

# **Appendix A: Environmental Assessment**



## FINDING OF NO SIGNIFICANT IMPACT

### Necedah National Wildlife Refuge Comprehensive Conservation Plan and Environmental Assessment

For the reasons briefly presented below and based on an evaluation of the information contained in the supporting references enumerated below, I have determined that adoption and implementation of the Comprehensive Conservation Plan (CCP) covering the Necedah National Wildlife Refuge is not a major Federal action which would significantly affect the quality of the human environment within the meaning of Section 102(2)(c) of the National Environmental Policy Act of 1969. An Environmental Impact Statement will, accordingly, not be prepared.

#### Reasons:

1. Economic impacts to the local and regional economy will be negligible compared to the overall economic base of the area. Refuge-dependent commercial (e.g., road maintenance, furbearer trapping, timber harvest), recreational (e.g., hunting, fishing, wildlife observation and photography), and management (e.g., Refuge spending) activities contribute considerably to the regional economy.
2. Acquisition and management of land in the Yellow River Focus Area by the U.S. Fish and Wildlife Service will be from willing sellers only and annual revenue sharing payments will be made to the Townships to help off-set potential impacts to the tax base. Potential tax impacts to area residents as a result of Service acquisition of land in the Yellow River Focus Area would be minimal.
3. Cultural resource inventory surveys will be conducted as necessary to insure protection of archeological, historical, and architectural resources.
4. Refuge management actions will not have any long-term adverse impacts to threatened or endangered species. Refuge management actions will improve habitat conditions for the Federally endangered Karner blue butterfly, whooping crane, and eastern timber wolf, as well as the bald eagle (federally threatened) and eastern massasauga rattlesnake (federal candidate). Ongoing re-introduction efforts of the Federally endangered whooping crane represent an important step toward recovery of that species (see attached Biological Opinion).
6. Increasing high quality grassland and savanna habitat on Refuge land will result in additional nesting habitat for many grassland/savanna-dependent bird species currently experiencing serious population declines. Additional emergent wetlands surrounded by grassy uplands will result in improved nesting and rearing habitat for many waterfowl species that utilize the Refuge.
7. The proposed visitor center will not result in the loss or degradation of any ecologically important or unique habitat or have any negative impacts on visitor experiences (e.g., hunters, wildlife observers).
8. The CCP provides a clear statement of direction for future management of the Refuge.

9. The CCP gives refuge neighbors, visitors and the general public an understanding of the Service's management actions on and around Complex refuges.
10. The CCP ensures that Refuge management actions and programs are consistent with the mandates of the National Wildlife Refuge System.
11. The CCP ensures that Refuge management is consistent with federal, state and county plans.
12. All issues raised were addressed.

Supporting References:

1. Necedah National Wildlife Refuge Final Comprehensive Conservation Plan and Environmental Assessment
2. Statement of Compliance
3. Environmental Action Statement
4. Biological Opinion
5. Land Protection Plan and the Director's concurrence with Boundary Expansion

**ACTING**  
  
Regional Director  
U.S. Fish and Wildlife Service  
Region 3, Ft. Snelling, Minnesota

10/26/07  
Date

ENVIRONMENTAL ASSESSMENT FOR  
IMPLEMENTATION OF COMPREHENSIVE CONSERVATION PLAN  
FOR NECEDAH NATIONAL WILDLIFE REFUGE

*Abstract:* The U.S. Fish and Wildlife Service is proposing to implement a Comprehensive Conservation Plan (CCP) for Necedah National Wildlife Refuge in Wisconsin. This Environmental Assessment (EA) considers the biological, environmental, and socioeconomic effects that implementing the CCP (the preferred alternative is the proposed action) and two other alternatives 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 Refuge for the next 15 years. This management action will be achieved by implementing a detailed set of goals, objectives, and strategies described in a CCP.

*Responsible Agency and Official:*  
Robyn Thorson, Regional Director  
U.S. Fish & Wildlife Service  
Bishop Henry Whipple Federal Building  
1 Federal Drive  
Ft. Snelling, MN 55111

*Contacts for additional information about this project:*

Larry Wargowsky, Refuge Manager  
Necedah NWR  
W7996 20th Street West  
Necedah, WI 54646  
608/565-2551

Thomas Larson, Chief, Division of Conservation Planning  
U.S. Fish & Wildlife Service  
NWRS/Conservation Planning  
Bishop Henry Whipple Federal Building  
1 Federal Drive  
Ft. Snelling, MN 55111  
612/713-5430



# Environmental Assessment Necedah National Wildlife Refuge

## Table of Contents

Chapter 1: Purpose and Need for Action .....	105
1.1 Purpose .....	105
1.2 Need .....	105
1.3 Background Information .....	106
1.3.1: The U.S. Fish and Wildlife Service .....	106
1.3.2: Mission of the U.S. Fish and Wildlife Service .....	106
1.3.3: Goals of the U.S. Fish and Wildlife Service .....	106
1.3.4: Objectives of the U.S. Fish and Wildlife Service .....	107
1.3.5: Functions of the U.S. Fish and Wildlife Service .....	107
1.4 The National Wildlife Refuge System .....	107
1.4.1: Mission of the National Wildlife Refuge System .....	108
1.4.2: Goals of the National Wildlife Refuge System .....	108
1.5 Necedah National Wildlife Refuge .....	108
1.5.1: Background .....	108
1.5.2: History of the Refuge .....	108
1.5.3: Resource Setting .....	108
1.5.4: Management .....	110
1.5.5: Refuge Purpose .....	110
1.5.5.1: Refuge Vision .....	110
1.5.5.2: Refuge Mission .....	110
1.5.5.3: Refuge Goals .....	110
1.5.5.4: Refuge Core Values and Guiding Principles .....	111
1.5.6: Current Issues and Needs .....	112
1.5.6.1: Service Trust Resources .....	112
1.5.6.2: Refuge Visitor Services .....	113
1.5.6.3: Habitat Management .....	114
1.5.6.4: The Yellow River Focus Area .....	115
1.6 Proposed Action .....	117
1.7 Scoping and Public Involvement .....	117
1.8 Decision Framework .....	118
Chapter 2: Description of Alternatives .....	119
2.1 Elements Common to All Alternatives .....	119
2.1.1: Archaeological and Cultural Resource Protection .....	119
2.1.2: Hydrology and Drainage .....	120
2.1.3: Landowner Rights Adjacent to Refuge Lands .....	120
2.1.4: Service Land Acquisition Policy .....	120
2.1.5: Maintenance of Roads and Existing Right-of-Ways .....	121
2.1.6: Environmental Justice .....	122
2.1.7: Timber Harvest .....	122
2.1.8: Fire .....	123
2.1.8.1: Prescribed Fire .....	123
2.2 Description of Alternatives .....	123
2.2.1: Alternative 1 (Status Quo) .....	123

2.2.2: Service Trust Resources .....	124
2.2.2.1: Listed Species .....	124
2.2.3: Visitor Services .....	126
2.2.4: Habitat Management .....	126
2.2.5: Yellow River Focus Area .....	127
2.3 Alternative 2 .....	127
2.3.1: Service Trust Resources .....	127
2.3.1.1: Listed Species .....	127
2.3.1.2: Waterfowl and other Migratory Birds .....	127
2.3.1.3: Native Biological Diversity .....	128
2.3.2: Visitor Services .....	128
2.3.3: Habitat Management .....	128
2.3.4: The Yellow River Focus Area .....	129
2.4 Alternative 3 (Preferred Alternative) .....	129
2.4.1: Service Trust Resources .....	129
2.4.1.1: Listed Species .....	129
2.4.1.2: Waterfowl and Other Migratory Birds .....	129
2.4.1.3: Native Biological Diversity .....	130
2.4.2: Visitor Services .....	130
2.4.3: Habitat Management .....	132
2.4.4: Yellow River Focus Area .....	136
Chapter 3: Affected Environment .....	140
3.1 History of the Refuge .....	140
3.2 Description of the Physical Environment .....	141
3.2.1: Archaeological and Cultural Values .....	141
3.2.2: Hydrology .....	142
3.2.3: Physiography .....	143
3.2.3.1: Historic Situation .....	144
3.2.3.2: Current Situation .....	144
3.2.4: The Yellow River Focus Area .....	146
3.3 Geology .....	147
3.4 Description of the Biological Environment .....	147
3.4.1: Listed Species .....	147
3.4.2: Waterfowl and Other Migratory Birds .....	150
3.4.3: Native Biological Diversity .....	150
3.4.4: Species Level Biological Diversity .....	150
3.4.5: Ecosystem Level Biological Diversity .....	152
3.4.6: Landscape Level Biological Diversity .....	152
3.5 Description of the Socioeconomic Environment .....	152
Chapter 4: Environmental Consequences .....	155
4.1 General Impact Analysis .....	155
4.1.1: Unavoidable Adverse Impacts .....	155
4.1.2: Short-Term Use Versus Long-Term Productivity .....	155
4.1.3: Irreversible and Irretrievable Commitments of Resources .....	155
4.2 Cumulative Effects .....	156
4.2.1: Listed Species .....	159
4.2.1.1: Bald Eagles .....	159
4.2.1.2: Timber Wolves .....	160

4.2.1.3: Karner Blue Butterflies .....	161
4.2.1.4: Eastern Massasauga Rattlesnake .....	163
4.2.1.5: Whooping Cranes .....	164
4.2.2: Maintenance of Roads and Existing Right-Of-Ways .....	164
4.2.3: Cultural Resources .....	164
4.2.4: Environmental Justice .....	165
4.2.5: Climate Change .....	165
4.3 Impacts Associated with Service Trust Resources .....	165
4.3.1: Alternative 1 (No Action) .....	165
4.3.1.1: Listed Species .....	165
4.3.1.2: Waterfowl and Other Migratory Birds .....	166
4.3.1.3: Native Biological Diversity .....	166
4.3.2: Alternative 2 .....	167
4.3.2.1: Listed Species .....	167
4.3.2.2: Waterfowl and other Migratory Birds .....	167
4.3.2.3: Native Biological Diversity .....	168
4.3.3: Alternative 3 .....	168
4.3.3.1: Listed Species .....	168
4.3.3.2: Waterfowl and Other Migratory Birds .....	169
4.3.3.3: Native Biological Diversity .....	169
4.4 Impacts Associated with Visitor Services .....	170
4.4.1: Alternative 1 .....	170
4.4.2: Alternative 2 .....	170
4.4.3: Alternative 3 .....	171
4.5 Impacts Associated with Habitat Management .....	172
4.5.1: Alternative 1 (No Action) .....	172
4.5.1.1: General Considerations .....	172
4.5.2: Alternative 2 .....	173
4.5.2.1: General Considerations .....	173
4.5.3: Alternative 3 (Preferred Alternative) .....	173
4.5.3.1: General Considerations .....	174
4.6 Impacts Associated with the Yellow River Focus Area .....	174
4.6.1: Alternative 1 (No Action) .....	174
4.6.1.1: Habitat Considerations .....	174
4.6.1.2: Land Acquisition and Property Taxes .....	175
4.6.2: Alternative 2 .....	175
4.6.2.1: Habitat Considerations .....	175
4.6.2.2: Land Acquisition and Property Taxes .....	176
4.6.3: Alternative 3 .....	176
4.6.3.1: Habitat Considerations .....	176
4.6.3.2: Land Acquisition and Property Taxes .....	176
Chapter 5: List of Preparers .....	181
Chapter 6: Consultation and Coordination with the Public .....	183
Chapter 7: Glossary .....	188
Chapter 8: References and Selected Readings .....	193

Figure 1: Necedah National Wildlife Refuge Location .....	109
Figure 2: Yellow River Focus Area .....	116
Table 1: Habitat Types on the Refuge by 2019 / Alternative 1, Necedah NWR .....	127
Table 2: Habitat Types on the Refuge by 2017 / Alternative 2, Necedah NWR .....	129
Table 3: Habitat Types on the Refuge by 2019 / Alternative 3, Necedah NWR .....	133
Table 4: U.S. Fish & Wildlife Service Land Acquisition Tools .....	137
Table 5: Summary and Comparison of Alternatives, Necedah NWR .....	138
Table 6: Summary of Water Sources and Sinks for Necedah NWR (May 1998 - April 1999) .....	143
Table 7: Land Cover Types, Necedah NWR .....	145
Table 8: Land Cover Types Within the Watershed, Necedah NWR .....	145
Table 9: Land Cover Types in the Yellow River Focus Area .....	147
Table 10: Karner Blue Butterfly Population Levels, Necedah NWR, 1993-2000 .....	149
Table 11: Rare Plants Found on the Refuge and Within the Yellow River Focus Area .....	151
Table 12: Habitat Types on the Refuge by 2015, Alternative 1, Necedah NWR .....	172
Table 13: Habitat Types on the Refuge by 2015, Alternative 2, Necedah NWR .....	173
Table 14: Habitat Types on the Refuge by 2015, Alternative 3, Necedah NWR .....	174
Table 15: Summary of Environmental Impacts, Necedah NWR .....	179
Table 16: Summary of Opportunities for Public Involvement in the CCP Process, Necedah NWR .....	184

# Chapter 1: Purpose and Need for Action

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## Chapter Highlights:

- A Description of the Purpose and Need for Action
  - A Discussion of Relevant Background Information
  - A Description of the Service's Proposed Action
  - A Description of the Scoping and Public Involvement Process, including Issues
  - An Explanation of the Decision(s) to be Made
  - A Description of Applicable Federal Laws and Executive Orders
- 

The purpose of this chapter is to briefly describe the underlying purpose and need to which the U.S. Fish and Wildlife Service (Service) is responding in proposing the proposed action and project alternatives.

## 1.1 Purpose

The purpose of this Environmental Assessment (EA) is to evaluate and publicly disclose the possible environmental consequences that implementation of the Necedah National Wildlife Refuge Comprehensive Conservation Plan (CCP), including the possible construction of a new visitor center at the Refuge and the acquisition of land from willing sellers in the Yellow River Focus Area, could have on the quality of the physical, biological, and human environment, as required by the National Environmental Policy Act of 1969.

## 1.2 Need

The need for a CCP for the Refuge was established by the National Wildlife Refuge System Improvement Act (Act) of 1997. The need for an EA for the CCP was established by Service policy guidance in accordance with CEQ regulations. The needs to be met by any long-range plan adopted for the Refuge were identified through internal and external scoping and the public involvement process. They are:

- Service trust resources, namely, the need to perpetuate listed species, waterfowl and other migratory birds, and native biological diversity.
- Refuge visitor services, namely, the need to provide the public quality visitor services at the Refuge, such as hunting, fishing, wildlife observation and wildlife photography, environmental education, and interpretation.

- Habitat management; namely, the need to provide quality habitat within the Refuge and the Yellow River Focus Area for the benefit of listed species, waterfowl and other migratory birds, and native biological diversity.
- The Yellow River Focus Area, namely, the need to conserve the existing quality habitat in the Yellow River Focus Area (Figure 1) for the benefit of listed species, waterfowl and other migratory birds, and native biological diversity.

