Environmental Assessment for Implementation of Comprehensive Conservation Plan for Rice Lake NWR and Mille Lacs NWR

Abstract: The U.S. Fish and Wildlife Service proposes to implement a Comprehensive Conservation Plan (CCP) for Rice Lake and Mille Lacs National Wildlife Refuges in Minnesota. This Environmental Assessment (EA) considers the biological, environmental, and socioeconomic effects that implementing the CCP (the preferred alternative is the proposed action) or an alternative would have on the issues and concerns identified during the planning process. The purpose of the proposed action is to establish the management direction for the Refuges for the next 15 years. This management action will be achieved by implementing a detailed set of goals, objectives, and strategies described in the CCP.

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Rice Lake
Mille Lacs

National Wildlife Refuges

Environmental Assessment

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Chapter 1: Purpose and Need

1.1 Introduction

The U.S. Fish and Wildlife Service is mandated by the National Wildlife Refuge System Administration Act of 1966, as amended by the National Wildlife Refuge System Improvement Act of 1997, to prepare and implement a Comprehensive Conservation Plan (CCP) for each unit in the National Wildlife Refuge System. This Environmental Assessment provides environmental information to Service officials and the general public before decisions are made and actions are taken.

1.2 Purpose

The U.S. Fish and Wildlife Service proposes to implement a CCP for Rice Lake National Wildlife Refuge (NWR) and Mille Lacs NWR in Minnesota. The action includes wildlife, habitat, and wildlife-dependent recreation management activities for the Refuges. The purpose of the proposed action is to specify a management direction for Rice Lake NWR and Mille Lacs NWR for the next 15 years. This management direction will be described in detail through a set of goals, objectives, and strategies in the CCP.

1.3 Need for Action

The action is needed because adequate, long-term management direction does not currently exist for the Refuges. Management is now guided by a dated Master Plan that was published in 1979 and by various general policies and short-term plans. Also, the action is needed to address current management issues. There is a need to specify the priority wildlife species of management concern and, within budget constraints and other limitations, specify how habitat will be managed to provide for them. There is a need to specify how Rice Lake water levels and vegetation should be managed using the best available science. There is a need to specify the priority programs and projects that will fulfill the goal of facilitating wildlife-dependent recreation.

This Environmental Assessment (EA) was prepared using guidelines established under the National Environmental Policy Act (NEPA) of 1969. NEPA requires that the effects of proposed actions on the natural and human environment are examined. In the following sections two alternatives for future Refuge management are described, along with the environmental consequences of each alternative and the preferred management direction. The alternatives are a reasonable mix of fish and wildlife habitat prescriptions and wildlife-dependent recreational opportunities. Selection of the preferred alternative is based on its environmental consequences and its ability to achieve the purposes of Rice Lake NWR and Mille Lacs NWR. This EA also provides direction and consideration of the Refuge's fire management program, which is integral to the CCP.

1.4 Decision Framework

The Regional Director for the Midwest Region (Region 3 of the U.S. Fish and Wildlife Service) will need to make two decisions based on this EA: (1) select an alternative and (2) determine if the selected alternative is a major federal action significantly affecting the quality of the human environment, thus requiring preparation of an Environmental Impact Statement (EIS). The planning team has recommended Alternative B to the Regional Director. The CCP was developed for implementation based on this recommendation.

1.5 Authority, Legal Compliance, and Compatibility

The National Wildlife Refuge System includes federal lands managed primarily to provide habitat for a diversity of fish, wildlife and plant species. National wildlife refuges are established under many different authorities and funding sources for a variety of purposes. Franklin D. Roosevelt established Rice Lake Migratory Waterfowl Refuge by Executive Order in 1935 "as a refuge and breeding ground for migratory birds and other wildlife." Woodrow Wilson set aside Spirit Island with Executive Order 2199 on May 14, 1915, as Mille Lacs Reservation. On October 13, 1920, Wilson enlarged the reservation by the addition of Hennepin Island under Executive Order 3340. The two islands were to constitute a "preserve and breeding ground for native birds" – its purpose. A 1940 presidential proclamation renamed Rice Lake and Mille Lacs as national wildlife refuges. Additional authority delegated by Congress, federal regulations, executive orders and several management plans guide the operation of the Refuges. The appendices of the CCP contain a list of the key laws, orders and regulations that provide a framework for the proposed action.

1.6 Scoping of the Issues

The planning process for the CCP began in December 2004. Initially, members of the regional planning staff and Rice Lake National Wildlife Refuge staff identified a list of issues and concerns that were associated with the management of the Refuge. These preliminary issues and concerns were based on staff knowledge of the area and contacts with citizens in the community. Refuge staff and Service planners then asked Refuge neighbors, organizations, local government units, and interested citizens to share their thoughts in three open houses.

In April 2005, the public was invited to open houses at the Refuge Visitor Center, at the Mille Lacs Band of Ojibwe District 2 East Lake Community Center, located one-quarter mile north of the Refuge Headquarters, and at the Mille Lacs Band of Ojibwe Tribal Government Center in Onamia. People were invited through articles in the local papers and individual letters to the members of the East Lake Community. Seventeen people attended the open house at the Visitor Center. Three people attended in Onamia, and seven people came to the East Lake Community Center. People were asked to provide written comments within 30 days. Twenty-six written comments were received during the comment period.

Following the public comment period, an additional meeting was held in the Fish and Wildlife Service Regional Office to review the public comments and identify concerns from subject specialists.

1.6.1 Issues and Concerns

A variety of issues, concerns, and opportunities were addressed during the planning process. Several recurring themes emerged from discussions among citizens, open house attendees, resource specialists, and Service staff. In general, these themes were related to habitat management, public use, and cultural values. Wilderness recommendation was also a topic that was raised.

1.6.1.1 Rice Lake NWR

- *Management of Rice Lake*

  Rice Lake is an important area for migrating waterfowl in the fall. Ojibwe Indians have a long tradition of harvesting rice on the lake and want to continue. There is less rice than in the past and pickerelweed beds are expanding. Since the water control structure was put on the lake, water levels do not vary as much as in the past. Refuge staff do not have a good understanding of cause and effect of rice management in the lake.

- *Management of Former Crop Field and Hay Field Areas*

  There are numerous old field areas on the Refuge that in general are remnants of the pre-refuge farming era. These grassland/brushland areas have been maintained by past management practices of grazing and haying and currently are maintained through prescribed burning. Historically these areas were forested. The largest of these areas is referred to as the old crop fields, located on the southwest end of the Wildlife Drive. The crop fields were cleared and planted to legumes and oats between 1958 and 1962 as part of the Canada Goose reintroduction program. This area was converted to grassland and maintained with haying in the late 1990s through 2002. This grassland area has been maintained with prescribed burning since 2003. Grasslands, and grassland-dependent birds, are greatly diminished within their historic range. However, the Refuge grassland/

brushland areas are only minimally successful for high priority breeding grassland birds due to their small acreages and negative edge effects (mammalian predators prefer to hunt along the edges and increased nest parasitism by brown-headed cowbirds). Maintaining the fields as open grassland sites provides wildlife viewing opportunities popular with visitors. Converting all of the old fields to forest would contribute to a large block of unfragmented forest and benefit high priority forest bird species.

- *Management of Forests*

  The Refuge lands were forest historically. A large block of diverse forest will benefit bird species that are a high priority for the Service. However, details of how to manage forest to meet biological goals have not been specified.

- *Wilderness Recommendation*

  In 1973, a 1,400-acre unit and the 6.27-acre island in Rice Lake were recommended for further consideration by the Secretary of Interior for Wilderness designation. The recommended areas have been managed as de facto wilderness. The Service and the Department have taken no action on the recommendation. The proposed Wilderness does not meet minimum wilderness standards for size (at least 5,000 acres of land or of sufficient size as to make practicable its preservation and use in an unimpaired condition). The Wilderness recommendation precludes some management activities.

- *Indian Community Activities*

  Ojibwe Indians have a long history of use on the land and harvesting wild rice is important to the Indian community. An easement permits an Indian cemetery on the Refuge. Indian ceremonies are held on the Refuge under special use permit. Some members of the local Indian community desire more facilities and ceremonial opportunities and agreements in perpetuity. Some members also desire unrestricted/unlicensed use of Refuge resources. There are long-term concerns about the cultural impacts caused by Refuge buildings on Indian Point.

- *Cultural Resources*

  The Refuge includes pre-historic and historic resources of recognized importance. One view is that interpreting these resources will bring understanding, appreciation, and improved protection of them. Another view is that interpreting resources will make them more broadly known and vulnerable to destruction. In addition, some people would like the recent Indian history of the area interpreted.

- *Wildlife-dependent Recreation*

  The National Wildlife Refuge System Improvement Act of 1997 directs refuges to facilitate wildlife-dependent recreation. There may be the opportunity to increase hunting opportunities, although the demand has not been great. Visitors want to see more wildlife on the Refuge and want more wildlife observation opportunities. The public has requested educational programs both on and off the Refuge, and they would like staff available on weekends, or at least Saturdays. There is an unrealized potential in interpretation and environmental education. There is no law enforcement presence on Rice Lake NWR, which raises a concern for visitor safety. The support for wildlife-dependent recreation is presently maximized under current staff and budget.

1.6.1.2 Sandstone Unit

- *Operation*

  Monitoring activities on the Unit is difficult because of its distance from the office. Access within the Unit is difficult because of damage to roads and bisection of the Unit by the Kettle River. Habitat management and law enforcement on the Unit are below Service standards.

1.6.1.3 Mille Lacs NWR

- *Common Tern Management*

  The emphasis of management on Hennepin Island is for the nesting colony of Common Terns, a State-listed threatened species. The nesting substrate of gravel is not reliably present because of changing water levels and erosion by waves. Gulls compete for nesting space on the island and reduce Tern nesting success. Therefore, a gull deterrent program includes destruction of gull eggs and placement of an aboveground string grid over the southern one-third of the island to prevent gulls from landing/nesting.

1.7 Review of the Draft EA

The Draft Environmental Assessment was published as Appendix A in the Draft CCP. The Draft CCP/EA was released for public review and comment on June 25, 2007. A Draft CCP/EA or a summary of the document was sent to more than 250

individuals, organizations, and local, state, and federal agencies and elected officials. An open house was held on July 10, 2007, at the Rice Lake NWR Headquarters following release of the draft document. Five people attended the open house. We received a total of 15 comment letters and e-mails during the 30-day review period. Appendix K of the CCP summarizes these comments and our responses. None of the comments addressed the EA.

Chapter 2: Description of the Alternatives

2.1 Formulation of Alternatives

The Rice Lake NWR and Mille Lacs NWR CCP planning team developed two management alternatives based on the issues, concerns and opportunities raised during the CCP scoping process. The alternatives were formulated under the assumption that a large budget increase for Refuge operations is unlikely during the life of the plan. However, the possibility of new private resources (volunteers, grant funds, etc.) and a modest Refuge program and/or staff funding increase was considered.

The alternatives were Current Direction (No Action) and Integrated Wildlife and Public Use (Preferred Alternative). A summary of the two alternatives is provided in Table 1 on page 12. The alternatives represent broad themes to management and administration and recognize the latitude managers have in focusing resources within existing laws and policy. Each alternative would contribute to the mission of the Refuge System, meet the purposes of the Refuges, and achieve the Refuges' goals. The degree to which an alternative meets the goals, purposes, and mission of the System, along with its environmental consequences, provide the basis for the final selection of an alternative and its subsequent CCP.

