and Potential Future Distributions of Common Trees of the Eastern United States.* Gen. Tech. Rep. NE-265. Radnor, PA. USDA Forest Service. Northeastern Research Station. 245 p.

Table 2.1a: Focused Issues, General Direction Statements and Strategies Generated from CP-PMOP SFRMP Issues

Primary Issue Area(s)	Focused Issues	CP-PMOP General Direction Statements that address the issue	CP-PMOP Strategies
A. Age Classes	**A1.** What is the desired age-class and growth-stage distribution for forest types across the landscape?	**A1a.** Forest resources will continue to represent multiple age classes, distributed across the landscape. **DFFC Statement** A range of age classes will be implemented, eventually moving the cover types toward a more balanced age structure. Harvest plans will be guided by the established rotation ages and acreage goals for each cover type as identified in the figures from Chapter 4 (Cover type Management Recommendations) that portray the 2017 through 2057 Desired Age-Class Distributions.	**1**. Consider ECS characteristics and other indicators when deciding where old forest and younger age classes are best suited. **2**. Provide representations of desired age-classes through forest composition goals**.** **3**. Develop and apply criteria to identify stands that are over rotation age but can be carried into subsequent 10-year planning periods to reduce age-class imbalances.

Primary Issue Area(s)	Focused Issues	CP-PMOP General Direction Statements that address the issue	CP-PMOP Strategies
	A2. What is the appropriate amount, type, and distribution of old forests?	**A2a.** Forest managed for old forest characteristics will be distributed across the landscape. **DFFC Statement** ERF will be designated in the following percentages: Aspen / balm of Gilead: 13.3 % Balsam Fir 14 Birch 12.5 BSL 23-39 14 +40 11 Jack Pine 13.8 Oak <60 20 >60 13 Red Pine 22.4 Tamarack 13 White Spruce Natural 17 Planted 10	**4**. Designate ERF stands in the amounts and percentages prescribed by the Statewide ERF Work Group. **5**. Distribute ERF stands across the landscape consistent with ERF policy. **6**. Prescribe ERF stands across all age classes to maintain a constant supply of effective ERF. **7**. Manage ERF stands in even-aged cover types to achieve a declining age-class structure from normal rotation age to maximum rotation age. **8**. Maintain the current acreage of designated Old Growth stands. **9**. Manage designated old-growth stands and OFMCs according to individual OFMC plans and DNR *Old Growth Management Guidelines*. **10**. Continue to prescribe ERF stands adjacent to old growth to create OFMCs consistent with DNR OFMC policy. **11**. Prescribe ERF stands in steep areas, inaccessible terrain, riparian areas, habitat areas, travel corridors, visual corridors to achieve desired old forest attributes consistent with DNR OFMC policy. **12**. Consider ECS and range of natural variation (RNV) when identifying sites capable of growing older stands and/or providing winter cover and food sources for wildlife. **13**. Give priority to designating ERF in areas of the landscape that have historically supported the oldest forests and highest proportion of older forests.

Primary Issue Area(s)	Focused Issues	CP-PMOP General Direction Statements that address the issue	CP-PMOP Strategies
	A3. What is the appropriate amount, type, and distribution of young, early successional forest?	**A3a.** Forests managed for young, early-successional stages will be distributed across the landscape. **DFFC Statement** Young forests will be distributed across the subsections in the cover types and percentages as identified in Table 3.1i of Chapter 3.	**14**. Consider ECS characteristics when locating sites capable of supporting young early-successional forests. **15**. Move aspen, balm of Gilead, paper birch, and jack pine cover types toward a balanced age-class structure. **16**. Maintain the amount of the paper birch cover type and the percent of stand component during the 10 planning period. **17**. Decrease the amount of birch as a cover type and stand component during subsequent 10 year planning periods (through five decades). **18**. Include areas of young, early-successional forest, adjacent to areas of extensive or expansive old forest (i.e. ERF, old growth, or OFMC). **19**. Maintain young, early-successional forest, in a variety of patch sizes to provide habitat for associated species.