## 1.3 Background Information

### 1.3.1 The U.S. Fish and Wildlife Service

The Service is the principal Federal agency responsible for conserving, protecting and enhancing fish, wildlife, and plants and their habitats for the continuing benefit of the American people. The Service manages the 93-million-acre National Wildlife Refuge System, which includes more than 520 national wildlife refuges and thousands of small wetlands and other special management areas. It also operates 66 national fish hatcheries, 64 fishery resource offices and 78 ecological services field stations. Among its key functions, the Service enforces Federal wildlife laws, protects endangered species, manages migratory birds, restores nationally significant fisheries, conserves and restores wildlife habitat such as wetlands, and helps foreign governments with their international conservation efforts. It also oversees a Federal Aid program that distributes hundreds of millions of dollars in excise taxes on fishing and hunting equipment to state fish and wildlife agencies.

The Service employs approximately 7,500 people in seven geographic regions. Its headquarters are located in Washington D.C. Necedah National Wildlife Refuge is located in the Great Lakes/Big Rivers Region of the Service, which includes the states of Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Ohio, and Wisconsin. The Great Lakes-Big Rivers Region manages over 1.2 million acres of land and water on 46 national wildlife refuges and nine wetland management districts, including more than 240,000 acres in waterfowl production areas. The Region also manages six national fish hatcheries, nine fisheries stations, 10 ecological services field offices, and 18 law enforcement field offices.

### 1.3.2 Mission of the U.S. Fish and Wildlife Service

The mission of the Service is working with others, to conserve, protect and enhance fish, wildlife, and plants and their habitats for the continuing benefit of the American people.

### 1.3.3 Goals of the U.S. Fish and Wildlife Service

- *Sustainability of Fish and Wildlife Populations:* Migratory birds, endangered fish and wildlife species, interjurisdictional fish, and marine mammals are conserved, protected, enhanced, or restored. The Service is participating in conservation of other species when its expertise, facilities, or lands can enhance state, tribal, or local efforts.
- *Habitat Conservation:* An ecologically diverse network of lands and waters, of various ownerships, is conserved to provide habitats for marine mammals and migratory, interjurisdictional, endangered, and other species associated with ecosystems conserved in cooperation with others.
- *Connecting Americans to Wildlife:* The American public understands and participates in the conservation and use of fish and wildlife resources.
- *Workforce Excellence:* The Service's workforce, scientific capability, and business practices – in cooperation with the Department of Interior's scientific expertise – fully support achievement of the Service mission.

### **1.3.4 Objectives of the U.S. Fish and Wildlife Service**

- Assist in the development and application of an environmental stewardship ethic for our society, based on ecological principles, scientific knowledge of fish and wildlife, and a sense of moral responsibility.
- Guide the conservation, development, and management of the nation's fish and wildlife resources.
- Administer a national program to provide the public opportunities to understand, appreciate, and wisely use fish and wildlife resources.

### **1.3.5 Functions of the U.S. Fish and Wildlife Service**

- Acquire, protect, and manage unique ecosystems necessary to sustain fish and wildlife such as migratory birds, resident species, and endangered species.
- Operate a National Fish Hatchery System in support of the restoration of depleted interjurisdictional fish stocks, the recovery of federally listed threatened and endangered species, and the fulfillment of Federal mitigation responsibilities.
- Provide protection of fish and wildlife from dislocation or destruction of their habitats, overuse, and industrial, agricultural, and domestic pollutants.
- Render financial and professional technical assistance to states through Federal Aid programs for the enhancement and restoration of fish and wildlife resources.
- Conduct programs of enforcement, management, and professional technical assistance to other agencies for the protection of endangered species.
- Promulgate and enforce regulations for the protection of migratory birds, marine mammals, fish and other non-endangered wildlife from illegal taking, transportation, or sale within the United States or from foreign countries.
- Conduct programs of planning, evaluation, and professional technical assistance to other agencies for the proper use and protection of fish and wildlife habitat that directly benefit the living natural resource and add quality to human life.
- Conduct programs of interpretation, education, and recreation to foster a stewardship ethic in the American public through quality fish and wildlife oriented experiences.
- Communicate information essential for public awareness and understanding of the importance of fish and wildlife resources and interpret fish and wildlife changes reflecting environmental degradation that ultimately will affect the welfare of human beings.

## **1.4 The National Wildlife Refuge System**

The National Wildlife Refuge System is the world's largest and most diverse collection of lands and waters set aside specifically for wildlife. The Refuge System began in 1903 when President Theodore Roosevelt designated 3-acre Pelican Island, a pelican and heron rookery in Florida, as a national bird sanctuary.

Today, over 500 national wildlife refuges have been established from the Arctic Ocean to the South Pacific, from Maine to the Caribbean. Varying in size from half-acre parcels to thousands of square miles, they encompass more than 92 million acres of the Nation's best wildlife habitats. The vast majority of these lands are in Alaska, with the rest spread across the rest of the United States and several U.S. territories.

## 1.4.1 Mission of the National Wildlife Refuge System

The mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

## 1.4.2 Goals of the National Wildlife Refuge System

- Preserve, restore, and enhance in their natural ecosystems (when practical) all species of animals and plants that are endangered or threatened with becoming endangered.
- Perpetuate the migratory bird resource.
- Preserve a natural diversity and abundance of fauna and flora on refuge lands.
- Provide an understanding and appreciation of fish and wildlife ecology and humankind's role in their environment and provide refuge visitors with quality, safe, wholesome and enjoyable recreational experiences oriented toward wildlife to the extent that these activities are compatible with the purposes for which each refuge was established.

# 1.5 Necedah National Wildlife Refuge

## 1.5.1 Background

The Necedah NWR CCP represents an intensive effort by the Service to identify and evaluate strategic opportunities and issues relative to the Refuge's ability to accomplish its purpose, contribute to the mission of the Service and the National Wildlife Refuge System, and to meet other relevant mandates.

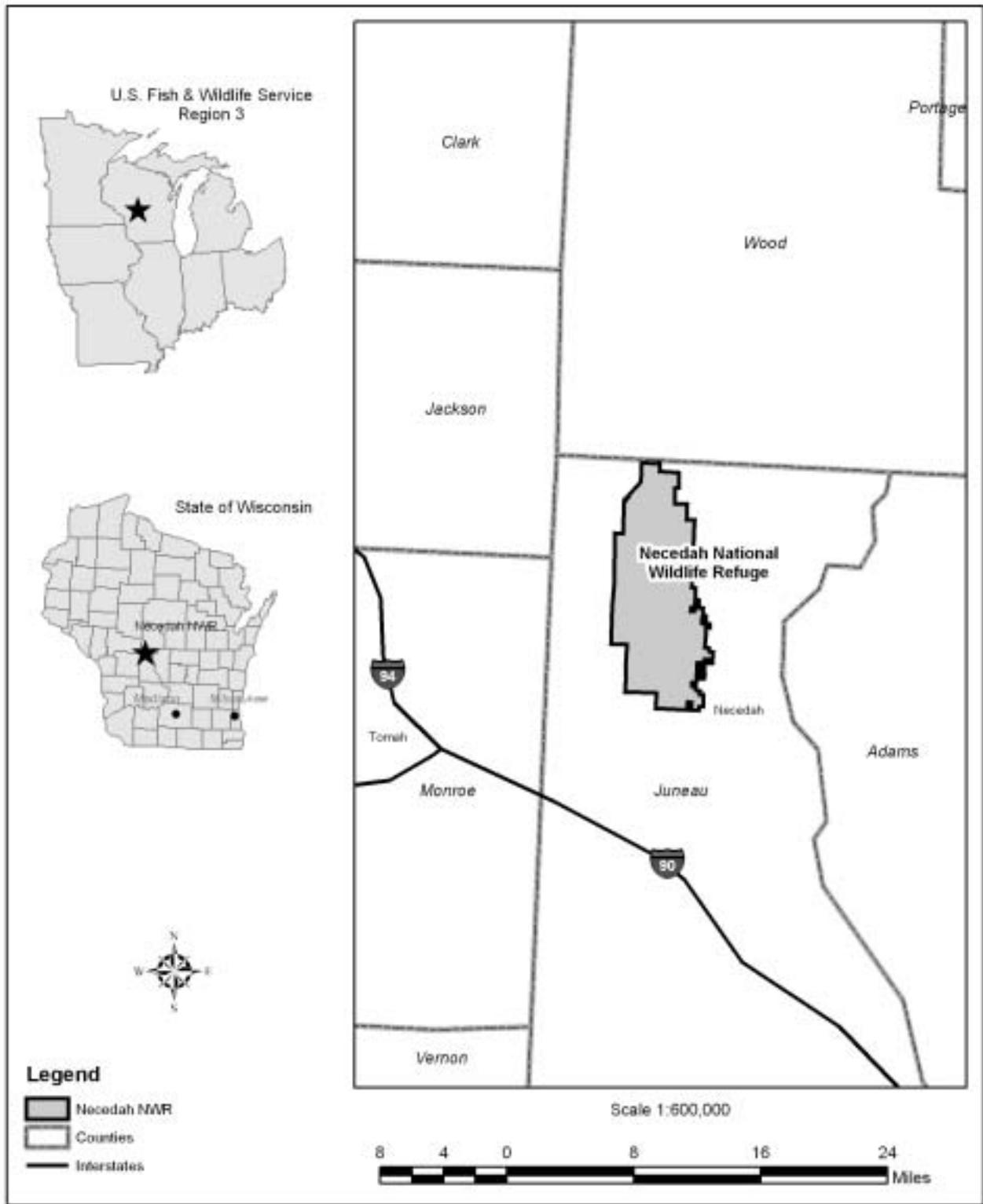
## 1.5.2 History of the Refuge

The history of the Refuge dates back to the early 1930s when the U.S. Government acquired 114,964 acres of land in Juneau, Wood, Monroe, and Jackson counties, Wisconsin, to assist farmers living within the area and to develop the area for wildlife. The Refuge was established in 1939 as a refuge and breeding ground for migratory birds and for use as an inviolate sanctuary for migratory birds. It is located in central Wisconsin, about 180 miles southeast of Minneapolis, Minnesota, 150 miles northwest of Milwaukee, Wisconsin, and about 4 miles west of Necedah, Wisconsin (Figure 1).

## 1.5.3 Resource Setting

Situated on the bed of former Glacial Lake Wisconsin and the Great Central Wisconsin Swamp, land in and around the Refuge was once a vast peat bog with some low wooded islands and savannas; the higher sand ridges were occupied by mature stands of pines and other species. Currently the Refuge consists of 43,696 acres of wetlands and open water areas, pine, oak, and aspen forests, grasslands, and rare savannas, all of which support a rich diversity of fish, wildlife, and plant populations. Over 230 different species of birds have been observed on the Refuge since its inception. The Refuge also supports several threatened, endangered, and rare species like the Karner blue butterfly, Blanding's turtle, and the eastern massasauga rattlesnake, as well as resident game species including the white-tailed deer, wild turkey, and ruffed grouse. Over 150,000 people visit the Refuge annually to hunt, fish, hike, observe and photograph wildlife, pick berries, or just relax among the trees, wetlands, and wildlife.

**Figure 1: Necedah National Wildlife Refuge Location**



## 1.5.4 Management

Management of the Refuge is carried out by a multi-disciplined team of biologists, technicians, and support staff who are recognized leaders in their fields. Conserving, restoring, and maintaining biologically diverse and productive wetlands, forest land, and open landscapes for listed species, waterfowl and other migratory birds are key indicators of management success. Management tools involve water level manipulation, prescribed burning, timber harvest, land acquisition, and public outreach and environmental education. Scientifically rigorous monitoring and research activities create the foundation from which quality management decisions are made. Cooperative working relationships with universities, other Federal agencies, the State of Wisconsin, elementary and secondary educational institutions, and non-government organizations are key assets to management success.

## 1.5.5 Refuge Purpose

Pursuant to the Refuge's enabling legislation, the Refuge purpose is "a refuge and breeding ground for migratory birds and other wildlife..." (Executive Order 8065, dated 1939) and "...for use as an inviolate sanctuary, or for any other purpose, for migratory birds" (Migratory Bird Conservation Act of 1929).

### 1.5.5.1 Refuge Vision

Necedah NWR exemplifies a diverse and productive ecological system of woodlands, savannas, and wetlands managed to perpetuate waterfowl and other migratory birds, listed species, and native biological diversity within Wisconsin's Central Sand Plain Natural Division. Refuge staff are a multi-disciplined team of biologists, technicians, and support staff who are dedicated to providing quality wildlife-dependent public use opportunities to a diverse and supportive public. The Refuge is a model in its commitment to create long-term mutually-beneficial relationships with its stakeholders, and has produced consistent growth in the public's understanding and appreciation of the Refuge, the National Wildlife Refuge System, and Service trust species.

### 1.5.5.2 Refuge Mission

Our mission is to provide scientific and community leadership and support in the restoration, preservation, and management of waterfowl and other migratory birds, listed species, and native biological diversity within south central Wisconsin, while providing, to the extent possible, quality wildlife-dependent recreational and educational experiences that foster an understanding and appreciation of these resources, and expands the role humankind plays in their stewardship.

### 1.5.5.3 Refuge Goals

- *Fish and Wildlife Management:* Fish and wildlife populations within the Refuge and the Yellow River Focus Area will be healthy, resilient, and capable of producing a variety of outdoor recreation benefits over the long-term.
- *Habitat Restoration and Management:* Diverse, productive, and self-sustaining wetlands, open landscapes, and forests within the Refuge and the Yellow River Focus Area will provide quality habitat for Service trust resources.
- *Resource Conservation:* Fish, wildlife, cultural, archaeological, water, and visitor resources on Refuge land will be conserved for the enjoyment of future generations.
- *Monitoring and Studies:* Quality scientific research and monitoring will guide Refuge management decision-making.
- *Coordination Activities:* Strong, long-term, mutually-beneficial working relationships with Refuge stakeholders will lead to healthy sustainable fish and wildlife populations within the Refuge and the Yellow River Focus Area.

- *Visitor Services:* Quality wildlife-dependent uses of the Refuge (namely, wildlife observation and wildlife photography, hunting, fishing, environmental education and interpretation) will foster public understanding and appreciation of the Refuge, the National Wildlife Refuge System, and Service trust resources, and will expand the role the public plays in their stewardship.
- *Planning and Administration:* A safe and healthy environment for employees, volunteers and visitors that will be pro-active in addressing a wide-range of conservation opportunities and issues.
- *Work Force:* Technically skilled and diverse employees with high morale and job satisfaction will achieve high levels of stakeholder satisfaction.

#### 1.5.5.4 Refuge Core Values and Guiding Principles

The Refuge holds the core values of quality, credibility, reliability, integrity, and responsiveness as the basis for all Refuge activities. They will be guided by these core values as well as the following guiding principles:

- *An Ecosystem Approach:* The ecosystem approach is a vision of desired future conditions developed in collaboration with a diverse group of stakeholders that integrates ecological, economic, and social factors. It is applied within a geographic framework (usually watershed) and founded primarily on ecological factors.
- *Results through Partnerships:* Partnership initiatives require extensive coordination and communication between Federal agencies; state, tribal, and local governments; and stakeholders and customers. Partnerships promote the pooling of resources and expertise to obtain results more quickly and efficiently. Results also tend to be longer lasting because consensus is built over a wide range of stakeholder interests.
- *Public Involvement:* Refuge management will include a clear, credible, and meaningful role for public input from the full spectrum of social and cultural backgrounds, and will receive full consideration in Refuge decision-making. The Refuge serves local, state, and national constituencies, therefore, public input at each of these levels will be solicited and incorporated into the Refuge's decision making process.
- *Cornerstones of Biology:* The Refuge will conserve existing, relatively intact ecosystems first; for they are the cornerstones for providing biota and other natural materials needed for future restoration.
- *Ecological Integrity:* The Refuge will restore ecological integrity, particularly the structure, composition, and natural processes of native biotic communities and physical environments.
- *Design for Self-Sustainability:* The Refuge will design for self-sustainability of natural systems. The best way to ensure long-term viability of habitat is to minimize the need for continuous maintenance.
- *Within a Watershed Context:* The Refuge will focus within the watershed and/or broader landscape level context and seek to understand its biological potential. A watershed/landscape has the capacity to become only what its physical and biological setting will support. This includes climate, geology, hydrology, and biological characteristics.
- *Address Degradation:* The Refuge will address on-going causes of habitat degradation. Conservation, restoration, and management activities will fail if the sources of degradation persist.
- *Have Clear Goals and Objectives:* The Refuge will have clear, up-to-date goals, objectives, and strategies, and will include a diverse array of expertise and interests in their development.
- *Use Passive Restoration:* The Refuge will use passive restoration and management when appropriate. Where possible, simulate natural hydrological process using low input, low

impact, and sustainable measures which capture the energies of the system to perpetuate the resources in question.