2.2 Alternatives Considered But Not Developed

No other alternatives that were reasonable or different from the two described below were formulated.

Alternatives that would include a "hands-off" approach to management or would include major changes in habitat were considered as was an alternative that would have opened the Refuge to wider recreational use. The alternatives were evaluated as too extreme and not reasonable. They were not pursued and were not considered in detail.

2.3 Elements Common to Both Alternatives

2.3.1 Prescribed Fire

Prescribed fire would be used to decrease and inhibit brush invasion in open bogs.

2.3.2 Common Tern Management and Monitoring of Mille Lacs NWR

Management of Mille Lacs NWR would be concerned primarily with the production of Common Terns on Hennepin Island. Monitoring bird populations and production on Spirit Island would continue.

2.3.3 American Indian Ceremonies

Indian ceremonies would be held under special use permit. The timing and harvesting of wild rice would be coordinated with a local Indian committee.

2.3.4 Hunting

Rice Lake NWR would remain open for small game and deer hunting. Approximately 1,340 acres of the Sandstone Unit would be open to public hunting. Fishing would be permitted in Twin Lakes, Mandy Lake, and the Rice River during regular State seasons. Ice fishing would be permitted on Mandy Lake. Visitors would hike, cross-country ski, canoe, snowshoe, and bike while visiting the Refuge. Mille Lacs NWR would be closed to public use.

2.3.5 Archeological and Cultural Values

The consequences of each action alternative in terms of cultural resources are the same. Lands administered by the Service come under Federal cultural resources laws (and executive orders and regulations), in addition to policies and procedures established by the Department of the Interior and the Service to implement the laws. Cultural resources on these lands receive protection and consideration that would not normally apply to private or local and state government lands.

Nevertheless, undertakings accomplished on the Refuge have the potential to impact cultural resources. The presence of cultural resources including historic properties cannot stop a Federal undertaking, the laws require only that adverse impacts on historic properties be considered before irrevocable damage occurs.

The Refuge Manager will, during early planning, provide the Regional Historic Preservation Officer (RHPO) a description and location of all undertakings (projects, activities, routine maintenance and operations that affect ground and structures, and requests for permitted uses); and of alternatives being considered. The RHPO will analyze these undertakings for their potential to affect historic properties and enter into consultation with the State Historic Preservation Officer and other parties as appropriate. The Refuge Manager will notify the public and local government officials to identify their concerns about potential impacts by the undertaking; this notification will be at least equal to the public notification accomplished for NEPA and compatibility.

2.4 Alternative A: Current Direction (No Action)

Under current management direction, Rice Lake would be managed primarily for wild rice production, which requires stable water levels throughout the growing season from early May through late September. The water level in the Lake would also be maintained at a sufficient level to allow harvesting of wild rice by American Indians in the fall. The former crop field area on the auto tour route would be maintained as grassland through prescribed fires. The forests of the Refuge would not be actively managed. They would change through succession. The recommendation to designate about 1,400 acres of the Refuge as Wilderness is pending and the recommended areas would be managed as de facto wilderness. Management on Mille Lacs NWR would consist of deterring gulls through the placement of a grid to prevent landing and egg destruction.

The pre-historic and historic cultural resources on the Refuge would not be interpreted on-site. The Refuge maintenance facilities and housing located on Headquarters Ridge would remain. Dependent on future new construction needs, additional degradation to cultural resources located at Headquarters Ridge could occur. A display in the headquarters would describe a part of the Indian heritage of the area.

Management activities on the Sandstone Unit would be limited to prescribed burns with the goal of maintaining the 2005 landcover while allowing for forest succession.

Public use would consist of wildlife-dependent recreation on Rice Lake NWR. Approximately 10,000 acres of Rice Lake NWR would be open to hunting of small game and deer. Refuge infrastructure that facilitates interpretation, observation, and photography would include an observation tower, an auto tour route, trails, kiosks, a display in headquarters, and brochures. The Refuge would host school groups upon request and participate from time to time in educational programs away from the Refuge.

2.5 Alternative B: Integrated Wildlife and Public Use (Preferred Alternative)

Under the Integrated Wildlife and Public Use Alternative, Rice Lake would be managed to simulate natural conditions that would include more variability in water levels. Water levels would be manipulated by the existing water control structure or by re-establishing the natural outlet to Rice Lake. Rice Lake would be allowed to function more as a natural system with natural fluctuations. Low water in the fall of some years could mean that access would be poor for harvesting wild rice. A portion of the old crop and hay fields would be reforested to establish a forest corridor with an 85-acre block next to the auto tour route maintained as open grassland and converted to native grasses and forbs in the future. The Refuge would develop and implement a forest management plan that would include cutting of some areas and natural or artificial seed-

ing of pines. The recommendation to designate a portion of the Refuge as Wilderness would be withdrawn to allow for more active management, if it would result in more desirable wildlife habitat. Management on Mille Lacs NWR would consist of current activities plus the rebuilding of Hennepin Island where it has eroded and its protection through a constructed reef.

All buildings would be removed from Headquarters Ridge to eliminate further degradation of this important cultural site due to future new construction and expansion requirements. There would be increased on-site interpretation of the pre-historic and historic cultural resources on the Refuge. In addition to the display in the headquarters, additional interpretation of the Indian heritage of the area would be developed in cooperation with the Mille Lacs Band and presented through a variety of media.

Management activities on the Sandstone Unit would be limited to prescribed burns with the goal of maintaining the 2005 landcover while allowing for forest succession. The Service would explore an exchange of the Sandstone Unit for State lands with the State of Minnesota. The purpose of the exchange would be to increase management efficiency for both entities and more closely align lands with the agencies' missions. Land exchanges are complex and require a number of years to complete. If and when the details of a possible exchange are specified, an environmental review of the proposed exchange would be completed. The environmental review process would include public notification and an opportunity for public comment.

Public use would consist of wildlife-dependent recreation on Rice Lake NWR. Rice Lake NWR would be open to additional hunting opportunities. Refuge infrastructure that facilitates interpretation, wildlife observation, and nature photography would be expanded through additional pull-offs on the auto tour route, an added nature trail, more interpretative signs, and increased programming. The Refuge would develop environmental education curricula that would be linked to state standards and continue to host school groups and participate in educational programs away from the Refuge.

Table 1: Summary of Management Alternatives for Rice Lake and Mille Lacs National Wildlife Refuges

Alternative A Current Direction (No Action)	Alternative B Integrated Wildlife and Public Use (Preferred Alternative)
Goal 1 – Habitat: The Refuge will contain a diversity of habitats typical of historical North Central Minnesota.	
Objective 1.1 Forest Size: Maintain 7,100 acres of forest with current 804 acres of old fields maintained.	Objective 1.1 Forest Size: Restore and maintain between 8,000 and 10,500 acres of forests.
Objective 1.2 Conifer Component: Allow existing white pines on the Refuge to mature.	Objective 1.2 Conifer Component: By the year 2106, have a 10 white pine/acre component on all suitable sites of a super-canopy size. To achieve this long-term objective, while allowing for attrition, increase the amount of white pine on suitable sites of any age class to 14 white pine/ acre , through natural regeneration and planting by 2020.
Objective 1.3 Northern Hardwoods: Maintain existing older aged stands of northern hardwoods.	Objective 1.3 Northern Hardwoods: Manage as an uneven aged system for a diversity of structure, species and age class.
Objective 1.4 Coniferous Bog: Maintain 1,000 acres of coniferous bog where it currently occurs.	Objective 1.4 Coniferous Spruce Bog: Same as Alternative A.
Objective 1.5 Open Bogs: periodically apply prescribed burn to open bog.	Objective 1.5 Open Bogs: Restore 5,000 acres of open bog (wet meadow) with a brush stem density of 6 or less stems per square meter within 15 years.
Objective 1.6 Pickerelweed: Identify effective means of control for pickerelweed.	Objective 1.6 Pickerelweed: Reduce pickerelweed occurrence by approximately 50 percent on Rice Lake to no more than 400 acres by 2015.
Objective 1.7 Wild Rice: Monitor wild rice beds on Rice Lake.	Objective 1.7 Wild Rice: Maintain the long-term viability of wild rice on Rice Lake through 2020 with a 10-year average of 1,400 acres, 80 seeds per head, and a stem density within rice beds of at least 20 stems per square meter.
Objective 1.8 Invasive Species: No goal is currently specified.	Objective 1.8 Invasive Species: Exotic invasive species will impact no more than 10 percent of the Refuge by the year 2020.
Objective 1.9 Special Management Area: Maintain Wilderness recommendation on 1,406 acres and manage it as de facto Wilderness.	Objective 1.9 Special Management Area: Withdraw Wilderness recommendation on 1,406 acres to allow complete range of management options, including habitat restoration.
Objective 1.10 Sandstone Unit: Maintain the 2005 landcover while allowing for forest succession.	Objective 1.10 Sandstone Unit: Same as Alternative A.

Table 1: Summary of Management Alternatives for Rice Lake and Mille Lacs National Wildlife Refuges (Continued)

Alternative A Current Direction (No Action)	Alternative B Integrated Wildlife and Public Use (Preferred Alternative)
Goal 2 – Wildlife: Fish and migrating and resident wildlife populations on the Refuge will be naturally diverse, healthy, and self sustaining.	
Objective 2.1 Regional Conservation Priority (RCP) Species: No objective is presently specified.	Objective 2.1 Regional Conservation Priority (RCP) Species: Seventy percent of all the Region 3 RCP species associated with historically occurring habitats on the Refuge will occur on the Refuge by 2020. This includes 84 percent of the RCP bird species during migration or nesting.
Objective 2.2 Monitoring: Wildlife response to management not scientifically established.	Objective 2.2 Monitoring: Verify wildlife response to habitat changes and monitor populations over time with scientifically credible data.
Goal 3 – People: Visitors will enjoy wildlife-dependent recreation and they, along with residents of the local community, will appreciate the value and need for fish and wildlife conservation.	
Objective 3.1 Wildlife Observation, Photography, and Interpretation: Host an estimated 30,000 visits a year.	Objective 3.1 Wildlife Observation, Photography, and Interpretation: Within 5 years of approval of the plan, Refuge visitation will likely increase by 20 percent over the 2005 level.
Objective 3.2 Interpretation: Provide interpretation at current levels with no plan for increased visitation.	Objective 3.2 Interpretation: Within 10 years of approval of the plan, reliably determine that opportunities for interpretation have corresponded with a 20 percent increase in Refuge visitation.
Objective 3.3 Environmental Education: Provide environmental education on demand with little monitoring of results.	Objective 3.3 Environmental Education: Within 2 years of hiring a park ranger, provide environmental education programming to no less than 600 students per year. Eighty percent of students will report an increased desire to protect fish and wildlife habitats as a result of the programs.
Objective 3.4 Fishing: Provide opportunities for fishing on Twin Lakes, Mandy Lake, and Rice River with little monitoring of results.	Objective 3.4 Fishing: Within seven years of approval of the plan reliably determine that the Refuge hosts at least 10,000 fishing visits per year with at least 85 percent of the anglers judging that they are being provided a quality opportunity.
Objective 3.5Hunting: About 10,000 acres open to hunting on Rice Lake main unit and 1,340 acres open on the Sandstone Unit with little monitoring of results.	Objective 3.5 Hunting: Within seven years of approval of the plan reliably determine the number of hunting visits to the Refuge and that at least 85 percent of hunters judge that they are being provided a quality opportunity.