Primary Issue Area(s)	Focused Issues	CP-PMOP General Direction Statements that address the issue	CP-PMOP Strategies
B. Forest Composition	**B1.** What is the appropriate forest composition at the landscape level and how will the important tree species that have declined, be restored?	**B1.** Forest composition will be managed according to ecological classifications to more closely reflect vegetation that developed under natural disturbance regimes. **DFFC Statement** The DFFC of cover types on the landscape will be as shown on Table 3.2a. The CP-PMOP Plan will move these subsections toward more conifer cover type acreage in upland areas. Cover type increases over the next 10 years will occur in jack pine, white pine, tamarack, and white cedar. Cover type decreases will occur in the aspen, balsam fir, oak, white spruce, northern hardwoods and ash/lowland hardwoods cover types. The cover type acreages of red pine, birch and black spruce lowland will be maintained over the 10-year planning period.	**20**. Consider the *MFRC North Central Landscape Region Plan* forest composition goals and objectives. **21**. Increase mixed forest conditions in most stands in selected cover types **22**. Decrease the acres of aspen, northern hardwoods, oak, ash, and lowland hardwoods to favor conifer cover types. **23**. Increase the acres of the white pine, jack pine, tamarack and northern white cedar cover types. **24**. Increase the acres of the cedar and tamarack cover types on both upland and lowland sites. **25**. Maintain the acres of the black spruce cover type on both upland and lowland sites.

Primary Issue Area(s)	Focused Issues	CP-PMOP General Direction Statements that address the issue	CP-PMOP Strategies
	B2. What is the appropriate mix of patch sizes and forest condition on the landscape considering the impacts of fragmentation?	**B2a**. Minimize forest fragmentation and manage habitat fragmentation to provide an ecologically appropriate variety of patch sizes distributed across the landscape. **DFFC Statement** The average forest patch size on state lands and the patch size within designated forest patches will increase through implementation of this plan.	**26**. Inventory current and potential patches by subsection. **27**. Manage patch sizes to more closely resemble those created under natural disturbance regimes. **28**. Retain and create larger patches, where conditions allow, through state management activities and cooperation with other landowners and forest managers. **29**. When applying silvicultural treatments in an area, give priority to management of whole stands, groups of stands, or entire native plant communities to further patch management. **30**. Coordinate plan implementation with large land managers including the U.S. Forest Service, county land departments, local governments, industrial forest land managers and nonprofit organizations to identify causes and mitigate impacts of fragmentation.
	B3. How can landscape level connectivity between forest habitats be maintained?	**B3a**. Connectivity will be maintained between forest habitats using natural corridors and corridors maintained using forest management practices.	**31**. Identify existing and potential corridors between significant forest areas and assess cooperation opportunities with other landowners. **32**. Maintain or improve important corridors between forest areas. **33**. Give priority to riparian corridors to connect significant forest areas.

Primary Issue Area	Focused Issues	CP-PMOP General Direction Statements that address the issue	CP-PMOP Strategies
	B4. What are the appropriate mixes of forest structure and growth stages for state lands within the subsections?	**B4a**. Representations of all growth stages with vertical and horizontal structural diversity will be distributed across the landscape. **DFFC Statements** All silvicultural prescriptions for uneven aged management cover types will ensure that all tree sizes, ages and species present in the stand at the time of the site level visit will be well represented following the stand treatment. All stands designated for final harvest prescriptions will have 15 or more scattered older live trees per acre or will have clumps that meet or exceed 5% of the sale acreage retained to provide future snags and cavity nesting trees. Prescribed ERF and effective ERF stands will be assessed and if necessary will have silvicultural treatments prescribed to enhance the older forest features. The forest inventory data set will include a field to record the observed growth stage represented at the time of the site level visit. All field personnel will receive the training necessary to consistently assess forest growth stages. Cover type conversions to meet management objectives will use natural regeneration methods when possible and minimal site preparation when artificial regeneration is necessary.	**34**. Retain structural components of old forest, when managing uneven-aged cover types and at the final harvest of even-aged cover types. **35**. Use variable density techniques during intermediate stand treatment and variable retention techniques during final harvest to move selected stands toward desired growth stages and desired within-stand structure. **36**. Develop a methodology to measure growth stages, within-stand age diversity, plant species diversity and vertical/horizontal structure and use this methodology to quantify and monitor changes.