- *Use Reference Sites:* The Refuge will, whenever available, use reference sites when restoring habitat. Reference sites are areas that are comparable in structure and function to the proposed restoration before it was degraded.
- *Adaptive Management Processes:* An adaptive management approach features a structured, iterative process that recognizes that most information used in decision making is incomplete. Adaptive management guides managers in efficiently collecting and using better information, thus enabling appropriate changes in management direction.

## 1.5.6 Current Issues and Needs

### 1.5.6.1 Service Trust Resources

Numerous Service trust resources utilize the Refuge and the Yellow River Focus Area for meeting one or more of their life cycle needs, including four Federally listed threatened or endangered species. These include the Karner blue butterfly (federally listed as endangered), Eastern timber wolf (federally listed as endangered), Whooping Crane (federally listed as endangered), and Bald Eagle (federally listed as threatened). The Eastern massasauga rattlesnake, which is currently a candidate for federal listing, is found in low numbers in the Yellow River area. Several state-listed threatened or endangered species also use the Refuge, including the Blanding's turtle, and Trumpeter Swan. The Refuge also supports several rare, threatened, or endangered species of plants, including the spring beauty, oval-leaved milkweed, and wooly milkweed, and provides habitat for several important plants (e.g., wild lupine) that support rare organisms (e.g., Karner blue butterflies). Protecting endangered and threatened species and restoring them to secure status in the wild is a primary responsibility of the Service and the Refuge. Under the Endangered Species Act of 1973, as amended, the Service has primary responsibility to conserve not only jeopardized life, but also the natural resources on which life depends.

In total, more than 230 different species of birds have been observed on the Refuge since its inception. The Refuge has long been considered an important migratory stopover area for waterfowl such as Mallards, Blue-winged Teal, Ring-necks, and Wood Ducks. Other migrant bird species that utilize the Refuge during spring, summer, or fall include: Canada, Snow, and White-fronted Geese; Sandhill Cranes; Woodcock; Snipe; Great Blue Herons; swans; egrets; Dickcissels; warblers; Brown Thrashers; several different species of sparrows; meadowlarks; Sora Rails; Black-crowned Night Herons; Bobolinks; Bitterns; and Red-tailed Hawks; just to name a few. During migrations, three species of geese, 10 species of dabbling ducks, nine species of diving ducks, and Trumpeter and Tundra Swans can be found on the Refuge.

Many bird species are declining across part or all of their breeding range in the Midwest (Peterjohn et al. 1994). Breeding Bird Surveys for the Great Lakes/Big Rivers Region indicate that numerous grassland nesting, non game species in the Midwest have shown extensive declines since the mid-1960's (National Biological Survey 1995). Grassland-dependent birds have shown steeper, more consistent, and geographically more widespread declines (25-65 percent) than any other group of North American birds (Samson and Knopf 1994). Several of these declining species utilize the Refuge and the Yellow River area. These include the Bobolink, Henslow's Sparrow, Grasshopper Sparrow, Vesper Sparrow, Savannah Sparrow, Lark Sparrow, Field Sparrow, Dickcissel, Eastern Meadowlark, and American Bittern. The Grasshopper Sparrow and Dickcissel have declined over 80 percent in Wisconsin since the mid-1960s. Many others, especially those associated with rare oak savannas (e.g., Red-headed Woodpecker; Northern Flicker), have experienced similar, though less dramatic declines.

The Refuge has incomplete inventories for many of its natural, archeological, and cultural resources, including wildlife and habitat. Monitoring systems needed to protect and properly manage Refuge

resources are inadequately funded. Monitoring and evaluation systems need to be developed to measure progress toward habitat goals and objectives.

### **1.5.6.2 Refuge Visitor Services**

The National Wildlife Refuge System Improvement Act of 1997 has ushered in a new era of public involvement on national wildlife refuges. Providing for public uses is now an essential part of Refuge missions across the country. Necedah NWR has always been a popular destination for hunting and fishing enthusiasts. However, in recent years other uses, such as wildlife observation, hiking, environmental education, and interpretation have surpassed traditional activities in terms of public interest.

The Refuge currently has two major needs relative to providing quality services to its visitors. First, the main office (which also serves as the visitor center) is ineffective as an initial visitor contact point due to its isolation, distance from a main road, and small size. The current facility has no formal education features (with the exception of a small conference room) and lacks in interpretive programming displays. In recent years, Refuge programs and activities have attracted over 150 participants at some events. The current facility accommodates a maximum of 30. Programs are held in the office space, reducing productivity of staff who are not directly involved with the event. It also compromises the overall effectiveness of the educational experience, due to the distraction of office business and the lack of student comfort.

Public use of the Refuge now exceeds over 150,000 visits annually. Three state highways border the Refuge: 21, 80 and 173. Wisconsin Department of Transportation numbers from 1995 (the latest information available) shows that over 1,500 vehicles a day use Highway 173; more than 3,200 vehicles a day travel on Highway 21; and over 1,100 use Highway 80 each day. Occupants of these vehicles are all potential visitors to the Refuge. Due to small, inconvenient facilities and poor signage, many of these potential visitors are currently being overlooked.

Further, the Refuge is now the site for an experimental Whooping Crane population, an attraction that will undoubtedly increase visitor use long-term at the Refuge. During the first year of the 10-15 year reintroduction program, the Refuge hosted an event that drew more than 600 visitors. The project frequently drew the attention of the media. This increased use of the Refuge could further disseminate key messages about the Refuge, its resources, and the National Wildlife Refuge System.

The second major need relates to the quality of the existing visitor facilities at the Refuge. There is a need to renovate existing facilities for safety and accessibility, to improve visitor information systems (signs and brochures), and to bring public facilities up to Service standards. To improve customer service, the Refuge needs to collect additional information on Refuge visitor volume, characteristics, opinions, and what their expectations are for the Refuge. Key components to customer service is having suitable facilities (addressed above) and having an eager work force that can provide quality service. Current Refuge staffing patterns do not emphasize the importance of good customer service. A strong volunteer base exists and could easily be used in the contact areas. A volunteer coordinator is vital. Seasonal public use staff could also help meet increased needs during peak times.

Other visitor services concerns learned through scoping is the Refuge are not known and understood within the local area. This was made apparent during the 3-year planning process for the Refuge CCP. Many people living near the Refuge do not distinguish the Service from the Wisconsin DNR, or understand that the Refuge is part of a national system of refuges dedicated to perpetuating our nation's fish and wildlife resources for the enjoyment of present and future generations. The Refuge needs to promote its recreation and educational opportunities, as well as raise awareness of the importance of the Refuge among the various economic and environmental interests that influence public policy and Refuge management direction.

### 1.5.6.3 Habitat Management

The need for additional wildlife habitat conservation, restoration and management at the Refuge has been made clear by the declining status of numerous grassland, savanna, and wetland-dependent species of birds (see “Service Trust Resources” above) and numerous studies that have demonstrated that habitat loss or degradation is a common causal factor in many of those declines.

Of the estimated 221 million acres of wetland habitat present in the lower 48 states at the time of colonial America, only 103 million acres remain (47 percent). Draining, dredging, filling, leveling, and flooding have reduced wetlands by 50 percent or more in 22 states, and 10 states have lost 70 percent or more (Dahl 1990). Prior to European settlement, Wisconsin had approximately 10 million acres of wetlands. Currently less than 47 percent remain.

In recent years, many plant and animal species associated with Midwestern grasslands have experienced serious declines, primarily due to habitat loss and alteration of natural structure and function (e.g., predation, exotic species, fire suppression, habitat fragmentation, drainage/flooding). The original tallgrass prairie, which extended from western Indiana to the eastern part of Kansas, Nebraska, and North and South Dakota and south to Oklahoma and Texas, has been virtually eliminated throughout its historic range. Recent surveys suggest that 82.6 to 99.9 percent declines in the acreage of tallgrass prairie have occurred in 12 states and one Canadian province since European settlement. The State of Wisconsin has lost over 99 percent of its original prairies. For years following the initial conversion of native Midwestern prairies, many prairie-dependent wildlife remained relatively stable through their ability to colonize agricultural grasslands. However, 20th century agricultural grassland loss has followed a similar path of decline as native prairie loss in the 19th century. In many parts of the Midwest, agricultural grasslands are at their lowest level in more than 100 years.

Similarly, oak savanna, which covered approximately 27-32 million acres of the Midwest prior to European settlement (Nuzzo 1985), has become one of the nation’s most endangered ecosystems (Noss et al. 1995). Nationwide, over 99 percent of our original savanna has been lost, and Midwestern oak savannas are among the rarest ecosystems in the Nation. Historically Wisconsin had roughly 4 million acres of savannas. Today, fewer than 60,000 acres remain, and much of what remains is highly degraded and of limited value for wildlife. Nuzzo (1985) found that by 1985 only 113 sites (2,607 acres) of quality oak savanna remained across the Midwest. Development has destroyed, fragmented, and disrupted the natural processes needed to maintain quality oak savanna ecosystems.

The wide-scale loss of oak savanna and pine barren ecosystems across 12 states and the province of Ontario, Canada, has had severe negative impacts on Karner blue butterflies (Karner Blue Butterfly Habitat Conservation Plan and Environmental Impact Statement, 1999). As a result, the KBB was proposed for federal listing on January 21, 1992, and listed as endangered on December 14, 1992. Today scattered populations are only found in portions of New Hampshire, New York, Michigan, Wisconsin, Indiana, and Minnesota. The Refuge is home to the world’s largest remaining population of Karner blue butterflies, providing habitat for 12 population complexes. No critical habitat has been designated for this species. The long-term effect of these landscape-scale losses of important ecosystems has yet to be determined.

The long-term declines in early successional forests across the north-eastern and north-central United States has contributed to the decline of many bird species. Selective harvesting, fire suppression, urban sprawl, and cessation of agricultural abandonment contributed to the present imbalance in distribution of young forests (Oliver and Larson, 1999).

The Refuge is facing increasing threats to its ecological health due to air, water, and noise pollution, exotic species, and incompatible recreational uses. Of late, a new round of change threatens many remaining ecosystems in the Refuge area. A trend called “rurbanization” where rural areas

containing quality wildlife habitat are being converted to a more densely developed state. In recent years, the population of the area surrounding the Refuge has expanded, while the size of the undeveloped land base continues to shrink, leaving many natural areas as scattered fragments of increased importance for scientific study, education, and conservation of natural ecological processes. According to the U.S. Census, the Town of Necedah and the Town of Finley grew by 34 percent and 27 percent respectively between 1990 and 2000. As a result, many of the large natural areas around the Refuge (and in the Yellow River area) are at risk of being fragmented through housing development, driveways, etc., which diminish the value of these areas for area-sensitive wildlife like the Bobolink, Prairie Chicken, and many large mammals. Habitat size, shape, and amount and type of edge are important factors in the reproductive success of many grassland birds. It is this type of development that particularly threatens the remaining oak savanna habitat in this region. Without management, most areas will continue to degrade due to their size, isolation, absence of natural processes such as fire and hydrologic cycle maintenance, and inadequate buffers conserving them from surrounding agricultural and urban land uses. It also places greater demands on the Refuge and its partners in terms of safeguarding Refuge ecosystem structure and function for the benefit of Service trust resources.

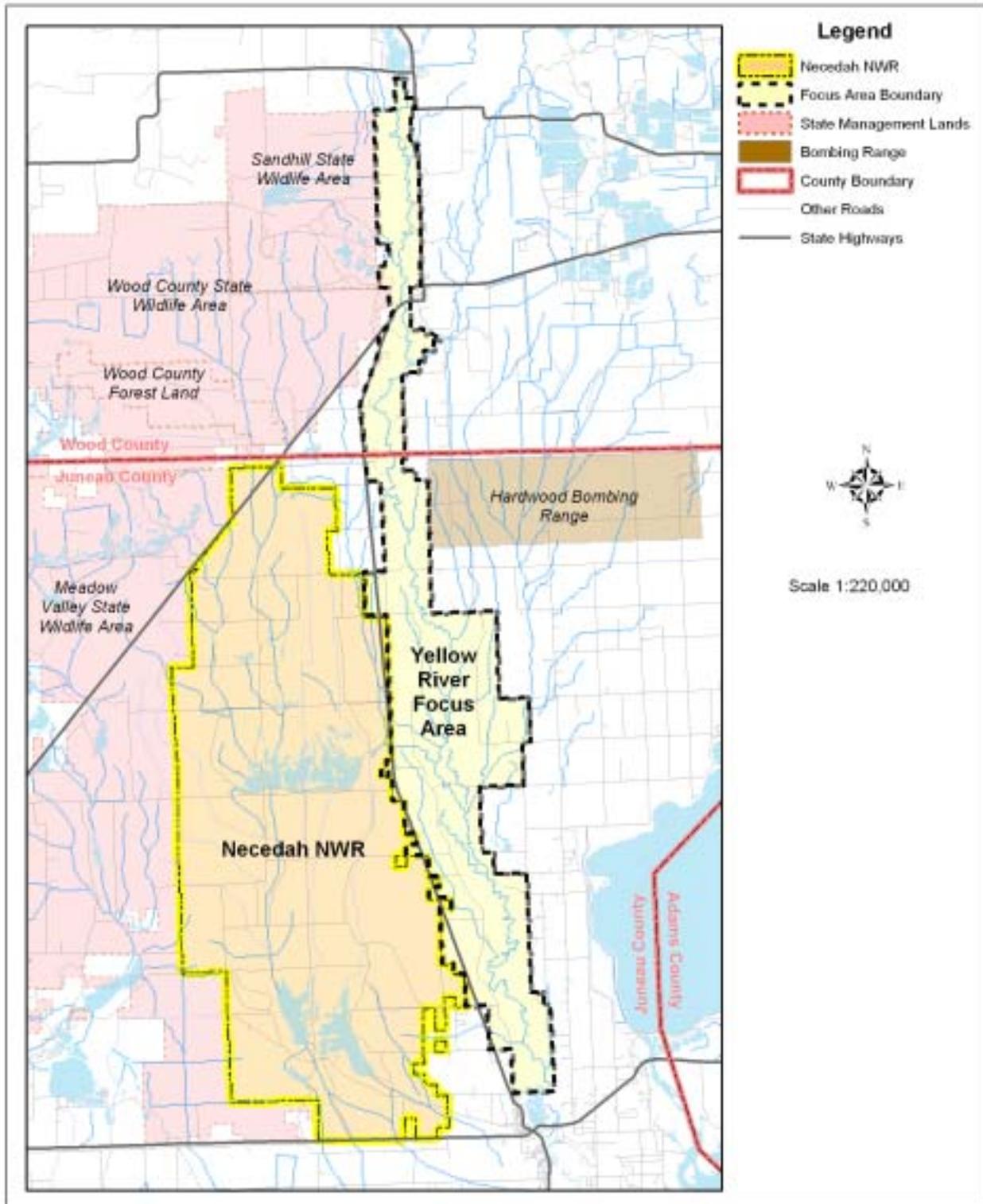
#### **1.5.6.4 The Yellow River Focus Area**

The Yellow River Area (Figure 2), which lies east of the Refuge within an area referred to as Wisconsin's Central Sand Plain Natural Division, provides a unique opportunity to conserve rare and declining bottomland forest and adjacent upland habitat for the benefit of listed species, waterfowl and other migratory birds, and native biological diversity. According to Wisconsin's Statewide Natural Area Inventory, extensive field reconnaissance by the Refuge, and other sources, the Yellow River area represents one of the few remaining quality bottomland hardwood forest ecosystems in the Midwest. Silver maple, swamp white oak, green ash, and river birch dominate the floodplain, while the lower sandy ridges, slightly higher than the flood plain, support white oak, bur oak, shagbark hickory, basswood, and white pine. The highest of these areas were once oak and pine savannas, one of North America's most endangered habitats, with only .02 percent of its pre-settlement acreage remaining. The shrub spectrum within the area varies in density from sparse to impenetrable, and includes buttonbush, dogwoods, prickly ash, winterberry, and wild grapes. The herbaceous layer of the forested areas support wood nettle, coneflowers, ferns, and many sedges. Aggressive non-native species are currently not an issue.