Table 1: Summary of Management Alternatives for Rice Lake and Mille Lacs National Wildlife Refuges (Continued)

Alternative A Current Direction (No Action)	Alternative B Integrated Wildlife and Public Use (Preferred Alternative)
Objective 3.6 Outreach: Represent Refuge at community events and issue occasional news releases.	Objective 3.6 Outreach: Within 3 years of approval of the plan gain local community support and appreciation for fish and wildlife conservation and endorsement of the Refuge's role in conservation.
Goal 4 – Cultural Values : The American Indian community and the Refuge will preserve American Indian cultural values through communication, consultation, and cooperation.	
Objective 4.1 American Indian Cultural Practices: No formal objective.	Objective 4.1 American Indian Cultural Practices: Opportunities to engage in American Indian cultural practices will be available at the level offered in 2005.
Objective 4.2 Archeological, Cultural, and Historic protection: No formal objective.	Objective 4.2 Archeological, Cultural, and Historic Protection: Remove all buildings from Headquarters Ridge to eliminate further degradation of cultural resources.
Goal 5: Funding, staffing, facilities, and public support will be sufficient to accomplish the purposes, vision, goals, and objectives of the Refuge.	
Objective 5.1 Volunteer and Friends' Participation and Outside Assistance: No formal objective.	Objective 5.1 Volunteer and Friends' Participation and Outside Assistance: Increase volunteer participation, Friends' activities, and outside assistance above the 2005 level.
Mille Lacs NWR: An optimum nesting population of Common Terns will exist on Hennepin Island and we will know the productivity and chronology of species using Spirit Island.	
Objective 1.1 Hennepin Island: Within five years of approval of the CCP host a minimum of 100 nesting pairs, over a 5-year average, each year.	Objective 1.1 Hennepin Island: Within 5 years of approval of the CCP annually host a minimum of 150 nesting pairs and produce 100 fledglings annually upon completion of island enhancement.
Objective 1.2 Spirit Island: Annually estimate productivity of birds on the Island.	Objective 1.2 Spirit Island: Annually estimate productivity of birds on the Island with scientifically credible data of known quality. The estimation will be able to detect at least a 20 percent change in productivity over 15 years.
Objective 1.3 Human Disturbance: No formal objective, however, Refuge is closed to public use.	Objective 1.3 Human Disturbance: Protect nesting birds and their habitat from human disturbance.

Chapter 3: Affected Environment

3.1 Introduction

This chapter includes a summary description of the affected environment of the refuges. More detail is contained in Chapter 3 of the CCP.

The 20,253-acre Rice Lake NWR is a mosaic of lakes, marshes, forests, and grasslands that provides a variety of habitat for migrant and resident wildlife. Abundant natural foods, particularly wild rice, have attracted wildlife to the area for centuries. The Refuge is especially noted for its fall concentrations of Ring-necked Ducks, which often number over 150,000 birds. Other important migrants include Mallards, Wood Ducks, Canvasback, and Canada Geese. White-tailed deer, black bear, river otter, beaver, Sandhill Cranes, Bald Eagles, Ruffed and Sharptail Grouse also inhabit the Refuge. In addition, songbirds, raptors, and nearly all other species associated with the bogs and forests of northern Minnesota, including gray wolves and an occasional moose, are found on the Refuge.

Rice Lake NWR includes the 2,045-acre parcel known as the Sandstone Unit (Unit), which is located approximately 52 miles southeast of the main part of the Refuge near the town of Sandstone, Minnesota. The majority of the Unit is upland forest with smaller components of grassland, forested wetland, shallow marshes, bogs, and riverine wetlands. The State designated Wild and Scenic Kettle River traverses the west side of the Unit creating spectacular bluffs and rock outcroppings.

Mille Lacs NWR is the smallest refuge in the National Wildlife Refuge System, which includes more than 545 refuges. The 0.57-acre Refuge consists of two islands, Hennepin and Spirit, in Mille Lacs Lake about 30 air miles southwest of the Rice Lake NWR office. The islands are covered with jumbled rock, boulders, and gravel. Hennepin Island is managed as a nesting colony for the State-listed threatened Common Tern. Spirit Island is used by other colonial nesting species including Ring-billed Gulls, Herring Gulls, and Double-crested Cormorants.

3.2 Climate, Geography, and Hydrology

The Refuge experiences long, cold winters and cool summers. The average annual rainfall, which mostly comes during the spring and fall, is about 27 inches. Snowfall averages about 60 inches per year. The temperature extremes for the year can range from minus-40 degrees to 100 degrees Fahrenheit. Lakes typically freeze over in early-November and remain frozen until middle to late April.

Glaciers formed the major landscape features that we see today on the Refuges. In order to generalize and understand the fundamental aspects of the landscape, scientists have classified areas with similar geological, soil and climatic characteristics. In the Ecological Land Classification for Minnesota, the northwestern portion of Rice Lake NWR lies in the Tamarack Lowlands subsection, which is generally characterized by rolling to flat lake plains, beach ridges and ground moraines. The potential vegetation for this area is black spruce bog, white cedar-tamarack swamp, and aspen-birch forest. The rest of Rice Lake NWR lies in the St. Louis Moraines subsection, characterized by glacial moraines, rolling hills and small short rivers and large lakes. The potential vegetation for the area is aspen-birch forest, and Northern hardwood forest. Mille Lacs NWR and the Sandstone Unit lie in the Mille Lacs Uplands subsection, which is generally characterized by an ice-molded landscape with irregular ground moraines. The potential vegetation for the area is white pine-oak forest, white pine-red pine forest, and cedar-tamarack swamp.

Rice Lake NWR is bisected by the Rice River, which drains the Refuge flowing from the southeast corner to the northwest and empties into the Mississippi River 20 miles to the west. The land's natural water drainage toward the south has been blocked by moraines. This wet area is slowly filling in with sediment and vegetation, becoming a floating or muskeg-like bog.

The Sandstone Unit is crossed by several small streams, flowing east to west to join the Kettle River. The Kettle River, which flows through the western portion of the Unit, has cut a steep sided canyon approximately 100 feet deep and 3,000 to 4,000 feet wide.

Mille Lacs NWR is located approximately 1 mile from any shoreline of Mille Lacs Lake. The water level in Mille Lacs Lake affects the size of the islands and their vulnerability to erosion by wave action. Seiches occur on the lake and account for brief, but record, changes in water levels. A seiche can be described as a large wave or storm surge that is created by dramatic changes in atmospheric pressure coupled with high winds. The more persistent changes in water level are influenced by broader weather patterns.

3.3 Natural Resources

3.3.1 Habitats

3.3.1.1 Forest

Rice Lake NWR lies within the transition zone between the coniferous forests of northern Minnesota and the deciduous hardwood forests typical of the southern portion of the state. Historically, white pine was very abundant in the pre-settlement mixed forests of the region, but logging in the late 1800s resulted in replacement of pine with quaking aspen, red and sugar maples, paper birch, basswood, and red oak. Today there are approximately 4,222 acres of upland forest on the Refuge. Lowland forest stands are characterized by tamarack, black spruce, black ash, balsam fir, and white cedar. There are approximately 3,259 acres of lowland forest on the Refuge.

Brushland is a habitat type that is difficult to classify. Brushland typically occurs in areas that were once farmed, grazed or hayed and have been left undisturbed for years, allowing brush to invade the grassland. In some systems, the bog areas are classified as brushland due to the expanses of invading brush species found dominating the native sedge species. In the case of the Refuge, brush is considered an undesirable condition, hence, brush dominated areas will be discussed as acreages in their desired condition, forest, bog or grassland.

The Sandstone Unit consists of approximately 1,315 acres of upland forest. The terrain is gently rolling to nearly flat. The presettlement vegetation was primarily pine, maple, oak and tamarack. Bearing trees listed in 1849 and 1851 surveys show primarily white pine and tamarack with a few aspen, red oak, maple, jack pine, and spruce. Francis Marschner's map of the Original Vegetation of Minnesota shows vegetation cover in the vicinity of the Sandstone Unit as being white pine groves, mixed hardwood and pine, and conifer bog and swamp. However, like most of the surrounding area, the virgin pine forests were extensively exploited by white settlers. Few examples of this original vegetation are now found anywhere in the county.

Most of the wooded uplands of the Sandstone Unit are now occupied by a relatively even aged (40-60 years) aspen/birch timber type that includes a mature red pine component. Some areas of this aspen/birch type are beginning to succeed to maple/basswood. There is also a 116-acre timber type that is dominated by red pine with an intermediate association of aspen, maple, oak and birch.

3.3.1.2 Bog

There are approximately 5,791 acres of bog lands habitat type on Rice Lake NWR. The bogs are flat expanses of poorly drained organic soils known as peat. They support a dense, spongy mixture of flowering plants, grasses, low shrubs, and small stands of black spruce, balsam fir and tamarack. Shallow lakes with marshy shorelines dot this landscape. Peat is formed from successive layers of partly decomposed vegetable matter, mostly sphagnum moss. The peat makes the bog soil acidic and tints bog waters a clear amber color. A muskeg or floating bog is created in a poorly drained lake that is slowly filling-in with vegetation. Dense collections of floating plants at the lake's margin offer a seedbed for more vegetation. Soon a floating mat forms that builds sediment on the lake bottom, paving the way for other water-tolerant plants and shrubs. A floating bog mat will eventually cover the water's surface and, over a long period of time, turn what was once a lake into a lowland forest.

The greatest expanse of bog on the Refuge is located on the north side of the Refuge. This area surrounding the Rice River is over 3,000 acres in

size and is adjacent to the state-owned Kimberly Marsh Wildlife Management Area, which contains an additional 5,000 acres of similar habitat. Some classification systems describe this area as a "brushland" though by description it has only achieved an overgrowth of brush due to the lack of a disturbance factor like wildfire over the past 70 years. The native vegetation within the bog would have consisted of sedge species with sporadic areas of brush like willow and dogwood. Prescribed fire has been the management tool used to decrease and inhibit further brush invasion into this bog.

3.3.1.3 Grassland

Rice Lake NWR maintains approximately 678 acres of grassland, which were created through the clearing of timber and brush by former landowners and planted to species suitable for hay cutting and grazing. Since 2003, these open areas have been maintained through the use of prescribed burning. The majority of these fields contain non-indigenous species (smooth brome and timothy), although a couple of small fields were planted to tall-grass prairie cultivars (big blue stem, Indian grass) by Refuge staff in the late 1980s. The largest grassland block is 148 acres. It occurs on the "west end" of the Refuge in the former crop-fields area.

The Sandstone Unit has approximately 406 acres of grass/brushland that exist primarily as a result of previous land clearing activities by the Federal Correctional Institution. The open area on the north end of the Unit was cleared of trees for agricultural development. This area was kept open through haying under a permit system until 2001.