Primary Issue Area	Focused Issues	CP-PMOP General Direction Statements that address the issue	CP-PMOP Strategies
	B5. How will native plant communities that developed under natural disturbance regimes be represented in the future?	**B5a**. The full range of common and uncommon native plant communities and the community viability that developed under natural disturbance regimes will be well represented in the future.	**37**. Use ECS information to assist in determining management direction for stands on state lands. **38**. Protect significant plant communities as they are identified. **39**. Encourage initiation of the Minnesota County Biological Survey in Beltrami, Itasca and Koochiching counties and completion of the survey in all other counties in the CP-PMOP. **40**. Delineate and manage ecologically important lowland conifer sites to enhance their unique characteristics. **41**. Document and manage known locations of NPCs with a statewide rank of Critically Imperiled (S1), or Imperiled (S2) and other plant communities that are rare in the landscape to maintain their ecological integrity. **42**. Identify stands with known locations of Critically Imperiled (S1) or Imperiled (S2) NPCs and monitor those stands during Annual Stand Exam List review.
C. Riparian/ Aquatic Areas	**C1**. How can the impacts of forest management on permanent wetlands, wetland inclusions, and seasonal ponds be addressed?	**C1a**. Forest management on state lands will protect permanent wetlands and seasonal ponds.	**43**. Implement the MFRC *Voluntary Site-level Forest Management Guidelines.* **44**. Protect non-target species from pesticide translocation by following the division's *Pesticide and Pest Control Operational Order #59.* **45**. Reduce negative impacts by selecting and implementing treatments that consider site-specific conditions such as soils, topography, hydrology, past management, existing vegetation and desired vegetation. **46**. Employ measures that maintain normal seasonal flows within wetland inclusions and seasonal ponds. **47**. Use access routes with the least impact when necessary to freeze-down winter crossings.

Primary Issue Area	Focused Issues	CP-PMOP General Direction Statements that address the issue	CP-PMOP Strategies
	C2. How will the appropriate width of the riparian management zone (RMZ) be determined and what vegetation management activities will be allowed to take place?	**C2a**. Management activities will protect or enhance riparian areas.	**48**. Establish widths of RMZs consistent with MFRC *Voluntary Site-level Forest Management Guidelines.* **49**. Field identify the boundaries of RMZs prior to applying treatments. **50**. Maintain a filter strip between aquatic resources and treatment areas consistent with MFRC *Voluntary Site-level Forest Management Guidelines.* **51**. Implement treatments within identified RMZs consistent with *MFRC Voluntary Site-level Forest Management Guidelines*. **52**. Distribute slash evenly within RMZs to adequately protect soils and provide nutrient retention. **53**. Retain a selection of live and dead trees in a variety of sizes and species adequate to provide a mixed age structure when conducting management within an RMZ.
	C3. How can the cumulative impacts to aquatic resources of forest management on a watershed/sub-watershed level be addressed?	**C3a.** The management and administration of state land will minimize negative cumulative impacts on aquatic resources.	**54**. Continue to implement all MFRC *Voluntary Site-level Forest Management Guidelines* directing forest management practices that pose potential impacts to surface waters. **55**. Collect baseline ecological data on surface water quality across the subsection. **56**. Implement ongoing surface water quality monitoring. **57**. Coordinate and cooperate with other landowners and water resource managers to establish guidelines that determine and minimize cumulative impacts. **58**. Implement site level surface water quality monitoring on water that may be impacted by logging activities when there is cause for concern.