Many rare, uncommon, and declining species of animals have been documented in the Yellow River area in recent years. Many of them are sensitive to size, isolation, context, and quality of habitat. These include the Eastern massasauga, Blanding's turtle, Red-shouldered Hawk, Cerulean Warbler, Acadian Flycatcher, Yellow-crowned Night-heron, Prothonotary Warbler, and Louisiana Waterthrush. Several neo-tropical migrants that are suspected of or exhibiting extensive population declines that use the area include the Verry, Wood Thrush, Sedge Wren, Blue-winged Warbler, and Golden-winged Warbler. Waterfowl species include Mallard, Wood Duck, and Hooded Merganser. Bald Eagles use the area year-round and at least one active nest has been documented. Great Blue Heron rookeries are found in the Yellow River area as well as extensive Wood Duck nesting. Federally-endangered Karner blue butterflies are also found on Friendship and Plainfield soils throughout the area. These soil types offer potential for expansion of oak savanna and the restoration of essential Karner blue butterfly habitat.

While rich in biological diversity, the Yellow River area is experiencing human-induced degradation, primarily due to rural development and lack of habitat management, and would benefit from habitat conservation and management practices designed to sustain its ecological value (conservation of habitat through financial incentives to landowners, prescribed fire, mowing, wetland and upland restorations, forest management). Recreational development pressures are high in the area. An expansion of agricultural activities could directly impact Yellow River habitats, and create many indirect impacts due to fragmentation, withdrawal and discharge of surface and ground waters, and construction of needed infrastructure.

**Figure 2: Yellow River Focus Area**



Many Federal, state, and local conservation organizations support stewardship and conservation of the natural resources in the Yellow River area. Several property owners have indicated an interest in selling their land and/or a conservation easement on their land to the Service. Many landowners within the 21,953-acre Yellow River Focus Area have contacted the Refuge in recent years in search of technical assistance in managing their land for wildlife. In the past 2 years, 121 landowners owning 17,308 acres in the Yellow River Focus Area have received technical assistance from the Service. However, most of the area is in private ownership and unprotected from future development. However, an organized group of Yellow River property owners as well as several local units of government strongly oppose any public acquisition of land in the area (fee title and conservation easements) that would potentially restrict future cranberry bed expansion, residential development, and impact the areas tax base.

## **1.6 Proposed Action**

The Service's proposed action in this EA is to develop and implement a Comprehensive Conservation Plan (CCP) for the Necedah NWR that best achieves the purpose of the Refuge; contributes to the mission of the National Wildlife Refuge System; is consistent with principles of sound fish and wildlife management, available science, legal mandates, and other Service policies, guidelines, and planning documents; and addresses the internal and external needs and issues identified during the scoping and public involvement process.

Future management of the Refuge aims to restore and conserve biological integrity, diversity, and environmental health of the Refuge and the Yellow River Focus Area, a 21,953-acre area located adjacent to the Refuge, for the benefit of listed species, waterfowl and other migratory birds, and native biological diversity. In addition, Refuge staff will be leaders in building mutually-beneficial relationships with the public and their conservation partners, and will facilitate, to the extent possible, quality wildlife-dependent environmental education, interpretation, and recreation experiences that further the public's understanding and appreciation for the Refuge, the National Wildlife Refuge System, and the role humankind plays in their stewardship.

## **1.7 Scoping and Public Involvement**

Scoping is the process of identifying opportunities and issues related to a proposed action. The Service publicly announced it was preparing a CCP for the Refuge in June 1997. Since that time, information about the planning project has been provided to the public through news releases, presentations, interviews, informational letters, and one-on-one briefings. Federal, state, local, and private entities were involved in the scoping process. More than 6,000 people were sent information on the Refuge CCP (e.g., letters, newsletters, draft CCPs), including landowners in the four townships surrounding the Refuge (information was obtained from Juneau and Wood county tax records) and landowners in the Yellow River Focus Area. Others involved were Wisconsin's Congressional Delegation, the U.S. Department of Agriculture, elected officials representing Juneau and Wood counties, the Wisconsin Department of Natural Resources, local governments, representatives of national, state, and local conservation organizations, neighboring landowners, and other interested people. Public input was considered at all phases of the CCP planning process. The Service coordinated its scoping effort closely, and corresponded frequently with many of the aforementioned entities. Since June of 1997, more than 10 public meetings were held to gather public input. In addition, three draft CCPs/EAs were issued to a wide range of interests, including all of the libraries in the counties surrounding the Refuge. The first draft was released in August 1998. The second draft was released in July 2000. A third draft was released in October 2001. Comments received during the scoping and public involvement process covered a wide range of interests.

In response to the Service's proposed action to prepare and implement a CCP for the Refuge and from questions raised in conversations and correspondence with individuals and organizations within and outside the Service, the Service identified several issues that will be analyzed in this EA. They are:

- Service trust resources, namely, what effect will Refuge management actions have on listed species, waterfowl and other migratory birds, and biological diversity (internal issue)?
- Refuge visitor services, namely, what effect will Refuge management actions have on the quality of visitor services provided at the Refuge, namely hunting, fishing, wildlife observation, photography, environmental education, and interpretation (internal/external issue)?
- Habitat management; namely, what effect will Refuge habitat management actions have on the quantity and quality of habitats within the Refuge and the Refuge watershed, namely the wetlands, forests, and open landscapes (internal issue)?
- The Yellow River Focus Area, namely, how will Refuge management actions affect the habitat in the Yellow River Focus Area, and how will those management actions impact private property rights and the areas tax base (external issue)?

## **1.8 Decision Framework**

In compliance with the National Environmental Policy Act of 1969, the Regional Director for the Great Lakes-Big Rivers Region of the Service will use this EA and attached CCP to select one of three alternative actions (Chapter 2) and will also decide whether this action will have environmental impacts requiring that an Environmental Impact Statement be developed or if a Finding of No Significant Impact can be issued.

# Chapter 2: Description of Alternatives

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- A Description of Elements Common to all Alternatives
  - A Description of Alternatives, including the No Action Alternative
  - A Summary and Comparison of Alternatives
- 

The purpose of this chapter is to describe two “Action” alternatives and one “No Action” alternative for the proposed action of developing and implementing the Necedah NWR CCP. It should be noted that in describing each alternative, specific attention was paid to the needs and significant issues identified through internal and external scoping.

## 2.1 Elements Common to All Alternatives

The following considerations apply to all future actions, regardless of the specific goals, objectives, strategies, and projects that will be used in pursuit of the vision for the Refuge.

### 2.1.1 Archaeological and Cultural Resource Protection

Archaeological and cultural resources are important parts of the nation’s natural heritage. The Service is committed to protecting valuable records of human interactions with each other and the landscape. This is done in conjunction with its more widely recognized mission of protecting fish, wildlife, and plant resources.

To date, archeological investigations have only addressed 2 percent of land within the Refuge. Surveys and other sources have identified 27 prehistoric and historic sites within the Refuge. Prehistoric mounds, including effigy mounds, have been reported near the Refuge, many of them near the Yellow River.

Indian tribes may have interest in the Refuge area in terms of traditional cultural properties and sacred sites, as well as claims to human remains, funerary objects, and other cultural items. Modern tribes with possible prehistoric and historic connections to the Refuge area include the Menominee, the Winnebago or Ho-Chunk, the Potawatomi, the Sauk and Fox, the Kickapoo, the Miami, and Mascouten.

The Refuge Manager will provide a description of projects on the Refuge to the Regional Historic Preservation Officer, who will analyze the undertakings for potential effect on historic properties. The Regional Historic Preservation Officer will enter into consultation with the State Historic Preservation Officer and other parties as appropriate. No undertakings will proceed until the Section

106 process is completed. As such, the Refuge Manager will notify the Regional Historic Preservation Officer early in the planning for all projects or activities potentially affecting archaeological and cultural resources on Refuge land. By 2019, in accordance with the Archaeological Resources Protection Act, the Refuge will protect 100 percent of the known archaeological and cultural resources on the Refuge.

## **2.1.2 Hydrology and Drainage**

It is Service policy not to impede the flow of waters from other lands, even if that flow passes through lands acquired by the Service. The Service will not cause any artificial increase of natural water levels, width, or flow of waters without ensuring that impacts would be limited to those lands in which the Service acquires an appropriate management interest. Site-level studies and detailed planning will be performed prior to the Service undertaking any management activity affecting drainage of private land. If the Service does inadvertently create a water-related problem for any private landowner (flooding, soil saturation, increase in water table height, etc.), the problem will be corrected by the Service at the Service's expense. The Refuge will continue to maintain ditches and water control structures that influence water access and use downstream. The Refuge will also continue to document water rights and use to conserve water resources for the benefit of fish, wildlife, plants and public use of Refuge water-dependent resources.

## **2.1.3 Landowner Rights Adjacent to Refuge Lands**

Service or other agency control of access, land use practices, water management practices, hunting, fishing, and general use next to any tracts owned by the Service is limited only to those lands in which the Service or other entities have acquired that ownership interest (the Service acquires land through purchase, donation, or other means of conveyance). Any landowners adjacent to lands owned by the Service retain all the rights, privileges, and responsibilities of private land ownership.

## **2.1.4 Service Land Acquisition Policy**

The U.S. Fish and Wildlife Service acquires lands and interests in lands consistent with legislation or other Congressional guidelines and Executive Orders, for the conservation of fish and wildlife and to provide wildlife-dependent public use for educational and recreational purposes. The Service policy is to acquire land only when other protective means, such as zoning or regulation, are not appropriate, available, or effective. When the Service acquires land, it acquires fee title (all property rights) only if lesser property interests (such as conservation easements, leases, or cooperative agreements) are not suitable to achieve resource objectives.

It is Service policy to acquire the minimum interest necessary to reach project goals and objectives. Any Service acquisition of lands, regardless of the type (easement or fee-title purchase) will be from willing sellers only. Written offers to willing sellers will be based on a professional appraisal of the property using recent sales of comparable properties in the area. Landowners will in no way be coerced into selling their land or any interest in their land. The Service recognizes that every landowner within or adjacent to an existing or proposed National Wildlife Refuge has the following rights:

- The right to retain all privileges and responsibilities of private ownership.
- The right to sell their land to anyone of their choice.
- The right not to sell their land.
- The right to receive a fair market offer for any property sought for purchase by the U.S. Fish and Wildlife Service.
- The right to control access on their land.

- The right to be heard and to provide input on management plans for neighboring Refuge lands.
- The right to be informed on a regular basis about refuge management activities.

No instances of uneconomic remnants will occur as a result of the Service's land acquisition program under any of the Action alternatives. Section 49 CFR Part 24.102 (k) prohibits the Federal Government from creating uneconomic remnants. If such a remnant were to occur, the Service would offer to purchase the remnant at market value, along with the portion of the property needed for the project. The Service would pay for necessary title evidence, mortgage prepayment penalties, mortgage releases, boundary surveys, recording fees, and similar expenses incidental to the transfer of title. It would not pay for fees charged by an attorney who was hired by the landowner.

The uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended (Uniform Act), provides for certain relocation benefits to home owners, businesses, and farm operators who choose to sell and relocate as a result of federal land acquisition. The law provides for benefits to eligible owners and tenants in the following areas:

- Reimbursement of reasonable moving and related expenses;
- Replacement housing payments under certain conditions;
- Relocation assistance services to help locate replacement housing, farm, or business properties;
- Reimbursement of certain necessary and reasonable expenses incurred in selling real property to the government.

The Refuge Revenue Sharing Act of June 15, 1935, as amended, provides for annual payments to counties or the lowest unit of government that collects and distributes taxes based on acreage and value of National Wildlife Refuge lands located within the county. The monies for these payments come from two sources: (1) net receipts from the sale of products from National Wildlife Refuge System lands (oil and gas leases, timber sales, grazing fees, etc.) and (2) annual Congressional appropriations. Annual Congressional appropriations, as authorized by a 1978 amendment, were intended to make up the difference between the net receipts from the Refuge Revenue Sharing Fund and the total amount due to local units of government. Annual payments are calculated based on which of the following formulas as set out in the Act, provides the largest return: (1) \$.75 per acre; (2) 25 percent of the net receipts collected from refuge lands in the county; or (3) three-quarters of 1 percent of the appraised value. In Wisconsin, three-quarters of 1 percent of the appraised value always brings the greatest return to the taxing bodies. Using this method, lands are re-appraised approximately every 5 years to reflect current market values.

## **2.1.5 Maintenance of Roads and Existing Right-of-Ways**

State, county, and townships retain maintenance obligations for roads and their rights-of-way under their jurisdiction within Refuge boundaries. Some township roads may be suited for abandonment (but not necessarily closure) and their maintenance assumed by the Service. Any such abandonments would only be with the consent of the appropriate governing body. Existing rights-of-ways and terms of other easements will continue to be honored. New rights-of-ways and easements will be considered in relation to Refuge System regulations and likely impacts of the rights-of-way or easement to Refuge resources.

The Refuge will cooperate with state, county and township officials in the maintenance of roads that cross the Refuge. Roadside mowing will be completed in accordance with State and local laws.

## 2.1.6 Environmental Justice

Environmental justice refers to the principle that all citizens and communities are entitled to:

- Equal protection from environmental and occupational health or safety hazards;
- Equal access to natural resources; and
- Equal participation in the environmental and natural resource policy formulation process.

On February 11, 1994, President Clinton issued Executive Order 12898: “Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations.” The purpose of this Order was to focus the attention of federal agencies on human environmental health and to address inequities that may occur in the distribution of costs/benefits, land use patterns, hazardous material transport or facility siting, allocation and consumption of resources, access to information, planning, and decision making, etc.