3.3.1.4 Aquatic

The main body of water on Rice Lake NWR is Rice Lake, which is approximately 3,600 acres, or nearly one-quarter of the Refuge, and has 9.5 miles of shoreline. Rice Lake is a shallow, natural wild rice producing wetland. Average water depth is 2 feet and the bottom is a composition of mud and silt. Vegetation in the lake is dominated by wild rice and pickerelweed. Although pickerelweed is a native species, it is acting as an invasive in the lake. This dominance has been accentuated by the stable water levels needed to produce wild rice. Other vegetation present in the lake include: bulrush, cattail, wild celery, and a variety of pondweeds. The lake is known as a bigmouth buffalo and northern pike spawning and rearing area. A ditch and water control structure were built on the inlet/outlet to the lake in 1963. A larger capacity structure was completed in 1979.

Other major water bodies on the Refuge are Mandy Lake, Twin Lakes and the Rice River. Mandy Lake is an open body lake with beds of wild rice, cattail, and common reed around the perimeter. The lake is 101 acres and has approximately 2.1 miles of shoreline with a maximum depth of 16 feet. Mandy Lake is connected to the Rice River via a floating bog. During times of high water, it is possible for fish to move under the bog.

Twin Lakes is a classic example of a developing bog. The two lakes have a combined surface area of 16 acres with a maximum depth of 50 feet and 0.6 mile of shoreline. The shoreline is filling in with peat and vegetation and provides an excellent example of bog succession and contains species like lady-slipper and pitcher plant.

The Rice River traverses the Refuge from the southeast corner to the northwest corner. The river originates in the Solana State Forest 7 miles south of the Refuge. The river is fed by Porcupine Lake and numerous small tributaries as it flows northwestward into the Refuge. The Refuge receives drainage from approximately 155 square miles of the Rice River watershed. The river averages 70 feet wide and 2.5 feet deep. The river serves as both the inlet and outlet to Rice Lake depending on the flow and water level in the lake. A water control structure (Radial Gates) located on the North Bog Road was installed in 1952 to form the Rice River Pool. This structure was enlarged in 1980. During high water times, the Pool will cover 2,500 acres. Sedge mats that support heavy growths of common reed, wild rice, cattail, and willow dominate the pool. Even when the pool is completely flooded, little increase in open water is achieved because of a propensity for the mat to float. The open water area of Rice River Pool seldom exceeds 300 acres.

3.3.2 Wildlife

3.3.2.1 Birds

A total of 242 species of birds has been confirmed on Rice Lake NWR and 83 species of birds on the Sandstone Unit (Appendix D). Waterfowl, raptors, and songbirds are commonly observed on the Refuge. Rice Lake NWR has been designated a Globally Important Bird Area by the American Bird Conservancy. This designation was granted due to the importance of the lake and it's naturally producing wild rice as a food source to migrating waterfowl, especially Ring-necked Ducks. The Refuge will typically attract more than 100,000 Ring-necked Ducks every fall. The Refuge has also been desig-

nated as a State Important Bird Area, as part of the larger McGregor Important Bird Area, by the National Audubon Society.

The two islands that comprise Mille Lacs NWR serve as nesting sites for colonial waterbirds. Hennepin Island is the site of one of four Common Tern breeding colonies in Minnesota. The common tern is a Minnesota State Threatened species. Spirit Island has nesting Ring-billed and Herring Gulls, and Double-crested Cormorants. Many species of waterbird, shorebird and waterfowl have also been observed on the islands, including American White Pelicans, Caspian Terns, Dunlin, Red Knots, Ruddy Turnstones, Common and Red-breasted Mergansers and Mallards.

3.3.2.2 Mammals

Forty-three species of mammals have been confirmed on Rice Lake NWR. (Appendix D). Whitetailed deer, black bear, porcupine, snow-shoe hare, bobcat, beaver, coyote and red fox are commonly observed species on the Refuge. The Refuge is home to at least one pack of gray wolves and Canada lynx have been observed. Although a rare occurrence, moose have also been seen on the Refuge.

3.3.2.3 Amphibians and Reptiles

Three species of reptiles have been confirmed on Rice Lake NWR. Literature searches indicate that four species could be found on the Refuge. Eight species of amphibians have been documented on the Refuge. Literature searches indicate that 12 species could be present. (Appendix D).

3.3.2.4 Fish

Fish surveys are conducted by the Minnesota DNR and the Service on a sporadic basis. Sampling by various methods has located 21 species including northern pike, yellow perch, bluegill, black and brown bullheads, bigmouth buffalo, white suckers, bowfin, golden shiner and walleye (Appendix D). The Refuge is best known for spring and fall runs of northern pike in and out of Rice Lake via the Rice River.

3.3.2.5 Mollusks and Crustaceans

A literature search indicates that 13 species of mussels have ranges that include Rice Lake NWR. Surveys have found and identified five species and one unknown species. The surveys were conducted by Service divers in July 2004. The most common species found during the survey were the fat mucket (*Lampsilis siliquiodea*); paper pondshell (*Utterbackia imbecillis*); eastern floater (*Pyganodon cataracta* sp.) (pending verification); giant floater (*Pyganodon grandis*); and the strange floater (*Strophitus undulatus*). Fingernail clams (*Sphaeridae* sp.) were also found throughout the Refuge. Four of the five freshwater mussels and clam are common species and found throughout the Midwest. The fifth species, the eastern floater, is a freshwater mussel looking very similar to the giant floater. It is not currently listed as being found in Minnesota (Appendix D).

3.3.2.6 Invertebrates

No formalized invertebrate sampling has been conducted on the Refuge. A literature search indicates that 103 species of butterflies and moths and 95 species of dragonfly/damselflies could exist on the Refuge (Appendix D).

3.3.3 Threatened and Endangered Species

Federally-listed threatened animal species that have been confirmed on the Refuge include the Bald Eagle and Canada lynx. The Bald Eagle population is recovering regionally as well as nationally. The Service recently removed the gray wolf from threatened status in the western Great Lakes area, which includes all of Minnesota, and the Bald Eagle may be "de-listed" and removed from the list of species protected by the federal Endangered Species Act of 1973. The habitat in the Great Lakes Region is naturally marginal and may not support prey densities sufficient to sustain lynx populations. As such, the Great Lakes Region does not currently contribute substantially to the persistence of the contiguous United States distinct population segment. The role of the Great Lakes Region in the long-term conservation of Canada lynx will be explored further in planning for its recovery. No federally listed plants are documented on the Refuge.

Two state-listed endangered or threatened bird species (Trumpeter Swan and Henslow's Sparrow) use Rice Lake NWR. One state-listed bird species, Common Tern, nests on Mille Lacs NWR. The state-listed plant, triangle moonwort, is found on Rice Lake NWR.

3.4 Public Use

Our estimate is that about 35,000 total visits were made to Rice Lake NWR in 2006. Public use of the Refuge has been slowly increasing over the past several years. Visitors participate in wildlife obser-

vation, photography, interpretation, hunting, fishing, and environmental education. Most Refuge visitors are engaged in wildlife observation and benefit from the interpretive displays. We estimate that less than 1,000 hunting visits occur and nearly 10,000 fishing visits occur per year. We reach about 200 students each year with programs on and off the Refuge. Through outreach efforts that include group presentations and exhibits, we reach more than 5,000 people each year.

3.5 Cultural Resources

Evidence of the two earliest recognized human cultures in Minnesota are absent from the Refuge, but the Woodland period culture and Ojibwe culture are strongly present at the Refuge and include sites important at the State level and perhaps at the regional level. Large and numerous prehistoric mound groups, prehistoric and Ojibwe villages, a historic Indian cemetery, and prehistoric and continuing wild rice harvesting by the local Indian community have been identified even though only 1 percent of the Refuge has been investigated for archeological sites. The East Lake Indian Community has identified sites for traditional cultural and sacred activities and desires to continue to perform religious and cultural practices on the Refuge.

Limited archeological investigations centered on Indian Point (Headquarters Ridge) villages and extensive related mound groups have identified evidence of the Middle Woodland Malmo (200 B.C.-A.D. 200), Saint Croix (A.D. 300-800), and Arvilla (A.D. 600-900); Late Woodland Sandy Lake (A.D. 1000-1750); and Chippewa (late 19th century-1939). No evidence exists for PaleoIndian (9500-6000 B.C.) nor Archaic (6000-500 B.C.) nor Early Woodland (500-200 B.C.), but the topography would allow for the presence of human use during those periods. The archeologists have located at least one and possibly two other Woodland period villages and an Ojibwe village; and large mound groups. In fact, the Refuge contains the largest concentration of linear mounds in Minnesota and Wisconsin (Johnson 1989A:7). An important component of the late prehistoric and historic periods is wild rice harvesting and processing. The archeological and the documentary records indicates ricing areas on both the south and north shores of Rice Lake, as well as on the south shore of Mandy Lake. And perhaps on Twin Lakes: the Refuge Manager recovered a dugout canoe there in 1969 (the canoe reportedly is still on the Refuge in a pothole near the old headquarters).

Western (e.g., Euro-American) culture is also represented on the Refuge. Documentation refers to sites associated with lumbering, farmsteads and fields, a Civilian Conservation Corps camp (and facilities on the Refuge constructed by the CCC), hunters graves, cabins, and railroad, in addition to Refuge facilities.

The Refuge also contains the historic Chippewa Cemetery, still being used by the East Lake Band. And Indian interviews have provided descriptions of traditional cultural properties.

Most likely a large number of unreported prehistoric and historic sites exist on the Refuge. Although none are reported, prehistoric and historic sites are likely to also exist on the Sandstone Unit. The geography of the Mille Lacs NWR islands indicates no extant sites exist.

Archeological surveys have been completed on 186 acres of Rice Lake. These surveys and other sources have identified 57 prehistoric and historic cultural sites on Rice Lake NWR. No surveys have been done at the Sandstone Unit or Mille Lacs NWR.

The Indian tribes listed in Chapter 6 have been recognized by the Federal government or self-identified by the tribe as having a potential concern for traditional cultural resources, sacred sites, and cultural hunting and gathering areas in the counties in which the Refuges are located.

Indian tribes are generally understood to have concerns about traditional cultural properties. Other groups such as church congregations, civic groups, and county historical societies could have similar concerns about historic sites.

The Refuge has museum property but lacks a scope of collection statement. Five archeological collections have produced 1,272 artifacts, of which 5 (and 2 more from other sources) are on display at the Refuge, the remainder is located at the Minnesota Historical Society. These artifacts are owned by the Federal Government and can be recalled from the repository by the RHPO at any time.

Cultural resources are important parts of the Nation's heritage. The Service is committed to protecting valuable evidence of human interactions with each other and the landscape. Protection is accomplished in conjunction with the Service's mandate to protect fish, wildlife, and plant resources.

3.6 Fire Management

This section contains details about the prescribed fire and wildfire suppression procedures used on Rice Lake NWR. We have included more detail on this subject here and in Chapter 4 of the EA in order to fully document the Refuge's recent Fire Management Plan (FMP) in compliance with the National Environmental Policy Act.