Primary Issue Area	Focused Issues	CP-PMOP General Direction Statements that address the issue	CP-PMOP Strategies
	C4. How can adequate safeguards be implemented to provide old-forest characteristics, including nesting cavities, in riparian areas?	**C4a.** Forest management activities will provide old- forest characteristics in defined riparian areas.	**59**. Define where management for old forest is appropriate in riparian areas and implement needed management. **60**. Manage RMZ forest composition to favor uneven-aged management of longer-lived species and extended rotations. **61**. Manage to meet or exceed DNR *Forestry-Wildlife Habitat Management Guidelines'* minimum requirements for cavity nesting trees within RMZs
	C5. How can the adverse impacts of forest management activities on aquatic plant species, fisheries, and wildlife habitat be minimized?	**C5a.** Riparian areas will be managed to provide critical habitat for fish, wildlife, and aquatic plant species.	**62**. Manage stands within RMZs for longer-lived, uneven-aged, mixed-species to provide shade, moderated microclimate, coarse woody debris, microhabitat diversity, resiliency to natural catastrophes, bank stability, nutrient cycling, and carbon and nutrient input. **63**. Manage for long-lived conifers, near water bodies, to discourage beaver related damming and siltation. **64**. Maintain a filter strip between aquatic resources and treatment areas consistent with MFRC *Voluntary Site-level Forest Management Guidelines.* **65**. Follow MFRC *Voluntary Site-level Forest Management Guidelines* regarding approaching water crossings at or near right angles to stream flow to minimize stream bank disturbances and chose construction materials that minimize sediment input and flow obstruction. **66**. Follow MFRC *Voluntary Site-level Forest Management Guidelines* regarding the appropriate timing of water crossing installations to minimize disturbance to fish spawning and migration patterns in areas identified by Fisheries staff. **67**. Leave snag trees, mast sources, and den trees, as directed in DNR *Forestry-Wildlife Habitat Management Guidelines*.

Primary Issue Area	Focused Issues	CP-PMOP General Direction Statements that address the issue	CP-PMOP Strategies
D. Access	**D1.** How can new access to stands identified for management during the 10-year planning period be established without negative impacts on forest resources?	**D1a.** Forest access routes will be well planned, with an increased level of collaboration among federal, county, private and local units of government to share access, minimize new construction, and close access routes no longer needed for forest management purposes.	**68**. Complete a timber access plan. **69**. As Annual Stand Exam Lists are prepared, continue to cooperate with other forest landowners to retain existing access to state land and to coordinate development and maintenance of new access routes across mixed ownerships. **70**. Develop long-term agreements with the United States Forest Service, county land departments, local governments, and private landowners where necessary to gain access to state lands. **71**. Gate, barricade or obliterate all roads constructed during the life of this plan that are not needed for future stand management.
E. Diversity/ Complexity	**E1**. Within stands, how are biodiversity, native plant community composition, and structural complexity maintained or enhanced?	**E1a.** Diversity of plant species within stands will be maintained or increased.	**72**. Maintain the highest soil productivity possible by favoring regeneration and growth of native vegetation and trees using the MFRC *Voluntary Site-level Forest Management Guidelines*. **73**. Utilize harvest systems, methods and sale regulations (e.g., process at stump) that protect advanced regeneration and maintain or improve the patterns, diversity and composition of forest vegetation present in the stand prior to harvest. **74**. Preserve legacy patches and inclusions in stands for seed sources and native plant diversity, as well as to favor regeneration and seeding of native vegetation. **75**. Establish and manage plantations to more closely resemble naturally occurring stands by planting a variety of tree species using variable-density thinning techniques, preserving existing natural vegetation, and preserving advanced regeneration. **76**. Develop methods to measure and monitor the within-stand diversity of plant species, and provide ongoing education and training on these techniques and methods.

Primary Issue Area	Focused Issues	CP-PMOP General Direction Statements that address the issue	CP-PMOP Strategies
		E1b. Age diversity as well as vertical and horizontal structure within-stands will be maintained or increased where compatible with other strategies in this plan.	**77**. Apply techniques during the young forest growth stage that encourages age and vertical/horizontal structure. **78**. Use intermediate treatments to provide age diversity and vertical/horizontal structure in the young forest, transition and mature forest growth stages. **79**. Design final harvest projects in a way that will transmit a legacy of age diversity, and vertical/horizontal structure. **80**. Develop a methodology for measuring growth stages, within stand age diversity, plant species diversity, and vertical/horizontal structure, and use this methodology to quantify and monitor changes.