The mission of the U.S. Fish and Wildlife Service is working with others to conserve, protect, and enhance fish and wildlife and their habitats for the continuing benefit of the American people. The developing environmental justice strategy of the Service extends this mission by seeking to ensure that all segments of the human population have equal access to America’s fish and wildlife resources, as well as equal access to information that will enable them to participate meaningfully in activities and policy shaping.

Within the spirit and intent of Executive Order 12898, no minority or low income populations would be impacted by any Service action under any alternative.

## 2.1.7 Timber Harvest

Timber harvest is an important tool used to accomplish Refuge ecological objectives. In recent years, the Refuge has conducted approximately two to four timber sales per year. Sales usually are between 40 and 400 acres. Jack pine, red pine, aspen, and Northern pin oak (Hill’s oak) are the species with the greatest quantities harvested. Under all circumstances, the following guidelines will apply:

- Timber will be cut and removed from the Refuge by private wood contractors.
- Archeological surveys will be done before any timber removal operations take place. The surveys will be funded by the timber sale and reflected in the bid price for the timber. When no other source of funding is available and it is imperative that the timber be cut, the Refuge will support the cost of the survey. Archeological surveys are required if any part of the timber harvest operation will disrupt the soil to a depth of 6 inches or more. If haul roads and/or yarding areas are to be constructed, an archaeological survey will be required in those areas.
- Refuge roads used for haul routes by contractors will be rehabilitated by grading and 4 inches of gravel, at the completion of the logging operation.
- The method for selecting the contractor for large sales over 500 cords shall be by sealed bid.
- Whenever possible, the establishment of firebreaks will be written in as part of the timber sale.
- All timber sales are designed to accomplish specific habitat objectives. Therefore, the sale price may be significantly lower for Refuge sales than comparative sales on private or other land.
- A timber sale appraisal report will be prepared in triplicate for each sale by Refuge staff for approval by the Refuge Manager. The report will clearly indicate the cutting area, amount of timber to be harvested, and species involved. The method of harvest, harvest objectives as

related to wildlife habitat improvement, stumpage prices, scale provisions, method of payment, and other special requirements will also be included.

- Contractors are generally allowed 1 to 2 years to complete each sale. Most of the harvesting is done during the winter months when the ground is frozen to prevent damage to soil, vegetation, and archaeological resources.
- No harvesting will be allowed in areas where Northern pin oak is present during the months of April through July when trees may be infected with the oak wilt fungus.

## **2.1.8 Fire**

### **2.1.8.1 Prescribed Fire**

Prescribed fire has been a habitat management tool used on the Refuge since 1944. Refuge staff annually burn an average of 2,000 acres of Refuge land to enhance habitat for upland game, waterfowl, and endangered species. The periodic burning of savannas, grasslands, and sedge meadows reduces encroaching vegetation such as oak sprouts and willow. It also encourages the growth of species like blueberry, raspberry, and wild lupine (a plant necessary for the survival of the endangered Karner blue butterfly).

All prescribed burns are carried out by highly trained and qualified personnel who perform the operation under very precise plans. No burning takes place unless it meets the qualifications of the prescription for each unit. A prescription is a set of parameters that define the air temperature, fuel moisture, wind direction and velocity, soil moisture, relative humidity, and several other environmental factors under which a prescribed burn may be ignited. This insures that there is minimal chance the fire will escape the unit boundaries and that the fire will have the desired effect on the plant community.

Prescribed burns will be conducted within or near Refuge development zones, sensitive resources, and boundary area to reduce the risk from wildfire damage. To the greatest extent possible, hazard reduction prescribed fires will only be used when they complement resource management objectives.

Burn frequency will vary from every 3 to 5 years or longer on established oak savanna units dependent on management objectives, historic fire frequency, and funding. As part of the prescribed fire program, a literature search will be conducted to determine the effects of fire on various plant and animal species, and a monitoring program will be instituted to verify that objectives are being achieved.

## **2.2 Description of Alternatives**

### **2.2.1 Alternative 1 (Status Quo)**

Under Alternative 1, management direction at the Refuge relative to the needs and significant issues identified during the scoping and public involvement process (Chapter 1) would proceed in accordance with guidance contained in the 1979 Refuge Master Plan and subsequent step-down management plans (e.g., forest management plan, fire management plan, marsh and water management plan, public use plan, etc.).

## 2.2.2 Service Trust Resources

### 2.2.2.1 Listed Species

This alternative would include:

- Establishing and maintaining one large population of Karner blue butterflies on the Refuge as stated in the Karner Blue Butterfly Recovery Plan (in this context “large population” refers to >6,000 second flight adults consisting of 25 sub-populations and dispersed over at least 10 square miles);
- Providing technical assistance and staff support to the Whooping Crane Reintroduction program (an action that is covered by a separate EA prepared by the Service’s Green Bay Ecological Service’s Field Office);
- Protecting and maintaining resident packs of Eastern timber wolves on public lands in central Wisconsin, in accordance with the Eastern Timber Wolf Recovery Plan;
- Protecting Bald Eagles nesting on the Refuge from human disturbance; and
- Continuing international management efforts for the Eastern massasauga rattlesnake, including research, to help preclude the need for federal listing. Refuge staff currently provide landowners in the Yellow River area, Monroe County, LaCrosse, and Buffalo County with Eastern massasauga rattlesnake management support and surveys.

Specific management actions would include:

#### Karner Blue Butterflies

- Restrict all construction activities in Karner blue butterfly habitat. The only exception to this will be for the graveling or paving of two hiking trails (Cranberry Loop and Lupine Loop).
- All silviculture activities in occupied Karner blue butterfly habitat will be designed to avoid or minimize impacts to the butterflies. Conservation measure will be written into timber sale contracts when necessary to protect Karner blue butterfly habitat from timber operations. Slash and stumps will not be placed in occupied Karner blue butterfly habitat. Skid trails and hauling roads will be designed to avoid or minimize impacts to lupine and Karner blue butterflies.
- Refuge visitors will be advised to avoid disturbing lupine plants in occupied Karner blue butterfly areas.

#### Whooping Cranes

- Should an experimental population of Whooping Cranes establish themselves on or near the Refuge, manage select Refuge pools and associated habitats to support the population, as directed by the Whooping Crane Recovery Team.
- Where Whooping Cranes exhibit territorial, breeding and/or nesting behavior, maintain or adjust pool levels to create optimum conditions.
- Preclude prescribed burning in or near a unit containing an active Whooping Crane nest site.
- Prohibit human and vehicular traffic in or near Whooping Crane nest sites.
- Implement any additional Whooping Crane guidelines that may be developed for nest protection.

#### Eastern Timber Wolf

- All new Eastern timber wolf den and rendezvous sites verified by wildlife biologists as well as den and rendezvous sites used within the last 2 years will be protected through

implementation of the “Management Policy for Wolf Den and Rendezvous Sites” (Wydeven and Schultz 1993).

- Preclude land use activities, including timber harvest, within 100 meters of a wolf den at any time of the year.
- Restrict human activity within 100 meters of a den to those activities specifically related to wolf research and which generally are done only when wolves are not active in the area.
- Maintain volunteer tracking efforts of wolves on the Refuge.
- Continue to keep Refuge roads closed to public vehicular traffic and continue berming access roads upon completion of timber sales.
- Continue prohibiting coyote hunting and trapping year-round on the Refuge.
- Collaborate with the Wisconsin DNR on wolf trapping and radio tracking.
- Issue an annual press release prior to gun deer season advising hunters of the coyote hunting closure.

#### Bald Eagles

- Enforce protective buffer zones around Bald Eagle nests in accordance with the Refuge’s “Water Management Plan” and the “Northern States Bald Eagle Recovery Plan” (USFWS, 1983), including a one-half-mile no fly zone for Air National Guard aircraft.
- Restrict prescribed burning and water level drawdowns within one-quarter mile of Bald Eagle nests.
- Continue monitoring Bald Eagle nesting success on the Refuge throughout the life of the CCP.

#### Eastern Massasauga Rattlesnake

- If the Eastern massasauga rattlesnake is listed as federally threatened or endangered, the Refuge will cooperate and support the Federal Recovery Team.
- Should the Eastern massasauga rattlesnake occur on the Refuge, the protective measures in “The Eastern Massasauga Rattlesnake: A Handbook for Land Managers 2000” (Johnson et al. 2000) will be implemented.
- Continue to assist landowners in the Yellow River area, Monroe County, LaCrosse, and Buffalo County with Eastern massasauga rattlesnake management support and surveys, in accordance with “The Eastern Massasauga Rattlesnake: A Handbook for Land Managers 2000” (Johnson et al. 2000).

#### Waterfowl and Other Migratory Birds

Under this alternative the Refuge would:

- Increase the breeding pair population of savanna species of concern (e.g., Red-headed Woodpeckers, Field Sparrow, Northern Flicker) on Refuge land through additional savanna habitat management, in accordance with the North American Waterfowl Management Plan, the Karner Blue Butterfly Recovery Plan, and guidelines developed by Sample and Mossman (1997).
- Increase the breeding pair population of Black Terns on Refuge land to eight nesting pairs through additional wetland management (Region 3 priority species).
- Increase the breeding pair population of Goshawks on Refuge land (Region 3 priority species). In the past, the Refuge has supported one nesting pair of Goshawks in select red and white pine plantations.

Specific management actions are found in the “Habitat Management” section that follows.

### Native Biological Diversity

Under this alternative, the Refuge would:

- Manage for increased biological diversity by restoring and managing additional savanna and wetland habitats (per guidance contained in the Refuge's Forest Management Plan and Water Management Step-down Plans).
- Continue to convert non-native habitat to native habitat on the Refuge.
- Actively control invasive and exotic species on Refuge land.
- Continue to restore wetlands, grasslands, savannas, and forest land in the Yellow River Focus Area through the Refuge's Partner's for Fish and Wildlife Program.

## **2.2.3 Visitor Services**

Under this Alternative the Refuge would:

- Maintain its wildlife observation, photography, fishing, education, interpretation, and outreach programs at 1999 levels.
- Maintain small game and deer hunting programs at current levels, until studies are available that show the number of hunters that can safely hunt Refuge land.
- Public use initiatives would focus primarily on updating existing signs, trails, piers and parking areas (per guidance contained in the 1979 Master Plan and public use plan).
- Refuge staff would continue to conduct outreach and environmental education programs consistent with the 1979 public use plan.
- The Refuge would enlarge its headquarters building to accommodate the additional needs of visitors, Refuge staff, and local and regional educators (per guidance contained in the 1979 Refuge master plan and public use plan). Any major construction activities aimed at enlarging the existing Refuge headquarters building would be covered by future National Environmental Policy Act (NEPA) compliance at the time of construction.
- Staffing patterns for this program would remain roughly the same.

## **2.2.4 Habitat Management**

Under this alternative, the Refuge would:

- Maintain the status quo in habitat management on the Refuge with the exception of 2,600 acres of additional savanna, which would be restored by converting an equal amount of Refuge land currently in forest cover per guidance contained in the Refuge's Forest Management Plan which currently serves as a guiding document for savanna restoration on the Refuge (Table 1).
- Restore wetlands on the Refuge and within the Refuge's Private Lands District in partnership with private landowners and other conservation organizations through the Refuge's Partners for Fish and Wildlife Program.
- Continue to provide habitat restoration and management assistance to landowners in the Yellow River Focus Area through the Refuge's Private Lands program.
- Maintain a fire management program that supports habitat objectives and reduces damage associated with wildfires throughout the life of this CCP. Contain 100 percent of wildfires occurring on the Refuge before they cross Highway 80 moving east and Highway 21 moving south.

**Table 1: Habitat Types on the Refuge by 2019 / Alternative 1, Necedah NWR**

<b>Land Cover Type</b>	<b>2019 Acres</b>	<b>Compared to 2000</b>
Open Landscapes (grasslands and savannas)	6,300	+ 2,600 acres (savanna)
Coniferous Forests	550	- 350 acres
Mixed Deciduous and Coniferous Forests	8,000	- 2,000 acres
Broad-leaf Deciduous Forests	5,350	- 250 acres
Emergent Wetlands and Wet Meadows	10,500	Status Quo
Forested Wetlands	5,700	Status Quo
Lowland Shrubs	5,500	Status Quo
Open Water Areas	1,800	Status Quo

## **2.2.5 Yellow River Focus Area**

Under this alternative, the Refuge would:

- Intensify and concentrate the Refuge’s Partner’s for Fish and Wildlife private lands program in the Yellow River Focus Area, which would include developing Wildlife Management Agreements (Table 4) with landowners in the area.
- Maintain working relationships with landowners in the Yellow River Focus Area.
- Ensure landowners in the Yellow River Focus Area have viable options for restoring, enhancing, and conserving their land for the benefit of wildlife.
- Develop Memorandums of Understanding with Wood and Juneau counties to enhance communication, coordination, and collaboration in conserving Yellow River land for natural resources.
- Develop a land stewardship and natural history slide presentation for the Yellow River; to raise awareness of its unique ecological value and need for conservation (High Priority).

## **2.3 Alternative 2**

Under Alternative 2, management direction at the Refuge relative to the needs and significant issues identified during the scoping and public involvement process would proceed in accordance with guidance contained in the Refuge’s 1979 Master Plan.

### **2.3.1 Service Trust Resources**

#### **2.3.1.1 Listed Species**

Under this Alternative the Refuge would continue protecting listed species and their habitat as described above in Alternative 1. However, under this Alternative the Refuge would not establish one large population of Karner blue butterflies on Refuge land through additional savanna habitat management.

#### **2.3.1.2 Waterfowl and other Migratory Birds**

Under this alternative the Refuge would:

- Continue its focus on providing migratory habitat for waterfowl and other migratory birds (feeding and resting) as prescribed in the 1979 Master Plan (mainly mid-migration habitat).
- Increase the breeding pair population of Black Terns on Refuge land to eight nesting pairs through additional wetland management (Region 3 priority species); and
- Increase the breeding pair population of Goshawks on Refuge land (Region 3 priority species). In the past, the Refuge has supported one nesting pair of Goshawks in select red and white pine plantations.
- Specific management actions are found in the “Habitat Management” section below.

### **2.3.1.3 Native Biological Diversity**

Under this alternative the Refuge would:

- Continue to convert non-native habitat to native habitat on Refuge land.
- Actively control invasive and exotic species on Refuge land.

## **2.3.2 Visitor Services**

Under this alternative the Refuge would:

- Maintain its wildlife observation, photography, fishing, education, interpretation, and outreach programs at 1999 levels. Small game and deer hunting programs would be maintained until studies are complete that identify the number of hunters that can safely hunt on the Refuge. No new trails, observation towers, fishing piers, or major facilities would be developed.
- Continue to conduct outreach and environmental education programs consistent with guidance contained in the 1979 Master Plan.
- Maintain the Refuge headquarters building as the primary visitor contact station. No additional classrooms, meeting space, or staff facilities would be developed under this Alternative.
- Maintain present staffing patterns.

## **2.3.3 Habitat Management**

Under this alternative the Refuge would:

- Maintain the status quo in habitat restoration and management on Refuge land (Table 2). However, some small wetlands may be restored within the Refuge’s Private Lands District (Figure 12 in the CCP).
- Maintain a fire management program that supports habitat objectives and reduces damage associated with wildfires throughout the life of this CCP. Contain 100 percent of wildfires occurring on the Refuge before they cross Highway 80 moving east and Highway 21 moving south.