3.6.1 Prescribed Fire

Prescribed fire is used regularly on the Refuge as a habitat management tool. Periodic burning of grasslands and wet meadows reduces encroaching woody vegetation such as willow. Fire also encourages the growth of desirable species such as native grasses, sedges and forbs. Trained and qualified personnel perform all prescribed burns under precise plans. The Refuge has an approved Fire Management Plan (FMP) that describes in detail how prescribed burning will be conducted. The FMP allows the Refuge to work cooperatively with the Minnesota DNR to plan for the cooperative use of prescribed fire to simultaneously burn adjoining units with similar management objectives. A burn is conducted only if it meets specified criteria for air temperature, fuel moisture, wind direction and velocity, soil moisture, relative humidity, and several other environmental factors. The specified criteria (prescription) minimize the chance that the fire will escape and increase the likelihood that the fire will have the desired effect on the plant community.

There are two burning seasons on Rice Lake NWR. The spring burning season starts as soon as spring thawing conditions will allow burning. This is usually in late March or April. It extends until mid-June. The fall season starts in late September and continues until fall rains, snow or low temperatures eliminate burning conditions. How often established units are burned depends on management objectives, historic fire frequency, and funding. The interval between burns may be 2 to 5 years or longer. As part of the prescribed fire program, we will conduct a literature search to determine the effects of fire on various plant and animal species, and we will begin a monitoring program to verify that objectives are being achieved.

Prescribed fires will not be started without the approval of the Regional Fire Management Coordinator when the area is at an extreme fire danger level or the National Preparedness level is V. In addition, we will not start a prescribed fire without first getting applicable concurrence when local fire protection districts or the State of Minnesota have instituted burning bans. Spot fires and escapes may occur on any prescribed fire. The spot fires and escapes may result from factors that cannot be anticipated during planning. A few small spot fires and escapes on a prescribed burn can usually be controlled by the burn crew. If so, they do not constitute a wildland fire. The burn boss is responsible for evaluating the frequency and severity of spot fires and escapes and, if necessary, slowing down or stopping the burn operation, getting additional help from the Refuge staff, or extinguishing the prescribed burn. If the existing crew cannot control an escaped fire and it is necessary to get help from the Minnesota DNR or other local fire units, the escape will be classified as a wildland fire and controlled accordingly. Once controlled, we will stop the prescribed burning for the burning period.

3.6.2 Fire Prevention and Detection

In any fire management activity, firefighter and public safety will always take precedence over property and resource protection. Historically, fire influenced the vegetation on the Refuge. Now, uncontrolled wildfires are likely to cause unwanted damage. In order to minimize this damage, we will seek to prevent and quickly detect fires by:

- Discussing fire prevention at safety meetings prior to the fire season and during periods of high fire danger and periodically training staff in fire prevention.
- Investigating all fires suspected of having been set illegally and taking appropriate action.
- Depending on neighbors, visitors, cooperators, and staff to detect and report fires.

3.6.3 Wildfire History

Wildfires were known in this area prior to the establishment of the Refuge in 1935. The historic occurrence of wildfire on the Refuge is limited to two documented wildfires in over 60 years. In 1987, a prescribed burn escaped the control lines, resulting in 300 acres classified as a wildfire. In 1988, a 2.5 acre wildfire was suppressed in the southeast portion of the Refuge.

The period of highest fire danger occurs from 1 April to 15 May and 1 September to 15 November. Generally, spring rains and vegetative green up have occurred by Memorial Day; in the fall, precipitation and colder temperatures reduce the fire haz-

ard by early November. The Refuge contains natural fire breaks such as lakes, creeks and the Rice River and manmade firebreaks i.e. roads, trails, dozer lines. These firebreaks have reduced wildfire danger in recent history. However, weather still has the greatest influence on wildfires in this area. A combination of prolonged drought conditions, lack of winter snow fall or delayed early spring rains can result in wildfire potential. Southerly winds in excess of 15 miles per hour are quite common and coupled with dried common reed (Phragmites) and cattail can create explosive conditions.

3.6.4 Fire Suppression

We are required by Service Policy to use the Incident Command System (ICS) and firefighters meeting National Wildfire Coordinating Group (NWCG) qualifications for fires occurring on Refuge property. Our suppression efforts will be directed towards safeguarding life while protecting Refuge resources and property from harm. Mutual aid resources responding from Cooperating Agencies will not be required to meet NWCG standards, but must meet the standards of their Agency. All wildland fires occurring on the Refuge and staffed with Service employees will be supervised by a qualified Incident Commander (IC). The IC will be responsible for all management aspects of the fire. The IC will obtain the general suppression strategy from the Fire Management Plan, but it will be up to the IC to implement the appropriate tactics. Minimum impact suppression tactics will be used whenever possible. As a guide, on low intensity fires (generally flame lengths less than 4 feet) the primary suppression strategy will be direct attack with hand crews and engines. On higher intensity fires (those with flame lengths greater than 4 feet) we may use indirect strategies of back fires or burning out from natural and human-made fire barriers. The barriers will be selected based on their ability to safely suppress the fire, minimize resource degradation, and be cost effective.

3.6.5 Wildland Urban Interface

Wildland Urban Interface (WUI) is defined as the area where houses meet or intermingle with undeveloped wildland vegetation. This makes the WUI a focal area for human-environment conflicts such as wildland fires, habitat fragmentation, invasive species, and biodiversity decline. FIREWISE is a community safety program developed to educate the public to the wildland urban interface and corrective measures needed. Additional examples include working toward a comprehensive social awareness and support system to inform the public concerning the benefits of using prescribed fire in fire adapted ecosystems.

The large size of Rice Lake NWR, coupled with uses on adjoining lands, somewhat diminishes the WUI presence but still creates the need to reduce wildland and urban intermix fire threats. The fire management program will mitigate any interface risks by a combination of mechanical fuels treatments near any buildings and prescribed fire to reduce and eliminate hazard fuel loadings while creating wide buffers around developed areas and adjacent to private property.

3.6.6 Mechanical Fuel Treatments

Mechanical fuel reduction is the use of mechanical equipment (i.e. weed whackers, chainsaws, dozers, rubber tired skidders, chippers, mowers, etc.) to cut and remove, or prepare for burning, woody fuels. Mechanical treatments are intended to help in achieving resource management goals and objectives, most often a combination of ecosystem restoration and reduction of high hazard fuel loadings. Mechanical fuel treatments must be described in a fuels project plan. The plan will contain a prescription defining goals, objectives, and treatment methods employed to achieve the objectives.

Mechanical fuel treatment is often used in concert with prescribed fire treatment. High hazard fuel conditions can be reduced while meeting structural objectives in areas immediately adjacent to buildings or on boundary areas through a mix of mechanical treatment and prescribed fire. Mechanical treatment can be used as the primary method of reaching structural goals while prescribed fire actually removes and eliminates the hazardous fuels.

Chapter 4: Environmental Consequences

4.1 Effects Common to all Alternatives

Specific environmental and social impacts of implementing each alternative are examined in the five broad issue categories:

- habitat management
- water management
- wildlife management
- public use
- cultural resources

However, several potential effects will be very similar under each alternative and are summarized below:

4.1.1 Air Quality

Air quality in Northern Minnesota is generally good. Habitat management involving prescribed fire will occur under each alternative, but only under ideal weather conditions. Approved smoke management practices developed by state and federal land management agencies in Minnesota will be implemented in all burning events. In addition, the generally low population density of the farmland and wildland bordering the Refuge serves to minimize even temporary smoke-related air quality impacts by reducing the number of potential "sensitive receptors" that could be affected by excessive smoke. Tailpipe emissions from operation of Refuge equipment and from visitation to the Refuge by the motoring public are negligible in comparison with overall regional emissions.

4.1.2 Water Quality

Water quality in Refuge water bodies is generally good. Proposed Refuge management activities such as prescribed fire, mowing, conversion of some habitat types to others, and approved herbicide use to control invasive and weedy plant species, should not negatively affect water quality. The same conclusion applies to present and proposed visitor use, including such activities as walking the nature trails, driving the auto tour route, hunting, photography, nature observation, and interpretation.

4.1.3 Cultural Resources and Historic Preservation

The Service is responsible for managing archeological and historic sites found on national wildlife refuges. The consequences of each alternative in this EA, in terms of cultural resources, are the same. Undertakings accomplished on the Refuge have the potential to impact cultural resources. Although the presence of cultural resources including historic properties cannot stop a Federal undertaking, the undertakings are subject to Section 106 of the National Historic Preservation Act; other laws often apply too and must be considered.

The Refuge Manager will, during early planning, provide the Regional Historic Preservation Officer a description and location of all projects, activities, routine maintenance and operations that affect ground and structures, and requests for permitted uses; and of alternatives being considered. The RHPO will analyze these undertakings for potential to affect historic properties and enter into consultation with the State Historic Preservation Officer and other parties as appropriate. The Refuge Manager will notify the public and local government officials to identify concerns about impacts by the undertaking; this notification will be at least equal to, and preferably with public notification accomplished for NEPA and compatibility.

Archeological investigations and collecting are performed only in the public interest by qualified archeologists or by persons recommended by the Governor of Minnesota working under an Archaeo-

logical Resources Protection Act permit issued by the Regional Director. Refuge personnel take steps to prevent unauthorized collecting by the public, contractors, and Refuge personnel; violators are cited or other appropriate action taken. Violations are reported to the Regional Historic Preservation Officer.

4.1.4 Environmental Justice

Executive Order 12898 "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations" was signed by President Clinton on February 11, 1994. Its purpose was to focus the attention of federal agencies on the environmental and human health conditions of minority and low-income populations with the goal of achieving environmental protection for all communities. The Order directed federal agencies to develop environmental justice strategies to aid in identifying and addressing disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority and low-income populations. The Order is also intended to promote nondiscrimination in federal programs substantially affecting human health and the environment, and to provide minority and low-income communities access to public information and participation in matters relating to human health or the environment.

Neither of the management alternatives described in this EA will disproportionately place any adverse environmental, economic, social, or health impacts on minority and low-income populations. The percentage of minorities in Aitkin County, where Rice Lake NWR is located, is lower than in the State of Minnesota and much lower than the United States as a whole. Although Aitkin County is among the 10 poorest counties in the state in terms of median household income and the poverty rate is in the top 20 counties in the state, public use activities that would be offered under each of the alternatives are available to any visitor regardless of race, ethnicity or income level.

In each alternative, the opportunity will continue for members of the Ojibwe Bands to harvest rice using traditional methods. Members of the local East Lake Band will continue to be permitted to practice drumming ceremonies and maintain a cemetery on the Refuge.

4.1.5 Climate Change Impacts

The U.S. Department of the Interior issued an order in January 2001 requiring federal agencies, under its direction, that have land management responsibilities to consider potential climate change impacts as part of long range planning endeavors.

The increase of carbon dioxide (CO2) within the earth's atmosphere has been linked to the gradual rise in surface temperature commonly referred to as global warming. In relation to comprehensive conservation planning for national wildlife refuges, carbon sequestration constitutes the primary climate-related impact that refuges can affect in a small way. The U.S. Department of Energy's "*Carbon Sequestration Research and Development*" defines carbon sequestration as "...the capture and secure storage of carbon that would otherwise be emitted to or remain in the atmosphere."

Vegetated land is a tremendous factor in carbon sequestration. Terrestrial biomes of all sorts – grasslands, forests, wetlands, tundra, and desert – are effective both in preventing carbon emission and acting as a biological "scrubber" of atmospheric CO2. The Department of Energy report's conclusions noted that ecosystem protection is important to carbon sequestration and may reduce or prevent loss of carbon currently stored in the terrestrial biosphere.