Primary Issue Area	Focused Issues	CP-PMOP General Direction Statements that address the issue	CP-PMOP Strategies
		E1c. Native plant communities and their ecological functions will be conserved within stands and stand level ecological function will be maintained or improved.	**81**. Design and implement training that allows field staff to identify native plant communities, growth stages, natural disturbance intervals, suitable tree species, and soil operability ratings. **82**. Control non-native invasive species. **83**. Control herbivory through management of wildlife populations, through the use of repellents, fencing or other practices that prove to be effective. **84**. Plan and execute stand maintenance and stand replacement silvicultural activities in a way that corresponds with the natural stand dynamics of the NPC. **85**. Ensure that regenerating tree species are suitable as indicated in the DNR's ECS *Suitability of Tree Species by Native Plant Community* tables. **86**. Provide growing conditions (i.e., sunlight, periodic fire, etc.) that will encourage species diversity in the ground, shrub and sub-canopy layers. **87**. Use soil operability ratings to avoid rutting and compaction when applying stand treatments. **88**. Use herbicide and heavy site preparation methods sparingly, or find alternative techniques. **89**. Restore or mitigate impacts to NPCs following heavy mechanical or chemical site preparation, frequent and/or intense disturbance, or establishment of species that are not native to the NPC. **90**. Meet MFRC *Voluntary Site-level Forest Management Guidelines* (i.e. 5 percent minimum) for retention of large living trees, snags, down logs, tree regeneration, and undisturbed forest floor within stands after harvest.

Primary Issue Area	Focused Issues	CP-PMOP General Direction Statements that address the issue	CP-PMOP Strategies
F. Wildlife Habitat	**F1.** How can habitat for all wildlife and plant species be provided?	**F1a.** Adequate landscape-level habitat and habitat components will be maintained for wildlife and plant species found within these two subsections.	<u>Landscape/Coarse Filter</u> **91**. Provide for both young and old forests distributed across the landscape. **92**. Retain or increase the amount of coniferous forest, coniferous woodland, and mixed coniferous/deciduous forest as a cover type. **93**. Maintain conifers as a component of deciduous cover types where suitable to the site. **94**. Retain or increase white cedar and oak as cover types and components of other cover types as they provide significant wildlife habitat. **95**. Maintain or enhance existing large patches. **96**. Provide a variety of patch sizes across the landscape to reflect patterns produced by natural disturbances. **97**. Provide a balanced age-class structure in cover types managed with even-aged silvicultural systems. **98**. Increase the productivity and maintain the health of even-aged cover types. **99**. Consider impacts to wildlife populations and habitat utilization in the design, management and regulation of forest management access and recreational trail systems. <u>Stand/site-level</u> **100**. Favor and promote robust NPCs and retain elements of biodiversity significance (e.g., variety and abundance of native plants, intact ecological function and intact structure within communities). **101**. Retain the integrity of, or improve riparian areas as habitat for dependant wildlife species and protect seasonal and permanent wetlands.

Primary Issue Area	Focused Issues	CP-PMOP General Direction Statements that address the issue	CP-PMOP Strategies
			102. Maintain the productivity of forest soils to favor regeneration and growth of native vegetation and trees. **103**. Provide for the needs of species that depend on snags, cavity trees, bark foraging sites, and dead downed-woody debris. **104**. Reserve a minimum of 5 percent undisturbed vegetation as legacy or reserve patches in clumps or strips to benefit wildlife, as well as to provide scattered super canopy long lived conifers, legacy or seed trees in each harvest unit. **105**. Provide sufficient amounts of soft and hard mast in a way that will meet the needs of wildlife. **106**. Retain and perpetuate aspen and birch inclusions/clones within all cover types, especially long lived conifer types. **107**. Support research needs concerning the impacts of forest thinning on wildlife species that rely on high stem density regeneration for habitat, particularly in aspen cover types. **108**. Retain conifers and protect conifer regeneration in clumps or strips to provide thermal cover, food, nesting cover, and structural attributes beneficial to wildlife. **109**. Retain or increase white cedar and oak as a stand component. **110**. Use harvest systems, and sale regulations that protect advanced regeneration and maintain or improve patterns, diversity and composition of forest vegetation representative of the stand prior to harvest. **111**. Establish and manage plantations to more closely resemble naturally occurring stands by planting diverse tree species, preserving existing natural vegetation, and preserving advanced regeneration by using variable density thinning techniques, varying stem density, and using less intense methods. **112**. Give consideration to within stand occurrences of species that are endangered, threatened, or of special concern.