**Table 2: Habitat Types on the Refuge by 2017 / Alternative 2, Necedah NWR**

<b>Land Cover Type</b>	<b>2017 Acres</b>	<b>Compared to 2000</b>
Open Landscapes (grasslands, savanna, shrublands, old fields)	3,700	Status Quo
Coniferous Forests	900	Status Quo
Mixed Deciduous and Coniferous Forests	10,000	Status Quo
Broad-leaf Deciduous Forests	5,600	Status Quo
Emergent Wetlands and Wet Meadows	10,500	Status Quo
Forested Wetlands	5,700	Status Quo
Lowland Shrubs	5,500	Status Quo
Open Water Areas	1,800	Status Quo

### **2.3.4 The Yellow River Focus Area**

Under this alternative, the Refuge would discontinue all of its efforts at conserving, restoring, and managing habitat in the Yellow River Focus Area. No easement or fee-title acquisition of land would occur under this alternative. The Refuge would not intensify and concentrate its Partners for Fish and Wildlife program in the Yellow River Focus Area. The Refuge would not develop any additional Wildlife Management Agreements with landowners in the Yellow River Focus Area.

## **2.4 Alternative 3 (Preferred Alternative)**

Under Alternative 3, future management direction at the Refuge relative to the needs and significant issues identified during the scoping and public involvement process would be guided by the goals, objectives, strategies, and projects described in Chapter 4 of the CCP.

### **2.4.1 Service Trust Resources**

#### **2.4.1.1 Listed Species**

This alternative would be the same as Alternative 1 regarding trust resources.

#### **2.4.1.2 Waterfowl and Other Migratory Birds**

Under this alternative, the Refuge would:

- Increase the breeding pair population of waterfowl on Refuge land to 700 pairs (e.g., Mallard, Teal, and Pintail) through additional grassland habitat management, in accordance with the North American Waterfowl Management Plan.
- Eliminate Wood Duck houses on Refuge land in favor of natural nesting cavities (the Refuge would maintain existing Wood Duck houses until they become unusable).
- Increase the breeding pair population of grassland species of concern (e.g., Dickcissel, Upland Sandpiper, Grasshopper Sparrow, Bobolink) on Refuge land through additional grassland habitat management, in accordance with the North American Waterfowl Management Plan, the Karner Blue Butterfly Recovery Plan, and guidelines developed by Sample and Mossman (1997).
- Increase the breeding pair population of savanna species of concern (e.g., Red-headed Woodpeckers, Field Sparrow, Northern Flicker) on Refuge land through additional savanna

habitat management, in accordance with the North American Waterfowl Management Plan, the Karner Blue Butterfly Recovery Plan, and guidelines developed by Sample and Mossman (1997).

- Increase the breeding pair population of Black Terns on Refuge land to eight nesting pairs through additional wetland management (Region 3 priority species); and
- Increase the breeding pair population of Goshawks on Refuge land (Region 3 priority species). In the past, the Refuge has supported one nesting pair of Goshawks in select red and white pine plantations.

Specific management actions are found in the “Habitat Management” section that follows.

### **2.4.1.3 Native Biological Diversity**

Under this alternative, the Refuge would:

- Manage for increased biological diversity by restoring and managing additional wetland, grassland, and savanna habitats on the Refuge and within the Yellow River Focus Area, including seasonal wetlands, wet meadows, native prairies, and riparian associations (see Table 3 in the “Habitat Management” section).
- Continue to convert non-native habitat to native habitat on the Refuge.
- Actively control invasive and exotic species on Refuge land.
- Continue to restore wetlands, grasslands, savannas, and forest land in the Yellow River Focus Area through the Refuge’s Partner’s for Fish and Wildlife Program.

## **2.4.2 Visitor Services**

Under this alternative, the Refuge would:

- Expand its wildlife observation, photography, fishing, education, interpretation, and outreach programs by roughly 10-20 percent over 1999 estimates (measured in visitor use-days).
- Small game and deer hunting programs would be maintained at current levels, until studies identify the number of hunters that can safely hunt Refuge land.
- Several notable upgrades to facilities (Figure 3) and services would occur under this alternative to provide for increased use of the Refuge (see Chapter 5 in the CCP for a complete description of projects). These would include:
  - Project 20 – developing an observation tower at Carpenter Field to enhance wildlife viewing opportunities
  - Project 21 – developing and maintaining two additional off-road parking areas on the Refuge.
  - Project 22 – developing a fishing pier at Harvey’s Pond to enhance Refuge fishing opportunities.
  - Project 23 – completing the Ellen Allan Outdoor Learning Center to facilitate on-site outdoor learning opportunities.
  - Project 25 – developing new signage that welcomes and orients visitors to the Necedah Wildlife Management Area.
  - Project 26 – developing 5 additional miles of interpretive trails on the Refuge.
  - Project 27 – designing and erecting new signs on the Refuge, including two interpretive kiosks and site interpretation signage.

- Project 29 – designing and building a new visitor center to serve as a first point of contact for Refuge visitors, office space for Refuge staff, and classrooms and meeting space for educators.

One of the proposed locations for the visitor center is an upland sight north of State Highway 21 and east of Headquarters Road (see Figure 18 in the CCP). The other site under consideration is located approximately 500 yards north-northwest of the existing office complex. This site includes the existing learning center, a converted garage. The current land cover at both sites is unrestored savanna, which would be restored in conjunction with construction of the visitor center. The restoration would benefit Service trust resources such as the Karner blue butterfly and migratory birds that use savannas and grasslands. This EA is intended to serve as the NEPA compliance document for this facility if it is constructed largely as described herein. The proposed center would have the following facilities, rooms, features:

Facility:

- The building would have a footprint of approximately 20,000 square feet, with additional square footage in the basement.
- Single story, above ground, universally accessible.
- Basement with walk-out entrance, universally accessible.
- Stone siding.
- Pond/recycling natural sewage system.
- Geothermal heating and cooling.
- Drilled well.
- Stone/tile flooring.
- Pine paneling harvested from Refuge Civilian Conservation Corps pine plantations.
- Parking area (approximately 35,000 sq. ft.) and would include space for buses, RVs, and vehicles with trailers.

Rooms:

- Reception area with desk.
- Activity area.
- Auditorium with seating for 100-150.
- Conference room which can be divided into two rooms.
- Full kitchen.
- Gift shop.
- Public restrooms (six stalls each).
- Office spaces (four)
- Staff restrooms.
- Staff break room.
- Utility room (basement).
- Storage area (basement).
- Delivery area (basement).

Outdoor Features:

- Hiking and cross-country ski trails.
- Demonstration garden with interpretive signs.

- Landscaping with native flora.
- Bird feeders.
- Outdoor theater
- Picnic area.
- Porch/deck area
- Outdoor seating
- Project 30 – constructing one additional universally accessible fishing pier, hunting blind, and hard surface trail or boardwalk.
- Project 31 – developing universally accessible versions of brochures (braille) and/or videos (close-captioned).
- Project 38 – developing housing to accommodate Refuge volunteers and other stakeholders living outside the commuting area (in this case the Refuge would remodel the Annex building to serve as volunteer housing).

### 2.4.3 Habitat Management

Under this alternative, the Refuge would:

- Maintain 23,500 acres of wetlands (e.g. emergent and wet meadow, forested, lowland shrub, open water) on Refuge land; maintain 12,500 acres of emergent wetland (e.g., palustrine) and wet meadow habitat (e.g., sedge meadows) on Refuge land to support nesting, resting, and feeding waterfowl (all types), associated bird species of concern (e.g., Black Terns, American Bittern, Henslow’s Sparrow, Sedge Wren), and to promote native biological diversity (Table 3).
- Maintain 5,700 acres of forested wetland habitat on Refuge land to support forest-nesting waterfowl (e.g., Wood Ducks) and associated bird species of concern (e.g., American Woodcock, Veery, Northern Flicker) and to promote native biological diversity (Table 3 summarizes all of the habitat changes.)
- Maintain 3,500 acres of lowland shrub habitat on Refuge land to support associated bird species of concern (e.g. Blue-winged Warbler, Golden-winged Warbler, Willow Flycatcher) and to promote native biological diversity.
- Maintain 1,800 acres of open water habitat on Refuge land to support nesting, resting, and feeding waterfowl (all types), other associated bird species of concern (e.g., Common Loon, Black Tern) and to promote native biological diversity.
- Establish and maintain 9,800 acres of open landscape habitat on Refuge land (e.g. grasslands and savannas).
- Establish and maintain 6,200 acres of native grassland habitat on Refuge land (e.g., midgrass and tallgrass prairies characteristic of the central Wisconsin sand plain subsection) to support nesting waterfowl (e.g., Mallard, Teal, Pintail), other associated bird species of concern (e.g., Dickcissel, Upland Sandpipers, Grasshopper Sparrows, Bobolink), and to promote native biological diversity.
- Restore and maintain 3,600 acres of native savanna habitat on Refuge land (e.g., oak savanna) to support Karner blue butterflies, associated bird species of concern (e.g., Red-headed Woodpeckers, Field Sparrows, Flicker), and to promote native biological diversity.
- Maintain 10,400 acres of forest land (e.g., coniferous, mixed deciduous/coniferous, broad-leaf deciduous). Timber harvest will only occur in areas designated open landscape, except in pine plantations or for safety, operations, or fuel reduction purposes.

**Table 3: Habitat Types on the Refuge by 2019 / Alternative 3, Necedah NWR**

Land Cover Type	2019 Acres	Compared to 2000
Open Landscapes (grasslands and savannas)	9,800	+ 2,600 acres savanna + 3,500 acres grassland
Coniferous Forests	550	- 350 acres
Mixed Deciduous and Coniferous Forests	4,500	- 5,500 acres
Broad-leaf Deciduous Forests	5,350	- 250 acres
Emergent Wetlands and Wet Meadows	12,500	+ 2,000 acres
Forested Wetlands	5,700	Status Quo
Lowland Shrubs	3,500	- 2,000 acres
Open Water Areas	1,800	Status Quo

- Maintain 550 acres of coniferous forest habitat on Refuge land to support associated bird species of concern (e.g., Northern Goshawks,) and to promote native biological diversity.
- Maintain 4,500 acres of mixed deciduous and coniferous forest habitat on Refuge land to support associated bird species of concern (e.g., Pine Warblers, Scarlet Tanager, Whip-poor-will, Black-and-white Warbler) and to promote native biological diversity.
- Maintain 5,350 acres of broad-leaf deciduous forest habitat on Refuge land to support associated bird species of concern (e.g., Yellow-billed Cuckoo, Wood Thrush) and to promote native biological diversity.

The following action items would apply:

Emergent Wetlands/Wet Meadows

- Restore and maintain two additional palustrine emergent wetland complexes (approximately 1,000 acres each) on the Refuge by converting 2,000 acres of lowland shrubs (Low Priority).
- Manage palustrine emergent wetlands for dense annual and perennial vegetation. Burn, mow, and disk as necessary.
- By 2009, sub-divide Sprague-Mather Pool, the largest impoundment on the Refuge, into three units to enhance water management capability to provide moist soil food production and/or invertebrate availability for migrating waterfowl (High Priority).
- Beginning in 2005, provide stable water and emergent vegetation for Black Terns by leaving Pool 19 (east and west), Carter-Woggon Pool, Upper Rice Pool, and Rice Pool at “full pool” (except for maintenance purposes), in accordance with guidelines developed by Naugle et al. 2000.
- By 2005, develop internal guidelines for acceptable amounts of woody vegetation in existing Refuge pools. Control as necessary.
- By 2005, acquire and install staff water gauges in Refuge pools for accurate water level readings (High Priority).
- By 2006, install a shallow well and a solar-powered pump as a supplemental water source for the Ducks Unlimited Wetland Project (High Priority).

#### Forested Wetlands

- Maintain large blocks of forested wetland habitat with mature trees, sparse understory, and within one-half mile of water. Implement disturbance regimes (e.g., mechanical thinning, burning, mowing) to maintain the desired herbaceous understory (sparse), as necessary (High Priority).

#### Lowland Shrubs

- Establish and maintain large blocks of lowland shrub habitat with a range of young to mature shrubs and dense understory. Maintain hydrology and active wildfire suppression.

#### Open Water

- Maintain the current water management regime on Refuge pools, which includes leaving pools flooded at full-pool 2 out of 3 years (to setback woody vegetation).

#### Grasslands

- Establish and maintain a mosaic of small (40 acres to 1,000 acres) and medium-sized (1,000 to 5,000 acres) native grasslands comprised of short, medium, and tall height-density patches containing diverse structure (e.g., bare soil, stiff-stemmed forbs, sparse woody vegetation) to provide nesting, brood-rearing, and foraging habitat for grassland birds and to enhance biological diversity. The Refuge will focus on creating blocks of grassland habitat that are structurally open and free of major linear woody edges. In most cases, woody cover will represent less than 5 percent of the grasslands habitat.
- Convert 200 acres of existing non-native grasslands to native grasslands for the purpose of enhancing native biological diversity. The Refuge currently has roughly 945 acres of non-native cool season grasses.
- Implement disturbance regimes (e.g., grazing, burning, mowing) on all Refuge grasslands to establish and maintain the desired herbaceous covers (e.g., composition, height/density), as necessary (High Priority).

#### Savannas

- Restore and maintain an additional 640 acres of oak and pine woodlands and sedge meadow wetlands on the Refuge distributed over at least a 10 square mile area by 2015, in accordance with the Karner Blue Butterfly Recovery Plan.
- Implement disturbance regimes (e.g., mowing, burning) to establish and maintain herbaceous cover, as necessary (High Priority).
- Maintain a mature oak component in savanna restoration units to provide nesting cavities for Red-headed Woodpeckers.
- Enhance and maintain a warm-season grass component in savanna restoration units to provide nesting cover for Field Sparrows.
- By 2013, construct an additional 30 miles of firebreaks around savanna restoration units and along the Refuge's eastern boundary (an area with concentrations of hazardous fuels) to allow for periodic fire (High Priority).
- By 2007, acquire a hydro-axe to maintain open landscape habitats for Karner blue butterflies and other savanna-dependent species (High Priority). Hydro-axe operation in Karner blue butterfly management units will be conducted between August 15 and April 15, and no more than one time per year.

#### Coniferous Forests

- Maintain select red and white pine plantations as monotypic, even-aged stands to support nesting Goshawks, in accordance with Rosenfield et al. 1998.
- Within designated maintenance areas of the Refuge (Figure 17 in the CCP), employ approved Timber Stand Improvement techniques, such as proper thinning and harvest

schedules, to transition monocultural stands (primarily red and white pine plantations) to mixed composition, uneven-aged stands. Treat stands at least once over the life of this CCP.

- Prepare and advertise for selective timber harvest on 350 acres (over a 15-year period) of Refuge coniferous forest land, in support of the Refuge's savanna and grassland restoration efforts.

#### Mixed Deciduous/Coniferous Forests

- Maintain large mature stands of oak forest with a white pine component to provide nesting habitat for Scarlet Tanagers and Least Flycatchers.
- Maintain large mature stands of jack pine with an oak component for nesting Pine Warblers, Whip-poor-wills, and Black-and-white Warblers.
- Conserve 640 acres of mesic mixed oak/pine forest with interspersed sedge meadows free from active human manipulation to provide a control area (reference site) where successional changes can be monitored and compared to other managed areas. Wildfires will be suppressed in the area to protect adjacent landowners.