Conserving natural habitat for wildlife is the heart of any long-range plan for national wildlife refuges. The actions proposed in this CCP would conserve or restore land and habitat, and would thus retain existing carbon sequestration on the Refuge. This in turn contributes positively to efforts to mitigate human-induced global climate change.

One Service activity in particular – prescribed burning – releases CO2 directly to the atmosphere from the biomass consumed during combustion. However, there is actually no net loss of carbon, since new vegetation quickly germinates and sprouts to replace the burned-up biomass and sequesters or assimilates an approximately equal amount of carbon as was lost to the air (Boutton et al. 2006). Overall, there should be little or no net change in the amount of carbon sequestered at Rice Lake NWR from any of the proposed management alternatives.

Several impacts of climate change have been identified that may need to be considered and addressed in the future:

- Habitat available for cold water fish such as trout and salmon in lakes and streams could be reduced.
- Forests may change, with some species shifting their range northward or dying out, and other trees moving in to take their place.
- Ducks and other waterfowl could lose breeding habitat due to stronger and more frequent droughts.
- Changes in the timing of migration and nesting could put some birds out of sync with the life cycles of their prey species.
- Animal and insect Species historically found farther south may colonize new areas to the north as winter climatic conditions moderate

The managers and resource specialists on the Refuge need to be aware of the possibility of change due to global warming. When feasible, documenting long-term vegetation, species, and hydrologic changes should become a part of research and monitoring programs on the Refuge. Adjustments in refuge management direction may be necessary over the course of time to adapt to a changing climate.

The following paragraphs are excerpts from the 2000 report, *Climate Change Impacts on the United States: The Potential Consequences of Climate Variability and Change*, produced by the National Assessment Synthesis Team, an advisory committee chartered under the Federal Advisory Committee Act to help the US Global Change Research Program fulfill its mandate under the Global Change Research Act of 1990. These excerpts are from the section of the report focused upon the eight-state Midwest region.

4.1.5.1 Observed Climate Trends

Over the 20th century, the northern portion of the Midwest, including the upper Great Lakes, has warmed by almost 4°F (2°C), while the southern portion, along the Ohio River valley, has cooled by about 1°F (0.5°C). Annual precipitation has increased, with many of the changes quite substantial, including as much as 10 to 20% increases over the 20th century. Much of the precipitation has resulted from an increased rise in the number of days with heavy and very heavy precipitation events. There have been moderate to very large increases in the number of days with excessive moisture in the eastern portion of the basin.

4.1.5.2 Scenarios of Future Climate

During the 21st century, models project that temperatures will increase throughout the Midwest, and at a greater rate than has been observed in the 20th century. Even over the northern portion of the region, where warming has been the largest, an accelerated warming trend is projected for the 21st century, with temperatures increasing by 5 to 10°F (3 to 6°C). The average minimum temperature is likely to increase as much as 1 to 2°F (0.5 to 1°C) more than the maximum temperature. Precipitation is likely to continue its upward trend, at a slightly accelerated rate; 10 to 30% increases are projected across much of the region. Despite the increases in precipitation, increases in temperature and other meteorological factors are likely to lead to a substantial increase in evaporation, causing a soil moisture deficit, reduction in lake and river levels, and more drought-like conditions in much of the region. In addition, increases in the proportion of precipitation coming from heavy and extreme precipitation are very likely.

4.1.5.3 Midwest Key Issues

Reduction in Lake and River Levels

Water levels, supply, quality, and water-based transportation and recreation are all climate-sensitive issues affecting the region. Despite the projected increase in precipitation, increased evaporation due to higher summer air temperatures is likely to lead to reduced levels in the Great Lakes. Of 12 models used to assess this question,11 suggest significant decreases in lake levels while one suggests a small increase. The total range of the 11 models' projections is less than a one-foot increase to more than a five-foot decrease. A five-foot (1.5-meter) reduction would lead to a 20 to 40% reduction in outflow to the St. Lawrence Seaway. Lower lake levels cause reduced hydropower generation downstream, with reductions of up to 15% by 2050. An increase in demand for water across the region at the same time as net flows decrease is of particular concern. There is a possibility of increased national and international tension related to increased pressure for water diversions from the Lakes as demands for water increase. For smaller lakes and rivers, reduced flows are likely to cause water quality issues to become more acute. In addition, the projected increase in very heavy precipitation events will likely lead to increased flash flooding and worsen agricultural and other nonpoint source pollution as more frequent heavy rains wash pollutants into rivers and lakes. Lower water

levels are likely to make water-based transportation more difficult with increases in the costs of navigation of 5 to 40%. Some of this increase will likely be offset as reduced ice cover extends the navigation season. Shoreline damage due to high lake levels is likely to decrease 40 to 80% due to reduced water levels.

Adaptations: A reduction in lake and river levels would require adaptations such as re-engineering of ship docks and locks for transportation and recreation. If flows decrease while demand increases, international commissions focusing on Great Lakes water issues are likely to become even more important in the future. Improved forecasts and warnings of extreme precipitation events could help reduce some related impacts.

Agricultural Shifts

Agriculture is of vital importance to this region, the nation, and the world. It has exhibited a capacity to adapt to moderate differences in growing season climate, and it is likely that agriculture would be able to continue to adapt. With an increase in the length of the growing season, double cropping, the practice of planting a second crop after the first is harvested, is likely to become more prevalent. The CO2 fertilization effect is likely to enhance plant growth and contribute to generally higher yields. The largest increases are projected to occur in the northern areas of the region, where crop yields are currently temperature limited. However, yields are not likely to increase in all parts of the region. For example, in the southern portions of Indiana and Illinois, corn yields are likely to decline, with 10-20% decreases projected in some locations. Consumers are likely to pay lower prices due to generally increased yields, while most producers are likely to suffer reduced profits due to declining prices. Increased use of pesticides and herbicides are very likely to be required and to present new challenges.

Adaptations: Plant breeding programs can use skilled climate predictions to aid in breeding new varieties for the new growing conditions. Farmers can then choose varieties that are better attuned to the expected climate. It is likely that plant breeders will need to use all the tools of plant breeding, including genetic engineering, in adapting to climate change. Changing planting and harvest dates and planting densities, and using integrated pest management, conservation tillage, and new farm technologies are additional options. There is also the potential for shifting or expanding the area where certain crops are grown if climate conditions become more favorable. Weather conditions during the growing season are the primary factor in year-to-year differences in corn and soybean yields. Droughts and floods result in large yield reductions; severe droughts, like the drought of 1988, cause yield reductions of over 30%. Reliable seasonal forecasts are likely to help farmers adjust their practices from year to year to respond to such events.

Changes in Semi-natural and Natural Ecosystems

The upper Midwest has a unique combination of soil and climate that allows for abundant coniferous tree growth. Higher temperatures and increased evaporation will likely reduce boreal forest acreage, and make current forestlands more susceptible to pests and diseases. It is likely that the southern transition zone of the boreal forest will be susceptible to expansion of temperate forests, which in turn will have to compete with other land use pressures. However, warmer weather (coupled with beneficial effects of increased CO2),are likely to lead to an increase in tree growth rates on marginal forestlands that are currently temperature-limited. Most climate models indicate that higher air temperatures will cause greater evaporation and hence reduced soil moisture, a situation conducive to forest fires. As the 21st century progresses, there will be an increased likelihood of greater environmental stress on both deciduous and coniferous trees, making them susceptible to disease and pest infestation, likely resulting in increased tree mortality.

As water temperatures in lakes increase, major changes in freshwater ecosystems will very likely occur, such as a shift from cold water fish species, such as trout, to warmer water species, such as bass and catfish. Warmer water is also likely to create an environment more susceptible to invasions by non-native species. Runoff of excess nutrients (such as nitrogen and phosphorus from fertilizer) into lakes and rivers is likely to increase due to the increase in heavy precipitation events. This, coupled with warmer lake temperatures, is likely to stimulate the growth of algae, depleting the water of oxygen to the detriment of other living things. Declining lake levels are likely to cause large impacts to the current distribution of wetlands. There is some chance that some wetlands could gradually migrate, but in areas where their migration is limited by the topography, they would disappear. Changes in bird populations and other native wildlife have already been linked to increasing temperatures and more changes are likely in the future. Wildlife populations are particularly susceptible to climate extremes due to the effects of drought on their food sources.

4.1.6 Prescribed Fire

4.1.6.1 Social Implications

A prescribed burn on the Refuge will benefit the public in creating recreational opportunities via improved habitat that will support increased wildlife populations for hunting and observation. If a wildland fire occurs on or near the Refuge, the areas that were prescribed burned and the fire-breaks intended for prescribed burning will help in controlling the fire.

Smoke from a Refuge fire could impair visibility on roads and become a hazard. All efforts will be taken to assure that smoke does not impact smoke sensitive areas such as roads and local residences. The impact of smoke can be reduced through management actions, which include:

- use of traffic control
- signing
- altering ignition techniques and sequence
- halting ignition
- suppressing the fire
- use of local law enforcement officers to assist with traffic control.

Burning will be done only when the smoke will not be blown across a neighboring community or when the wind is sufficient to prevent heavy concentrations.

Combustion of fuels during prescribed fire operations may temporarily impact air quality, but the impacts are mitigated by small burn unit size, direction of wind, and distance from population centers. In the event of wind direction change, mitigation measures will be taken to assure public safety and comfort. Refuge staff will work with neighboring agencies and State air quality personnel to address smoke issues that require additional mitigation. The Prescribed Fire Plan describes specific measures to deal with smoke management problems for each unit.

Any smoke from the Refuge may cause some public concern. This concern will be reduced through a concerted effort by Refuge personnel to inform the local citizens about the prescribed burning program, emphasizing the benefits to wildlife and the safety precautions that are taken. Interpretive programs, explaining the prescribed burning program, may also be conducted on and off the Refuge.

In general, local public attitude toward fire is positive. In fact, during the spring or fall, smoke becomes a familiar part of the surrounding landscape.

4.1.6.2 Cultural and Archaeological Resources

There may be archaeological sites within prescribed burn units. When these units are burned, it is doubtful that the fire will have any adverse impact on the sites. The fire will be only a temporary disturbance to the vegetation in the area and in no way destroy or reduce the archaeological value, since artifacts are buried beneath the surface. No known sites will be impacted by prescribed burning operations.

Constructing firebreaks usually involves some shallow ground disturbance that could damage or destroy these resources. If a firebreak is needed on undisturbed ground, the area will be surveyed prior to construction to protect any cultural or archaeological resources.

4.1.6.3 Flora

The prescribed burning program will have a visible impact on vegetation and the land. Immediately after a fire much of the land will be blackened. There will be few grasses or ground forbs remaining and most of the brush will be scorched. Trees may be scorched. Because of wet ground conditions or discontinuous fuel, there may be areas within the burn unit that are untouched by the fire.

In spring, grasses and forbs will begin to grow within a few days of the burn. The enriched soil will promote rapid growth such that after two or three weeks the ground will be covered. In some cases, young trees will re-sprout. Some of the less fire resistant trees will show signs of wilting and may succumb. After one season of regrowth, most signs of the prescribed burn will be difficult to detect without close examination.