Primary Issue Area	Focused Issues	CP-PMOP General Direction Statements that address the issue	CP-PMOP Strategies
			Fine Filter **113**. Designate special management areas for the benefit of wildlife species. **114**. Consider Natural Heritage Program data and other rare species information during development and implementation of both the 10-Year Stand Exam List and Annual Stand Exam Lists.
G. Wildlife Populations	**G1.** How can sustainable wildlife populations be maintained at levels that are acceptable to user groups?	**G1a.** Forests will be managed to provide sustainable wildlife populations.	**115**. Enhance habitat while completing land treatments by using practices and procedures outlined in the DNR *Forestry-Wildlife Habitat Management Guidelines* and the DNR's *Interdisciplinary Forest Management Coordination Policy*. **116**. Implement corridor planning and management. **117**. Adhere to the recommendations in the MFRC *Voluntary Site-Level Forest Management Guidelines* regarding RMZs, leave trees, legacy patches, woody debris, etc. **118**. Identify and acquire critical habitat land parcels for management and protection of important species. **119**. Develop cooperative procedures with other land management agencies to coordinate wildlife management efforts. **120**. Use the openlands assessment and planning process to develop necessary strategies and DFFCs for the designated open lands. **121**. Identify habitat components and habitat distributions needed to sustain wildlife populations at levels that are acceptable to user groups, but not detrimental to forest vegetation.

Primary Issue Area	Focused Issues	CP-PMOP General Direction Statements that address the issue	CP-PMOP Strategies
H. Sustainable Harvest	**H1.** What is the appropriate timber harvest level on state lands, with consideration for the sustainability of all forest resources?	**H1a.** Forests will be managed to provide a sustainable supply of forest products for human use, while minimizing negative impacts to wildlife habitat and forest biodiversity. **DFFC Statement** The treatment levels for even-aged cover types will be established with the DFFC of achieving a balanced age-class as shown in Chapter 4, Cover type Management Recommendations.	**122**. Move even-age managed cover types toward a balanced age-class structure. **123**. Achieve a declining age-class structure in ERF stands from normal rotation age through maximum rotation age. **124**. Improve the distribution of ages and quality of timber in uneven-age managed cover types. **125**. Designate lowland conifer old growth from EILC stands and return undesignated stands to the harvest pool**.** **126**. Implement recommendations identified in the MFRC's *Voluntary Site-Level Forest Management Guidelines, Biomass Harvesting Guidelines for Forestlands, Brushlands, and Open Lands*.

Primary Issue Area	Focused Issues	CP-PMOP General Direction Statements that address the issue	CP-PMOP Strategies
	H2. How can an adequate and sustainable supply of non-timber forest products be ensured for the future?	**H2a.** Forests will be managed to provide a sustainable supply of non-timber forest products for human use while minimizing negative impacts to wildlife habitat and forest biodiversity.	**127**. Implement the recommendations of the Special Forest Products (SFP) planning process. **128**. Increase supervision of SFP harvest permits and increase enforcement of rules against illegal harvesting activity. **129**. Manage selected forest stands for non-timber forest products. **130**. Support research to determine sustainable harvest levels for SFPs (e.g., decorative spruce tops), criteria for managing harvests and methods of propagation. **131**. Use all available information including "*Careful Harvest Fact Sheets*" (Extension Web site), and the DNR Forestry's Utilization and Marketing Web site that supports sustainable harvest of non-timber forest products when approving SFP Permits. **132**. Apply knowledge of existing traditional gathering areas of non-timber forest products when managing other forest resources. **133**. Identify managers with local expertise in managing non-timber products and utilize their knowledge when managing non-timber forest products at the landscape and statewide levels. **134**. Reduce impacts by coordinating non-timber product harvests with timber harvest. **135**. Increase public knowledge about the sustainable use of non-timber forest products through dissemination of educational information and training.
I. Timber Quality and Quantity	**I1.** How can timber productivity be increased on state lands?	**I1a**. Forests will be managed to increase overall timber productivity.	**136**. Support research that maximizes timber productivity (e.g., optimal stocking levels, mixed species management, treatment timing) without impacting wildlife and plant species. **137**. Apply management techniques to improve stocking and stand composition on general forestry lands.