#### Broad-Leaf Deciduous Forests

- Maintain large mature stands of oak forest with a diverse, dense understory component, to provide nesting habitat for Yellow-billed Cuckoo, Chestnut-sided Warbler, and Wood Thrush.

#### Fire Program

- Maintain a fire management program that supports habitat objectives and reduces damage associated with wildfires throughout the life of this CCP. Contain 100 percent of wildfires occurring on the Refuge before they cross Highway 80 moving east and Highway 21 moving south.
- By 2007, acquire an additional pump engine to increase the effectiveness of both prescribed burning and fire suppression (Medium Priority).
- By 2007, construct a 40-foot by 70-foot storage building that can be heated to protect fire management vehicles from the weather (Medium Priority).
- Reduce the density of jack pine and remove slash from at least one unit with significant overmature and standing dead timber biannually with emphasis on the Refuge's eastern boundary to aid in fire control. All treated units will be within designated Maintenance Areas of the Refuge (Figure 17 in the CCP).

#### Pest Management

- By 2005, develop an Integrated Pest Management step-down plan that will reduce populations of exotic and invasive species from current levels, restrict the distribution of pest plants (e.g., Leafy Spurge, Spotted Knapweed, Reed Canary Grass) to their current acreage, and reduce the impact pest plant species have on rare plant communities, throughout the life of this CCP.
- Beginning in 2006, complete a rare plant inventory, and inventory every 5 years thereafter (Medium Priority).

#### Special Refuge Management Areas

- Restoration and management of the above mentioned habitats will be accomplished through the development of six special management areas on the Refuge. Figure 17 in the CCP represents a blueprint (long-term) for what the Refuge landscape might consist of within these special management areas. Table 6 in the CCP describes how these areas would be managed to achieve the Refuges wildlife, habitat, and people commitments.
- Similarly, Figure 17 in the CCP is a map of the Refuge's desired future habitat management condition (long-term). It combines ecological information (soils data) relative to what the Refuge can naturally support with other factors such as budgets and opportunities and

issues identified by the Refuge and its stakeholders during the CCP scoping process. This information together was used to create a blueprint of what the Refuge landscape might look like in the future. Built into the desired future condition were several key management assumptions (Chapter 3 of the CCP).

## 2.4.4 Yellow River Focus Area

Under Alternative 3 the Refuge would:

- Pursue long-term conservation and management of land within the Yellow River Focus Area. Over the next 15 years, roughly 3,000 acres of wetlands, uplands, and riparian areas could be conserved by the Service through technical assistance to Yellow River landowners, voluntary partnership agreements, conservation easements and fee acquisition programs (Table 4). The Service would acquire the minimum interest necessary to accomplish natural resource goals and only acquire land from willing sellers (see Table 4). Restoration and conservation would occur at a rate of approximately 250 acres/year assuming the presence of willing sellers and the availability of funds (best guess estimate). The Service would not request land acquisition money for the project until the year 2006.
- Continue developing Wildlife Management Agreements with willing landowners in the Yellow River area.
- Maintain working relationships with landowners in the Yellow River Focus Area.
- Ensure landowners in the Yellow River Focus Area have several viable options for restoring, enhancing, and conserving their land for the benefit of wildlife. As previously mentioned, the Yellow River represents one of Wisconsin's most diverse ecosystems. Therefore, landowners in the area often have several management options. The Service would work with landowners to identify management options and the suite of species that will benefit from each. Property owners with large blocks of closed canopy forest could maintain those large blocks for Cerulean Warblers, Red-shouldered Hawks, etc. The same landowner may also have sedge meadows that they wish to maintain as "open" for Sedge Wrens, Henslow's Sparrows, or Eastern massasaugas. The brush on the same meadows could be maintained for Blue-winged Warblers and Golden-winged Warblers and Willow Flycatchers and Alder Flycatchers. Whichever option property owners choose, the Service would assist them in that habitat management and in process to benefit a suite of rare or imperiled species.
- Develop Memorandums of Understanding with Wood and Juneau County to enhance communication, coordination, and collaboration in conserving Yellow River land for natural resources.
- Develop a land stewardship and natural history slide presentation for the Yellow River, to raise awareness of its unique ecological value and need for conservation (High Priority).

*Fee-simple acquisition* involves acquisition of most or all of the rights to a person's land. There is a total transfer of property with the formal conveyance of a title to the Federal government. While fee acquisition involves most of the rights to a property, certain rights may be withheld or not purchased, such as water rights, mineral rights, and use reservations.

*Conservation Easements* involve the acquisition of certain rights that can be of value for the purpose of achieving fish and wildlife habitat objectives, usually by prohibiting or encouraging certain practices (right to drain a wetland or delay haying harvest). Easements become part of the title to the property and are usually permanent. If a landowner sells his or her property, the easement continues as part of the title. Based on conversations with landowners in the Yellow River Focus Area, this mechanism offers the most promise relative to landowner participation.

**Table 4: U.S. Fish & Wildlife Service Land Acquisition Tools**

<i>Fee Title -</i>	The acquisition of all land ownership rights
<i>Conservation Easements -</i>	The acquisition of part of the surface land ownership rights. Such easements are usually perpetual.
<i>Jurisdictional Transfer -</i>	The transfer of surface management from one Federal agency to another.
<i>Cooperative Agreement/Wildlife Management Agreement -</i>	Short term agreements with landowners to accomplish specific management objectives.
<i>Lease -</i>	Short term or long term “rental” of land for management. This usually includes periodic payments to the landowner.
<i>Donation -</i>	Gift of land or interest in land without monetary reimbursement.

*Cooperative Agreements/Wildlife Management Agreements* are negotiated between the Service and other government agencies, conservation groups, or individuals. An agreement usually specifies a particular management action or activity the landowner will do, or not do, on his or her property. For example, a simple agreement would be for the landowner to agree to delay hayland mowing until after a certain date to allow ground nesting birds to hatch their young. More comprehensive agreements are possible for such things as wetland or upland restoration, or public access. Agreements are strictly voluntary on the part of the landowner and are not legally binding. As long as a landowner abides by the terms of the agreement, this conservation can be effective in meeting certain objectives. Unfortunately, because these agreements are voluntary and can be modified, they do not offer the Service or the American public perpetual conservation.

*Lease Agreements* are short-term agreements for full or specified use of the land in return for an annual rental payment that generally includes occupancy rights. For example, the Service could lease 40 acres of grassland habitat to provide safe nesting for ground nesting birds. The landowner would not be able to hay or otherwise disturb the ground during the lease period.

**Table 5: Summary and Comparison of Alternatives, Necedah NWR**

<b>ACTION</b>	<b>ALTERNATIVE 1 (No Action) (Guidance contained in the 1979 Master Plan and associated Step-down Management Plans)</b>	<b>ALTERNATIVE 2 (Guidance contained in the 1979 Master Plan)</b>	<b>ALTERNATIVE 3 (Preferred) (Guidance contained in the Refuge CCP)</b>
<b>1. Service Trust Resources</b>			
<i>Listed Species</i>	Would continue protecting all listed species and their habitats, including restoration and management of their habitats.	Would continue protecting all listed species and their habitats. However, the Refuge would not attempt to establish one large population of Karner blue butterflies on Refuge land through additional savanna habitat management.	Would continue protecting all listed species and their habitats, including restoration and management of their habitats.
<i>Waterfowl and other Migratory Birds</i>	Would not increase waterfowl use and production. Would not increase grassland species of concern. Would increase savanna species of concern through additional savanna management.	Would not increase waterfowl use and production. Would not increase grassland species of concern. Would not increase savanna species of concern through additional savanna management.	Would increase waterfowl use and production through additional habitat management. Would increase grassland species of concern through additional grassland management. Would increase savanna species of concern through additional savanna management.
<i>Biological Diversity</i>	Would manage for increased biological diversity only through savanna restoration efforts on Refuge land and through the Private Lands Program in the Yellow River Focus Area.	Would not manage for increased biological diversity on either Refuge land or land within the Yellow River Focus Area.	Would manage for increased biological diversity on both Refuge land and within the Yellow River Focus Area through additional wetland, grassland, and savanna habitat restoration.
<b>2. Visitor Services</b>			
	Refuge visitor services would remain at 1999 levels. No new trails, observation towers, fishing piers, or major facilities would be developed. Headquarters building would be enlarged to accommodate staff.	Refuge visitor services would remain at 1999 levels. No new trails, observation towers, fishing piers, or major facilities would be developed. Headquarters building would remain the same and would not be enlarged.	Visitor Services would be expanded by roughly 20 percent over 1999 levels. Many upgrades to existing facilities would occur. New headquarters building/visitor center would be constructed.

**Table 5: Summary and Comparison of Alternatives, Necedah NWR (Continued)**

<b>ACTION</b>	<b>ALTERNATIVE 1 (No Action) (Guidance contained in the 1979 Master Plan and associated Step-down Management Plans)</b>	<b>ALTERNATIVE 2 (Guidance contained in the 1979 Master Plan)</b>	<b>ALTERNATIVE 3 (Preferred) (Guidance contained in the Refuge CCP)</b>
<b>3. Habitat Management</b>			
	The Refuge would maintain the status quo in habitat management with the exception of 2,600 acres of new savanna. Forest land would be reduced by an equal amount (2,600 acres). No new grasslands or wetlands would be developed for nesting birds.	The Refuge would maintains the status quo in habitat management. No new wetlands, grasslands, or savannas would be restored and managed for nesting birds.	The Refuge would increase open landscape land on the Refuge (grasslands and savannas) by 6,100 acres. Emergent wetlands and wet meadows would increase by 2,000 acres as well. Coniferous, broad-leaf, and mixed forests would decrease by 6,100 acres. Lowland shrubs would decrease by 2,000 acres (this habitat would be converted to emergent wetland/wet meadow habitat through alteration of the hydrology).
<b>4. Yellow River Focus Area</b>			
5. Cultural Resources	The Refuge would continue private lands program in YRFA developing Wildlife Management Agreements with willing landowners; no easements or fee-title purchases of land.	The Refuge would discontinue private lands program in YRFA. No new Wildlife Management Agreements would be developed with willing landowners. No easement or fee-title purchases of land would occur.	The Refuge would purchase conservation easements and fee-title purchases from willing sellers. Wildlife Management Agreements would be developed with willing landowners.
<b>5. Cultural Resources</b>			
	By 2019, in accordance with the Archaeological Resources Protection Act, the Refuge will protect 100 percent of the known archaeological and cultural resources on the Refuge.	By 2019, in accordance with the Archaeological Resources Protection Act, the Refuge will protect 100 percent of the known archaeological and cultural resources on the Refuge.	By 2019, in accordance with the Archaeological Resources Protection Act, the Refuge will protect 100 percent of the known archaeological and cultural resources on the Refuge.
<b>6. Fire Management</b>			
	The Refuge will manage its fire program consistent with guidance contained in section 2.2.4.	The Refuge will manage its fire program consistent with guidance contained in section 2.3.3.	The Refuge will manage its fire program consistent with guidance contained in section 2.4.3.

# Chapter 3: Affected Environment

- 
- A Description of the History of the Refuge
  - A Description of the Physical Environment
  - A Description of the Biological Environment
  - A Description of the Socioeconomic Environment
- 

This chapter describes physical, biological, and socioeconomic environments associated with the Refuge, the Castle Rock Watershed (Refuge Watershed), and the Yellow River Focus Area.

## 3.1 History of the Refuge

European settlement occurred on the Refuge during the decade of 1850 to 1860. The first of a long history of fires probably occurred during the decade of 1860 to 1870 along with increased settlement and land clearing operations. By the early 1880s lumber operations were in full swing. This was followed in 1893 by a disastrous fire which eliminated most of the remaining tamarack and spruce in the bogs. This fire also burned into the peat, probably for the first time. Following this fire the country became very prairie-like, with a few scattered oak and pine on the “islands.” The two prairie grouse, Sharp-tailed Grouse and Prairie Chickens, became abundant following this fire. Many of the former bog areas developed extensive stands of wire grass which were cut for commercial manufacture of carpets. Fires were common and widespread between 1893 and 1900.

Drainage and settlement proceeded in the decade of 1900-1910. In 1910 a fire burned large acreages of wild lands. Smartweed volunteered abundantly in crop fields and burns. By 1912 it was apparent that certain drainage ditches were inadequate, subjecting some fields to flooding. Drainage continued until about 1920, when the last drainage ditches were dug. Drainage had further reduced the tamarack and spruce areas and wire grass disappeared with elimination of surface water. It was replaced by farm weeds, goldenrod, bluejoint, woolgrass, sedges, willow, and increasing amounts of aspen and birch. Fire was common at this time. In 1920, a widespread fire covered much of the area.

Agriculture depression beginning in 1920, excessive drainage district taxes, and drought resulted in the end of the agriculture period. By 1925, abandonment was common, with only a few farms left. Most of the abandoned land was invaded by aspen, birch, woolgrass, and upland herbs.

In the fall of 1930 the most extensive and severe fire in the history of the area occurred. It burned more than 300,000 acres and consumed huge holes in the peat. Most of the sand islands were denuded of their topsoil, and it almost completely eradicated all indications of previous settlement. Following the fire, some areas came directly into aspen, while others came into agricultural weeds and smartweed.

Abandonment of most of the farms allowed for the creation of the Refuge in 1939. The events leading up to its establishment date back to the early 1930s when the U.S. Government acquired 114,964 acres of land in Juneau, Wood, Monroe, and Jackson counties, Wisconsin, using the authority of the National Industrial Recovery Act of 1933 and the Emergency Relief Appropriation Act of 1935. The purpose for these acquisitions was to assist farmers living within the area and to develop the area for wildlife.

Creation of the Refuge led to wildfire suppression and large scale wetland restoration activities by the Civilian Conservation Corps (CCC). Wetlands created by the CCC were actually not restorations as they created large, open-water impoundments where sedge meadows and tamarack bogs once occurred. Wildfire suppression activities had an equally significant effect as the areas prairie-like appearance began to disappear. Unsuppressed, succession began to create closed-canopy forests where they most likely had not occurred before. As the Refuge's savannas were lost, both Prairie Chickens and Sharp-tailed Grouse disappeared. By 1960, all of the Refuge's open-landscape savannas had been degraded. In that year, the Refuge began savanna restoration activities.

## **3.2 Description of the Physical Environment**

### **3.2.1 Archaeological and Cultural Values**

Archaeological records show evidence of human occupation in Juneau County since the end of the last Ice Age when Paleo Indians hunted large prehistoric animals. Every subsequent cultural period for the past 10,000 years is represented. The land now known as the Refuge was probably used by several cultures since the Ice Age. The peat-covered lowlands around the extensive marsh and shallow river environment contained a wide variety of food resources. Slightly higher ground would have been suitable for resource-extraction activities, but the people likely located their larger camps and villages on elevated land forms not found within the Refuge.

Archaeological investigations have covered 2 percent of the Refuge. The surveys and other sources have identified 27 prehistoric and historic sites. The earliest evidence of people on the Refuge has been dated to the Middle Archaic period of 5,000 to 3,000 years ago. The rest of the identified sites are camps from the Woodland period of 3,000 to 250 years ago, and farmsteads and cemeteries from the period of Western culture settlement and occupation. Prehistoric mounds, including effigy mounds, are reported near the Refuge. An inventory of Yellow River archaeological values and previous archaeological work within the Yellow River Focus Area has not been completed. As of November 1, 1998, the National Register of Historic Places contained seven properties in Juneau County and three properties in adjacent Jackson County. These properties include a bridge, houses, and prehistoric sites, including the Cranberry Creek Archaeological District 3 miles east of the Refuge.