Other signs of the burn will remain for longer periods. The firebreaks will be maintained for use in containing wildland fires and future prescribed burns. Vehicle tracks through the burn are visible on the freshly burned ash and may be longer lived if the vehicle created ruts in the ground. Travel across the burn area will be kept to a minimum. Vehicle travel is necessary in some instances, such as lighting the fire lines or quickly getting water to an escape point. When vehicle traffic is deemed necessary it will most likely be a tracked vehicle as a wheeled vehicle is unable to operate in the bog.

4.1.6.4 Listed Species

Precautions will be taken to protect threatened and endangered species during prescribed burning. Nesting trees for Bald Eagles will be protected and burning will not be conducted at a time or in a way to negatively impact any nesting eagles. If any of the known populations of listed plant species are in or near a burn unit, precautions will be taken to avoid the plants.

4.1.6.5 Soils

The effect of fire on soil is dependent largely on the fire intensity and duration. On areas with high fuel loads, a slow backing fire is usually required for containment and desirable results. The intense heats generated by a slow backing fire will have a greater effect on the soils than fast, cooler headfires. The cool, moist soils of wetter areas in the burn units or areas with little fuel will be minimally affected by the fire.

The degree of impact to the soil is a function of the thickness and composition of the organic mantle. In cases where only the top layer of the mantle is scorched or burned, there will be no effect on the soil. This usually occurs in the forested areas of the burn units.

On open grassland sites, the blackening of the relatively thin mantle will cause greater heat absorption and retention from the sun. This will encourage earlier germination during the spring growing season.

Nutrient release occurs as a result of the normal decomposition process. Fire will speed up the nutrient release process. The rate and amount of nutrients released will be dependent on the fire duration and intensity as well as the amount of humus, duff and other organic materials present in the mantle. The increase, immediately after a burn, of calcium, potash, phosphoric acid and other minerals will give the residual and emergent vegetation a short-term boost.

There is no evidence to show that the direct heating of soil by a fire of low intensity above it has any significant adverse affect. Fire of this type has little total effect on the soil, and in most cases would be beneficial.

4.1.6.6 Peat Fires

An ecological impact that can result from wildfire is ignition of peat soils. Most of the Refuge's bog soils are overlain with peat varying in depth from a few inches to 6 feet or more. Once started, peat is often difficult to extinguish and can burn down to mineral soils. This can change the vegetation composition in an area. Peat fire suppression efforts can also have an adverse effect on the vegetation through the use of heavy equipment (dozers, fire trucks, etc).

On Agassiz NWR, a refuge in northwest Minnesota, some previously burned areas with prolonged peat fires has shown that the resulting habitat has become exceptional for waterfowl. The burned-out areas created potholes in what were otherwise temporary or cattail-choked wetlands. The damages versus benefits of burning peat will need to be addressed on a case by case basis.

4.1.6.7 Escaped Fire

The possibility exists that prescribed fire may escape to the surrounding area. An escape can be caused by factors that may, or may not, be preventable. Inadequate firebreaks, too few personnel, unpredicted changes in weather conditions, peculiar fuel type, and insufficient knowledge of fire behavior are factors that can lead to a loss of control. An escaped fire can turn into a very serious situation. On the Refuge's wildlands, an escaped fire would cause less severe damage than on land where buildings, equipment, and land improvements could be damaged. Many of the prescribed burn areas are well within the Refuge and of minimal threat to private or other improved lands. We will exercise extreme care, careful planning, and adherence to the unit prescription when we conduct all prescribed burns. We will place an extra emphasis on control when burning areas that are near developed areas or the Refuge boundary.

In the event that a prescribed fire does jump a firebreak and burn into unplanned areas, there is a high probability of rapid control with minimal adverse impact. In general, prescribed burns will have light fuel loads (0.25 to 3 tons of fuel per acre), will be burned under low fuel moisture conditions, and will be burned under specific wind direction and atmosphere stability conditions. The network of firebreaks and roads will greatly assist in rapid containment.

In most cases, all of the Refuge fire fighting equipment will be immediately available at the scene with all nearby water sources previously located. The applicable Minnesota DNR fire suppression crews and local fire departments will always be notified of a prescribed burn. Thus, maxi-

mum numbers of experienced personnel and equipment are immediately available for wildfire suppression activities.

4.2 Summary of Effects by Alternative

This section describes the environmental consequences of adopting each Refuge management alternative. Table 2 on page 32 addresses the likely outcomes for specific issues and is organized by broad issue categories.

4.2.1 Alternative A: Current Direction (No Action)

This alternative would lead to the long-term decline of rice production on Rice Lake. Less rice would mean less food for migrating waterfowl and smaller harvests for American Indians. The experimental pickerelweed mowing study would continue as well as coordination and comparison of the other pickerelweed control measures with state and tribal agencies in the Great Lake States. Forest succession would occur without management intervention. The age classes among trees would be less diverse than what occurred historically and would lead eventually to an over-representation of mature and old age classes. Most warbler species would have less beneficial habitat than would have occurred historically. Invasive species would be detected after spreading, causing effective management to be difficult.

In this alternative, the old crop field on the auto tour would be maintained as open grassland. Wildlife observation would continue to be a benefit from the area. Visitors would have a reasonable expectation of seeing deer. Grassland bird species, such as Bobolinks, would continue to use the area.

The area recommended for Wilderness would continue to be managed as de facto wilderness. Invasion of brush into the sedge meadow of the area would continue. The sedge meadow would change in character from its historical character when fire was more common.

The Sandstone Unit would continue to receive little or no management. Grasslands would gradually succeed to forests and the existing forest would continue to succeed with a more even-aged structure than would have occurred historically.

The numbers of visitors partaking in wildlife-dependent recreation would continue to gradually increase as the population increases. The opportunities would stay the same as in 2005 with a gradual increase in quality of facilities. The volunteer program and coordination with the Friends group would continue at current levels. Outreach would continue at current levels. Community and visitor support for the Refuge mission would increase gradually as a result of experience on the Refuge and information about it.

The opportunities for American Indians to practice their cultural traditions would continue at the current level, which would help to maintain the cultural values within their community. All buildings associated with Headquarters Ridge would remain, with continuing impacts to cultural resources.

Current management and monitoring practices at Mille Lacs NWR would continue. Common Tern production would exist with increased uncertainty and variability as adequate nesting habitat on Hennepin Island varied in size with water levels of the lake.

4.2.2 Alternative B: Integrated Wildlife and Public Use (Preferred Alternative)

This alternative would lead to a sustained or increased rice production on Rice Lake. Continued production of rice would mean food for migrating waterfowl, but with increased variability from year to year. Greater overall harvests of wild rice by American Indians would be anticipated. However, the increased variability of harvest would mean that in some years the harvest would be difficult and the yield low. The anticipated control of pickerelweed would also contribute to greater rice production. The increased control of pickerelweed would be accomplished through increased management costs. Because management of forests would increase, the age classes within the aspen stands would have greater diversity than at present. The priority bird species that are expected to benefit from mixed-age stands are neotropical species like Golden-winged Warblers and game species like American Woodcock. The bird species that are expected to benefit from reduced fragmentation are forest-interior birds such as Wood Thrush, Red-eyed Vireo, Scarlet Tanager, Ovenbird, Pileated Woodpecker, and Broad-winged Hawk. In this alternative the old crop field on the auto tour would be partially restored to forest with an 85-acre block next to the auto tour route maintained as open grassland and converted

to native grasses and forbs in the future. The area in which wildlife observation would be easiest would be decreased. However, the species using the grassland would be more easily seen because the animals would be closer to the road. Grassland species, such as Bobolinks and Eastern Meadowlarks, would have less habitat available to them. Species that use the forest, such as Broad-winged Hawk and Wood Thrush would have more habitat available to them. Invasive species would be detected quickly and appropriate action taken to reduce large scale impacts to the natural habitats and the wildlife that depend on them.

The recommendation for Wilderness on a portion of the Refuge would be withdrawn under this alternative. Additional management options to treat sedge meadow, for instance, would be available to the staff. That portion of the Refuge would have greater chance of optimizing the habitat for priority wildlife. Natural processes would not necessarily be allowed to proceed, which may reduce ecological information of the area.

The Sandstone Unit would be more actively managed under this alternative with accompanying increased management costs. Vegetation would be slowly restored to pre-settlement conditions. This alternative would favor forest bird species over grassland birds in the long-term. The change in habitats would occur more rapidly than under Alternative A.

The number of visitors would increase more than under Alternative A due to increased hunting and wildlife observation opportunities. A curriculum linked to state standards would result in higher quality environmental education opportunities. Increased quality and quantity of outreach activities would be expected to generate more visitation and support for the Refuge under this Alternative than under Alternative A. Support for the Refuge and accomplishments would increase under this alternative as a result of a larger and more active volunteer and Friends program.

The opportunities for American Indians to practice their cultural traditions would continue at the current level, which would help to maintain the cultural values within their community. All buildings associated with Headquarters Ridge would be relocated to avoid further degradation of cultural resources.

With increased size and protection of Hennepin Island, Common Tern production would increase with more certainty than in Alternative A. The monitoring of bird populations on Spirit Island would continue as in Alternative A.

4.3 Cumulative Impact Analysis

"Cumulative impact" is the term that refers to impacts on the environment that result from the incremental impact of the proposed action when added to other past, present and reasonably foreseeable future actions, regardless of what agency (federal or nonfederal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. In this section, the cumulative impacts of each of the two alternatives are discussed in terms of wildlife habitat and environmental education, and hunting.

4.3.1 Wildlife Habitat

The water level and pickerelweed management across northern Minnesota through removing beaver dams, and using cookie cutters and harvesters to remove pickerelweed will likely result in maintaining the current Minnesota range and production of wild rice for wildlife and humans. The historic range of wild rice has shrunk dramatically over the century with wetland loss and seed source loss. Under Alternative A, Rice Lake would be managed primarily for wild rice production, which requires stable water levels throughout the growing season from early May through late September. Under Alternative B, Rice Lake would be managed to simulate natural conditions that would include more variability in water levels. Rice Lake would be allowed to function more as a natural system with natural fluctuations in an effort to reduce perennial plant competition with wild rice. Pickerelweed on Rice Lake would be reduced through mowing and water level management to a level as to not interfere with long-term wild rice production. This management strategy, coupled with the active management of wild rice producing lakes across northern Minnesota, would provide large scale / long-term cumulative benefits for migrating waterfowl and the Ojibwe people.

There are two shifts currently ongoing in Minnesota's forests. Formerly large, privately owned forests are being parcelized due to increasing land

values. This has resulted in forest fragmentation and more forest managers/owners managing smaller forest units for personal economic gain. Public land, however, is seeing an increased focus on certification, which balances the economics, public desires/uses, with ecological health. This is a shift from the previous focus on economic driven timber management. Under Alternative A, forest succession would occur without management intervention. The age classes among trees would be less diverse than what occurred historically and would lead eventually to an over-representation of mature and old age classes. Under Alternative B, management of forests would increase, the age classes within the aspen stands would have greater diversity than at present. Rice Lake NWR is in a unique position to focus on the ecological health and bird forest relationship without a mandate to produce income. Rice Lake NWR can provide habitat at both ends of the forest spectrum, early successional forest and older growth hardwoods, both habitats currently limited in this area due to economic driven forest management practices. In working with adjacent land managers, larger blocks of the forest will be managed for the benefit of Minnesota's priority wildlife.