Primary Issue Area	Focused Issues	CP-PMOP General Direction Statements that address the issue	CP-PMOP Strategies
J. Visual Quality	**J1**. How will the impacts of forest management activities on visual quality be minimized?	**J1a.** Impacts of forest management on visual quality will be minimized.	**138**. Apply the MFRC *Voluntary Site-level Forest Management Guidelines* and the *Visual Quality Best Management Practices for Forest Management in Minnesota,* as they apply, to all vegetative management activities. **139**. Review and update as appropriate the *Visual Sensitivity Classification* county maps.
K. Other Statutes	**K1.** How will foresters and wildlife managers achieve the goals of this plan and remain consistent with state and federal statutes?	**K1a.** Forest management activities will continue to adhere to state and federal statutes.	**140**. Invite comment from, and coordinate with adjacent landowners. **141**. Ensure that forest resource managers maintain a working knowledge of all applicable state and federal statutes, rules, guidelines and policies. **142**. Ensure that DNR forest managers have access to and consider appropriate related resource management policy, guidelines and plans of other divisions when vegetative management is prescribed.
L. Cultural Resources	**L1**. How will cultural resources be protected during forest management activities on state administered lands?	**L1a.** Forest management activities will protect cultural resources on state administered lands.	**143**. Subsection plans will consider the impacts of forest treatments on cultural resources consistent with all adopted DNR policy and guidelines. **144**. Share data on known cultural sites and consider impacts to these sites as silvicultural treatments are applied. **145**. Increase cultural resource training for field staff, stress the importance of preserving cultural resources, and encourage the reporting of new sites. **146**. Evaluate the existing Cultural Resource Review procedure to improve efficiency and reduce time required for site review.

Primary Issue Area	Focused Issues	CP-PMOP General Direction Statements that address the issue	CP-PMOP Strategies
M. Rare Species/Features	**M1.** How can rare plants and animals, their habitats, and other rare features be protected?	**M1a.** Forest management will continue to implement measures to sustain or enhance existing biodiversity. **DFFC Statement** The full range of all growth stages is well represented on the landscape.	**147**. Complete the Minnesota County Biological Survey (MCBS) for all counties within the subsections. **148**. Maintain the ecological integrity of Native Plant Communities (NPCs) by documenting and managing known locations with a statewide rank of Critically Imperiled (S1) or Imperiled (S2), and those with S-ranks of S3 to S5 that are rare or otherwise unique in these subsections. **149**. Consult the Natural Heritage database (including the rare features database) prior to prescribing or implementing forest management activities.
N. Managing Impacts	**N1.** How should the impacts of forest insects and disease on forest ecosystems be addressed?	**N1a.** Forest management will minimize damage to forests from native insects and diseases.	**150**. Manage identified forest insect and disease occurrences to contain and reduce impacts, using techniques appropriate for the species involved. **151**. Identify, document, and monitor native insect and disease populations (e.g. jack pine budworm, ips bark beetle, two lined chestnut borer, or diplodia shoot blight), as part of the *Forest Health Monitoring Program* and establish occurrence levels above which management action should be taken. **152**. Manage the vegetative content and structure of stands to reduce the potential impact of insects and disease.

Primary Issue Area	Focused Issues	CP-PMOP General Direction Statements that address the issue	CP-PMOP Strategies
	N2. How will threats and invasions of exotic species be managed?	**N2a.** Damage to forests from exotic species will be minimized.	**153**. Identify, document and monitor exotic species populations (e.g., gypsy moth, garlic mustard, common buckthorn, emerald ash borer, and earthworms) as part of the *Forest Health Monitoring Program* on state-managed lands. **154**. Contain and reduce impacts caused by exotic species using proven techniques**.** **155**. Manage the impact of exotic species using techniques such as aggressive containment or seasonal timing.
	N3. How will natural disturbances such as fire and blow down be considered in forest management decisions?	**N3a.** Natural disturbance events will be evaluated to determine the appropriate forest management response to address the effects on the landscape.	**156**. Accept a higher level of disturbance in ERF stands, provided the level of impact does not jeopardize the ability to regenerate the stand to the desired cover type or jeopardize the management goals of surrounding stands. **157**. Evaluate large-scale (i.e., hundreds to thousands of acres) and small-scale (i.e., tens of acres) disturbance events to determine appropriate action. **158**. Implement efforts to salvage usable timber stumpage from damaged stands in a timely manner to minimize losses due to decay and staining.
	N4. How can vegetation be managed to reduce animal damage, crop depredation, nuisance animals, potential spread of animal disease, and possible human health impacts (e.g., Lyme disease)?	**N4a.** Negative impacts caused by wildlife species on forest vegetation will be reduced.	**159**. Expand the knowledge of field staff related to preventing or reducing damage caused by wildlife through training and/or field level information sharing. **160**. Consider the potential for wildlife damage to artificial or natural regeneration when prescribing site management measures. **161**. Incorporate damage prevention strategies at all phases of forest management. **162**. Focus artificial forest regeneration efforts in areas less likely to be impacted by wildlife species. **163**. Apply mitigation strategies where wildlife damage is anticipated (e.g., considering stock sources that are less palatable to wildlife).