In central Minnesota, fire suppression has allowed many open bog/sedge meadow habitats to succeed to brushland. Many agencies on public and private land are working hard to maintain what open bog is in good condition and restore as many areas as possible through prescribed burning and brush cutting to a more open landscape. On Rice Lake NWR, prescribed fire has been the management tool used to decrease and inhibit further brush invasion into the open bogs. This concerted effort would likely lead to an increase in the amount of open bog habitat available for priority breeding birds and a cumulative beneficial impact to such species as Yellow Rail, American Bittern, LeConte's Sparrow and Nelson's Sharp-tailed Sparrow and thus stabilizing breeding populations in Minnesota.

4.3.2 Environmental Education

Environmental education is provided by a variety of institutions inside and outside of the formal classroom. In addition to K-12 public schools, in which environmental education is generally included under the life and physical sciences, especially biology, but also within chemistry, geography, civics, and history, museums, zoos, parks, libraries, television and the news media (e.g., newspapers, magazines, the Internet) all contribute to improving environmental education for American students and citizens. As a result of the cumulative impact of these combined efforts, in recent decades the average American's level of environmental knowledge and awareness appear to have gradually increased.

At present, Rice Lake NWR provides a small amount of environmental education on and off the Refuge. These efforts are focused primarily on wildlife and habitat. Efforts and results are constrained in part by staffing and budgetary limitations. The Refuge is not able to dedicate an entire staff person's efforts to environmental education, rather it is a collateral duty shared among the staff. Under Alternative A, this would remain the same, and there would be a continuing modest contribution to overall environmental education efforts in the region. Under Alternative B, environmental education would receive an increased emphasis. This enhanced effort would likely lead to an associated cumulative, beneficial impact on environmental knowledge and awareness in the citizens of east-central Minnesota.

4.3.3 Hunting

Hunting is a popular and traditional pastime in the rural areas of Minnesota. Hunting is a priority public use that occurs at many National Wildlife Refuges across the country and at all nearby Refuges in Minnesota. Refuge hunting seasons and bag limits for non migratory species are established within guidelines provided by the state. The state guidelines/regulations are based on wildlife population indices that determine the amount of harvest a particular population can sustain without impacting long term population goals. There is ample scientific data to support modern hunting regulations that only harvest the surplus portion of the population. Hunting white-tailed deer is a prime example; approximately 250,000 deer are harvested each year in MN (from years 2003 – 2006). Hunting is necessary to keep the deer population in check with available habitat.

While hunting activity on the Refuge does add to the total number of animals harvested at both the state and national level, all but two of the species taken are part of local populations with small home ranges, resulting in a limited harvest that does not cumulatively affect populations across the state or country. Woodcock and Snipe are the only migratory bird species taken on the Refuge that could impact a larger migratory population. However, the U.S. Fish and Wildlife Service monitor these populations annually and the Refuge participates in nationwide

woodcock surveys. The harvest on the Refuge contributes to only a very minor percentage of the total flyway harvest.

Hunting on the Refuge contributes a very small percentage of the total harvest for deer, grouse, and other small game. While no Refuge deer harvest data exists for the archery hunters, firearms hunters harvested only 12 deer in 2005 and 13 deer in 2006, yet local surveys conducted by MN DNR indicate the deer population is increasing. There are approximately 1,000 total hunting visits to the Refuge each year. The majority of hunter visits occurs during the months of September, October, and November. Not all hunters successfully take game, therefore the number of animals harvested on the Refuge contribute only a small number to the overall harvest across the state and nation.

Under Alternative A, all hunting activities would remain the same. Hunting opportunities and the number of hunting visits is expected to increase slightly under Alternative B. Alternative B would allow expansion of the deer hunting program to include limited hunts by disabled hunters, youth, and muzzleloaders, while modifying hunt unit boundaries and seasons to minimize the potential for conflict with non-hunting users. The modified hunting seasons are expected to result in fewer hunters for the general firearm deer season. As such there will be no cumulative impacts to wildlife populations or their habitat from a modest increase in hunting on Rice Lake NWR, taking place during state seasons for which regular wildlife population surveys/analysis occurs.

Table 2: Summary of Impacts for Management Alternatives at Rice Lake NWR and Mille Lacs National Wildlife Refuges

Issues	Alternative A: Current Direction (No Action)	Alternative B: Integrated Wildlife and Public Use (Preferred Alternative)
Rice Lake NWR		
Management of Rice Lake		
Rice Production	Long-term decline.	Sustained or increased.
Pickerelweed	Increasing acreage.	Decreasing acreage.
Rice Harvest	Long-term decline.	Increase overall, but with greater annual variability.
Management Cost	No change from present.	Increased cost for control of pickerelweed and more active water management.
Birds	Long-term decline in fall waterfowl usage.	Increase use in fall by waterfowl, but with greater annual variability.
Fish	No change from present.	Possible decreased spawning activity in low water years.
Other Wildlife	No change from present.	No change from present.
Management of Crop Field Area		
Birds	No change from present.	Decrease in grassland bird abundance, increase in forest bird abundance.
Other Wildlife	No change from present.	Slight decrease in wildlife use by edge preferring species.
Wildlife Observation	Same opportunities.	Slightly reduced opportunities.
Management of Forest		
Forest Age	Long-term over-representation of mature and old age classes.	Reduced age in aspen/birch forest, increase in age in northern hardwood forest blocks.
Forest Health	Long-term decline in health, over crowding, more susceptible to disease.	Increase in health, more resistant to disease and invasive species (e.g. gypsy moth).
Forest Block Size	No change from present.	Larger blocks of contiguous forest.
Birds	No change from present.	Increased production, fewer edge effects (nest parasitism and predation).
Other Wildlife	No change from present.	Connection of forest corridor will allow for easier movement of forest wildlife.

Table 2: Summary of Impacts for Management Alternatives at Rice Lake NWR and Mille Lacs National Wildlife Refuges (Continued)

Issues	Alternative A: Current Direction (No Action)	Alternative B: Integrated Wildlife and Public Use (Preferred Alternative)
Rice Lake NWR		
Economic Benefit	No increase.	Small increase due to some timber harvest.
Threatened or Endangered Species	No change from present.	Increase in nesting habitat for Bald Eagle.
Invasive Species		
Detection and Control	No change from present.	Increased control due to early detection.
Management Cost	Long-term increase, attacking just large scale invasions.	Short-term increase/long-term decrease due to minimized large scale outbreaks.
Wildlife	Long-term decrease in species abundance due to reduced suitable habitat.	Maintaining or slight increase in species abundance due to better quality habitat.
Forest	Unhealthy/diseased forest through exotic insects, invasive plants, and changing understory due to exotic earthworms.	Limited impacts of invasive species due to early control measures.
Bog	Decrease in native plants, increase of common reed and purple loosestrife.	Limited impacts of invasive species due to early control measures.
Rivers and Lakes	Decrease in native species/ increase in exotics (plant and animal)	Limited impacts of invasive species due to early control measures.
Wilderness Recommendation		
Management Flexibility	1,400 acres managed as de facto wilderness.	Increased flexibility for sedge meadow management.
American Indian Community Activities		
	No change from the present.	No change from the present.
Cultural Resources		
Interpretation of past	Same opportunity for visitors to learn about cultural history.	Increased opportunity for visitors to learn about cultural history.
Protecting Cultural Resources	No change from present.	Increased opportunity.
Wildlife-dependent Recreation		
Hunting	No change from present.	Increased opportunity.

Table 2: Summary of Impacts for Management Alternatives at Rice Lake NWR and Mille Lacs National Wildlife Refuges (Continued)

Issues	Alternative A: Current Direction (No Action)	Alternative B: Integrated Wildlife and Public Use (Preferred Alternative)
Rice Lake NWR		
Fishing	No change from present.	No change from present.
Observation & Photography	No change from present.	Increased opportunity.
Interpretation	No change from present.	Increased opportunity.
Environmental Education	No change from present.	Increased quality and opportunity; and closer link to state standards.
Prescribed Burning		
Birds	No change from present.	No change from present.
Other Wildlife	No change from present.	No change from present.
Management Cost	No change from present.	No change from present.
Sandstone Unit		
Management to Service Standards		
	No change from present.	Increase in management costs; forest birds favored over grassland birds.
Mille Lacs NWR		
Common Tern Management		
Birds	No change from present.	Increase in common tern nesting pairs, large increase of fledglings produced
Management Costs	No change from present.	Increase short-term to complete island enhancement project, then same as present.
Tribal Coordination	No change from present.	No change from present.

Chapter 5: List of Preparers

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Chapter 6: Consultation and Coordination With Stakeholders

The Rice Lake and Mille Lacs NWRs Comprehensive Conservation Plan and Environmental Assessment has been written with the participation of Regional Office and Refuge staff, Minnesota DNR personnel, and the local community. Representatives of the Minnesota DNR and of the Mille Lacs Band of the Ojibwe reviewed early drafts of the documents. Please see Chapter 2 of the CCP for more information on the public scoping process.

The Draft CCP and EA were sent to the following list of federally-recognized tribes, county historical societies, and other organizations/offices:

- Bad River Band of the Lake Superior Tribe of Chippewa Indians
- Bois Forte Band (Nett Lake) of the Minnesota Chippewa Tribe
- Fond du Lac Band of the Minnesota Chippewa Tribe
- Grand Portage Band of the Minnesota Chippewa Tribe
- Keweenaw Bay Indian Community
- Lac Courte Oreilles Band of Lake Superior Chippewa Indians of Wisconsin
- Lac du Flambeau Band of Lake Superior Chippewa Indians
- Lac Vieux Desert Band of Lake Superior Chippewa Indians
- Leech Lake Band of the Minnesota Chippewa Tribe
- Mille Lacs Band of the Minnesota Chippewa Tribe
- Minnesota Chippewa Tribe
- Red Cliff Band of Lake Superior Chippewa Indians of Wisconsin
- Red Lake Band of Chippewa Indians
- Saint Croix Chippewa Indians of Wisconsin
- Sokaogon Chippewa Community, Wisconsin
- White Earth Band of Minnesota Chippewa Tribe
- Crow Creek Sioux
- Flandreau Santee Sioux
- Lower Brule Sioux
- Lower Sioux Mdewakanton Indian Community
- Oglala Sioux
- Rosebud Sioux
- Santee Sioux
- Shakopee Mdewakanton Sioux
- Sisseton-Wahpeton Sioux Tribal Council
- Spirit Lake (Devils Lake) Sioux
- Standing Rock Sioux
- Upper Sioux Indian Community of Minnesota
- Yankton Sioux
- Aitkin County Historical Society
- Mille Lacs County Historical Society
- Pine County Historical Society
- State Historic Preservation Officer
- Office of the State Archeologist
- Minnesota Indian Affairs Council
- The Advisory Council on Historic Preservation
- Dr. Barbara H. O'Connell, Department of Anthropology, Hamline University
- James Myster, Archeologist, Bureau of Indian Affairs
- The FWS Historic Preservation Officer

The final CCP will be sent to the State Historic Preservation Officer; and to others who request it.

Chapter 7: References and Literature Cited

Please see Appendix H of the CCP.