Primary Issue Area	Focused Issues	CP-PMOP General Direction Statements that address the issue	CP-PMOP Strategies
	N5. How should forest management respond to global climate change within the planning period?	**N5a.** Forest management practices will consider the impacts of climate change on forest lands and will attempt to mitigate these impacts using current knowledge and future research findings.	**164**. Reference the MFRC *Voluntary Site-level Forest Management Guidelines* for identification and management of tree species currently found at, or near the edge of their range. **165**. Maintain or increase species diversity across the subsections. **166**. Ensure connectivity that encourages the migration of plants and animals as climate changes the landscape. **167**. Evaluate site conditions with respect to climate change when selecting tree species for future forest stands. **168**. Apply the concept of carbon sequestering to remove carbon dioxide from the atmosphere.

Chapter 3. Focused Issues, General Direction Statements, DFFCs, and Strategies

3.0 Background

In response to the final list of Issues identified in Chapter 2, the CP-PMOP Planning Team developed general direction statements (GDSs) to address the Issues, strategies to achieve the general directions, and desired future forest composition (DFFC) goals. General direction statements consider direction provided in state statues and rules; Department policies, guidelines, and direction (e.g., *Directions 2000, The Strategic Plan* or *A Strategic Conservation Agenda 2003-2007)*; and management that will sustain forest resource on state-administered forest lands in the subsections. GDSs provide general direction such as: increase, decrease, maintain, or protect a certain condition, output, or quality. Strategies were developed for each of the GDSs to move toward the general direction as specified. Where possible (i.e., current ability to measure and quantify), DFFC goals were identified. DFFC goals are expressed both in short term (during the 10-year SFRMP plan implementation period) and long-term (50+ years) goals for the ultimate desired condition of DNR forest lands in the subsections. Examples of DFFC goals are: cover type acres, age-class distribution, amount of young and old forest, and cover type treatment levels (e.g., harvest level).

DFFC goals, general direction statements, strategies, as identified in this Chapter, and Cover type Management Recommendations as identified in Chapter 4, were used to determine stand treatment levels and define stand selection criteria to identify a pool of stands from which to select stands to be treated during this 10-year plan. This plan recommends treatment levels by cover type to move toward the DFFC goals and establishes the 10-year Stand Exam List that identifies specific forest stands selected for site-visit and possible treatment. The GDSs, strategies, and DFFC goals presented in this chapter have been used to guide the selection of the 10-Year Stand Exam List for the CP-PMOP SFRMP.

The following summarizes the sequence from Issues to Strategies:

1. 14 forest management Preliminary Issue Areas were identified in the *Preliminary Issues and Assessment document*; from these,
2. 29 more Focused Issue statements were drafted; from these,
3. 31 General Direction Statements and DFFCs were developed, relating to each Issue; then,
4. 168 Strategies were drafted to implement the GDSs and DFFCs.

As background to this chapter, Figure 3.0a shows the state land acres administered by the Division of Forestry and the Management Section of Wildlife in the two subsections. The state park lands within the CP-PMOP are not addressed in this plan. "*Forest land"* consists of all lands included in the forest inventory from aspen and pine cover types to stagnant conifers, and lowland brush. "*Timberland* " includes those cover types that are capable of producing merchantable timber. In this plan, "*managed"* acres are those acres available for timber management purposes. These managed acres make up approximately 90 percent of the total forest land (both divisions) in the two subsections. State lands reserved from harvest such as designated old-growth stands and scientific and natural areas (SNAs) are not included in managed acres, meaning they are not available for harvest.