Early 20th century fires burned across the Refuge area, destroying the peat so that now the sandy subsurface is exposed or shallowly covered with silt. The slight elevations that might have been used for resource extraction or temporary camps are virtually indistinguishable. In consultations with the Wisconsin State Historic Preservation Officer, the more efficient method of identifying archaeological sites would be to conduct a geomorphological investigation of the Refuge to determine where land forms exist that could have supported human use. The study conducted at Fort McCoy, Wisconsin, could be a useful prototype.

Indian tribes may have interest in the Refuge area in terms of traditional cultural properties and sacred sites, as well as claims to human remains, funerary objects, and other cultural items. During the early historic period in Wisconsin, Indian tribes were in a great state of flux, many tribes from the east having moved from their ancestral land and pushed the aborigines from Wisconsin to the south and west. Thus, connecting historic period tribes with their prehistoric cultural antecedents in Wisconsin is problematic. People of the Late Woodland Lakes phases may have become the

Menominee tribe. Evidence from archaeological excavations indicates that ancestors of the Winnebago had lived in eastern Wisconsin for hundreds of years; the Oneota of eastern Wisconsin may have been prehistoric Winnebago. In any event, historic records place Winnebago and Potawatomi in the area at the time of Western contact. The Refuge is within the area recognized by the Indian Claims Commission as being part of Menominee and Winnebago aboriginal territory. The Ioway spoke a Siouan language which likely links them to late prehistoric cultures of central and southern Wisconsin. To a limited extent the Illinois were indigenous tribes in southern Wisconsin, probably not as far north as the Refuge. By the 1600s, however, a variety of tribal groups were moving in and out of areas south of the Refuge and may have spent limited periods of time in areas adjacent to and within the vicinity. These tribes included the Sauk, Fox, Potawatomi, Kickapoo, Miami, and Mascouten.

### **3.2.2 Hydrology**

Water plays an important part in the history of the Refuge. The sandy sediments and flat topography of the area are a result of Glacial Lake Wisconsin, a pre-historic lake that developed when a glacier blocked the Wisconsin River near Baraboo, Wisconsin. This extensive lake occupied large parts of Juneau and Adams counties, and parts of Wood, Portage, Waushara, Marquette, Columbia, Sauk, Richland, Vernon, Monroe and Jackson counties. Glacial Lake Wisconsin drained catastrophically about 13,000 years ago when the glaciers retreated.

The Refuge is located in the Upper Mississippi River/Tallgrass Prairie Ecosystem (Ecosystem) which is one of eight hydrologically defined ecosystems that comprise the Great Lakes-Big Rivers Region of the Service. The Ecosystem is a large and ecologically diverse area that encompasses land in the states of Wisconsin, Illinois, Indiana, Iowa, Minnesota, and Missouri. The Mississippi River bisects the Ecosystem east and west. Other major rivers include the Minnesota, Chippewa, Black, Wisconsin, Iowa, Rock, Skunk, Des Moines, and Illinois.

Located in the Castle Rock watershed (8-Digit Hydrologic Unit Code) (see Figure 5 and 6 in the CCP), the Refuge is supported by an important hydrological system comprised of natural and man-made waterways in which materials and energy are transferred. Some, such as the Yellow River and its tributaries, constitute an important ecological component to the Refuge by connecting biologically diverse food webs that provide important habitat features for wildlife. The Refuge, along with a series of other swampy basins such as Meadow Valley Flowage, Beaver Flowage, and numerous managed cranberry bogs, all contribute to the 7,800-square-mile Middle Wisconsin River Basin. The Castle Rock watershed drains 3,259 square miles, contains 27 rivers and streams, and has 3,358 total river miles.

On average, approximately 85 percent of the water entering the Refuge comes directly from precipitation, either as rain or snow (Table 6). Precipitation averages 32.6 inches annually. Streams that flow into the Refuge contribute about 13 percent of the water, while groundwater flow into the Refuge accounts for about 2 percent of the water, due largely to the interception of ground water by the extensive drainage networks surrounding the Refuge. Surface-water inflow to the Refuge includes: Remington Ditch (60 percent), Neal Lateral (15 percent), EBR-Spencer (11 percent), Meadow Valley (6 percent), and un-gauged (8 percent).

**Table 6: Summary of Water Sources and Sinks for Necedah NWR (May 1998 - April 1999)<sup>1</sup>**

<b>Water Sources</b>	<b>Annual Flow (acre-ft.)</b>
Precipitation	118,700
Surface Water Inflow	19,600
Ground Water Inflow	2,300
<b>Total Water In</b>	140,600
<b>Water Sinks</b>	<b>Annual Flow (acre-ft.)</b>
Evapotranspiration Loss	85,400
Surface Water Outflow	51,500
Ground Water Outflow	2,700
<b>Total Water Out</b>	139,600
Change in Storage (water inflow - water outflow)	1,000
Percent of Water Inflow	0.7

*1.U.S. Geological Survey Fact Sheet, May 2000*

Of the water leaving the Refuge, about 62 percent is lost to evaporation from the pools or transpiration of water vapor back to the atmosphere from plants. Evaporation from open-water surfaces is estimated to be about 28 inches annually, as determined from a regional map of average annual lake evaporation (Kohler and others, 1959). Surface-water outflows from the Refuge, mostly through Rynearson Pools 1 (28 percent) and 2 (59 percent) and Suk-Cerney Pool (10 percent), constitute about 36 percent of the total outflows; groundwater flows out of the Refuge are about 2 percent of the total annual outflows. This small amount of groundwater outflow, along with larger surface water outflows, demonstrates the efficiency of the extensive drainage network within the Refuge boundaries. A natural topographic fall of 50 feet occurs from north to south across the Refuge, or roughly 2-3 feet per mile.

From recent groundwater modeling of the Refuge, annual recharge was estimated to be 9.5 inches. Hence, evapotranspiration was 32.6 inches (precipitation) minus 9.5 inches (groundwater recharge), or 23.1 inches. This value agrees well with the findings of Weeks and Strangland (1971), who reported evapotranspiration values for nearby agricultural areas ranging from 15 to 20 inches per year, with higher rates expected in areas containing water-tolerant vegetation. Groundwater moves through the Refuge in a northwest to southeast direction traveling toward the Yellow River and Wisconsin River. Groundwater varies from 0 to 20 feet and is typically high in iron, with a pH of approximately 6.0, which is slightly acidic. Total dissolved solids and hardness are low. Groundwater recharge occurs primarily from percolation of precipitation through the loamy sands.

Water control structures within the Refuge regulate drainage. Water contained within certain Refuge pools provide and impact water manipulation capability on other pools. Water is generally stored in Refuge pools during spring runoff and is used to refill pools that are drained and re-flooded during the course of the summer.

### **3.2.3 Physiography**

The Refuge is located in the central plain province of Wisconsin within an area known as the Great Central Wisconsin Swamp, an extensive alluvial lake plain extending over 2,000 square miles. As stated previously, the Refuge is located in the Upper Mississippi River/Tallgrass Prairie Ecosystem (Service definition). Bailey's Ecological Unit Classification System (Keys et al., 1995) defines this ecosystem as laurentian mixed forest, eastern broadleaf forest, lower Mississippi riverine forest, and prairie parkland. The Refuge is located in the eastern broadleaf forest province within the central Wisconsin sand plain subsection.

### 3.2.3.1 Historic Situation

Historically, land in and around the Refuge was once a vast peat bog with some low wooded islands and savannas. The higher sand ridges were occupied by mature stands of pines and other species (see Figure 8 in the CCP). The original land surveys of the area were conducted in 1853. While conducting the surveys, the surveyors recorded the soil quality, relief, and dominant timber types of the area. At nearly every survey point on the Refuge the land was described as “surface level, wet, and mostly swampy” with fairly open stands of “small, scattered “bastard pine” (jack pine) and tamarack.” Notable exceptions to this were the sand ridges that cross the area. On these ridges the surveyors described the area as surface rolling with low ridges. The vegetation on these ridges was described as “scattered jack pine and black oak” (presumably Hill's oak). On occasion, white pine, red pine, birch, and aspen were mentioned at some survey points, but in limited numbers.

From this information it appears that the original landscape of the former lake bed of Glacial Lake Wisconsin, which the Refuge is part of, was wet and swampy and was dominated by jack pine and tamarack. This would be consistent with the name early pioneers gave to the area: “Great Central Wisconsin Swamp.” Sand ridges provided diversity to this monotypic, wet landscape. On these ridges grew scattered patches of jack pine and Hill's oak. It is difficult to say exactly what habitat types were represented on these sandy areas. Based on the number of sessile savanna species that are found in the area today, these areas were most likely dominated by savanna habitat.

### 3.2.3.2 Current Situation

As of 1994, the Refuge consists of roughly 43,700 acres of pine, oak, and aspen forests, grasslands and savannas, and wetlands and open water areas, all of which support a rich diversity of fish and wildlife. Table 7 is a summary of land cover types on the Refuge. Table 8 is a summary of land cover types found in the Refuge watershed (for comparison purposes).

Refuge forest communities (upland) include northern mesic forest (white and red pine, bigtooth aspen, trembling aspen, red maple) and mixed wet-mesic forest (jack pine, northern pin oak, red maple, trembling aspen, paper birch). Refuge forests provide excellent habitat for many neo-tropical migratory birds such as the Scarlet Tanager, Eastern Wood-pewee, and Ovenbird. Currently upland forests on the Refuge comprise roughly 16,500 acres.

Refuge grasslands, savannas, fallow fields, and shrublands comprise open landscapes on the Refuge. Refuge grasslands include prairies, fallow fields, and meadows. Tree cover on the grasslands ranges from little to none. Plant cover is a mixture of sedges, grasses, and forbs that attract nesting Bobolinks, Vesper Sparrows, Grasshopper Sparrows, and Upland Sandpipers. Some common grassland species on the Refuge include big bluestem, little bluestem, Kentucky bluegrass, and a wide variety of other grasses, sedges and forbs. Blackberry and spirea are scattered in grassland areas as well. Willow-dogwood communities are invading old farm fields and wet meadows in places where disturbance is rare. Refuge grasslands provide important nesting habitat for many migratory birds including ducks, geese, and Sandhill Cranes, and also serve as grazing sites for white-tailed deer.

Refuge savannas include northern pin oak, jack pine, warm season grasses, upland sedges, blueberry, goldenrod, and wild lupine. These savanna areas are also known as barrens because fire and tree diseases such as oak wilt are more common in the droughty, sandy soils. These disturbances keep the trees small and scattered. Oak savanna has been defined as having at least one tree per acre, but less than 50 percent cover. Wisconsin historically had over 4 million acres of barren habitat covering 12 percent of the state. Today less than 14 percent remains. Refuge savannas support Eastern massasauga rattlesnakes, phlox moths, Blandings turtles, Karner blue butterflies, and over 110 species of birds. Currently, open landscape lands on the Refuge comprise roughly 3,700 acres.

Refuge wetlands include forested, non-forested, and open water wetlands. The majority of these occur within pools, streams, and ditches. Wetland plant species include pondweeds, spike rushes, elodea,

**Table 7: Land Cover Types, Necedah NWR<sup>1</sup>**

Land Cover Type	Acres
Open Landscapes (grasslands, savanna, shrublands, old fields)	3,700
Coniferous Forests	900
Mixed Deciduous and Coniferous Forests	10,000
Broad-leaf Deciduous Forests	5,600
Emergent Wetlands and Wet Meadows	10,500
Forested Wetlands	5,700
Lowland Shrubs	5,500
Open Water Areas	1,800
<i>Total</i>	43,700

1. Data source: WISCLAND (1994)

**Table 8: Land Cover Types Within the Watershed, Necedah NWR<sup>1</sup>**

Land Cover Type	Acres
Urban Areas	26,565
Agricultural Land	510,395
Open Landscapes (grasslands, savanna, shrublands, old fields)	327,305
Coniferous Forests	118,188
Mixed Deciduous and Coniferous Forests	163,507
Broad-leaf Deciduous Forests	431,145
Emergent Wetlands and Wet Meadows	128,974
Forested Wetlands	176,491
Lowland Shrubs	108,187
Open Water Areas	79,426
<i>Total</i>	2,070,183

1. Data source: WISCLAND (1994)

coontail, milfoils, and duckweeds. Some Refuge pools are drawn down for part of the year to promote the production of high energy waterfowl foods such as millet, smartweed, chufa, beggar ticks, pigweed, sedges, and spikerush. Ditches and streams also provide additional wetland habitat, although to a lesser extent than Refuge pools.

Wet meadows and marsh edges consist of bur-reed, smartweeds, beggar's ticks, bulrushes, blue-joint grass, and reed canary grass. Open sedge meadows comprise mixed sedges with invading jack pine, willow, and hardhack. Sedge meadows on the Refuge are home to northern harriers, sedge wrens, and sora rails.

Bottomland forested areas include jack pine, silver and red maple, green ash, northern pin and swamp white oak, river birch, and trembling aspen. Tamarack was historically present in these areas. Currently non-forested, forested, and open water wetlands comprise roughly 23,500 acres.

### **3.2.4 The Yellow River Focus Area**

The Yellow River is a 99-mile warm water stream that originates in Clark County, Wisconsin, and flows through Wood and Juneau counties before emptying into the Castle Rock Flowage. The Wisconsin Department of Natural Resources (DNR) selected the upper Yellow River as a Priority Watershed in 1990. The Refuge and the DNR proposed a collaborative effort to conserve the Yellow River in 1994, with the DNR conserving the upper Yellow River and reaches below the Necedah dam.

The Yellow River drains a portion of extinct Glacial Lake Wisconsin, which covered much of Central Wisconsin 10,000-12,000 years ago from approximately the current Black River on the west and the current channel of the Wisconsin River on the east. The Yellow River watershed is characterized by near level terrain and sandy soils, as is much of the Central Sands Ecological Landscape. This landscape historically was characterized by pine and oak barrens, wetlands, and dry to dry-mesic oak and pine forests. Currently the Yellow River is a meandering, low-gradient stream with many oxbow lakes, cut-off and running sloughs, and small ponds in the floodplain. The predominant plant community is floodplain forest (silver maple, green ash, swamp white oak, and river birch). Low sandy ridges support white oak, bur oak, shagbark hickory, black cherry, and white pine. Above all, the Yellow River boasts a rich and bountiful bottomland hardwood forest that has retained much of its wild character.

Many rare, uncommon, and declining animal species have been found in the Yellow River area in recent years. Many of these are sensitive to size, isolation, and quality of habitat. Species of Federal concern include the Eastern massasauga rattlesnake, Blanding's turtle, and Cerulean Warbler. The Red-shouldered Hawk, Acadian Flycatcher, Yellow-crowned Night Heron, Sedge Wren, Prothonotary Warbler, and Louisiana Waterthrush, each which falls within various state categories of concern, are found there also. An active Great Blue Heron rookery has been present since 1991. Other bird species present during the breeding season include several neotropical migrants which have shown significant population declines. These include the Veery, Wood Thrush, and Golden-winged Warbler. Waterfowl include the Mallard, Wood Duck, and Hooded Merganser. Woodcock, Wild Turkey, Ruffed Grouse, white-tailed deer, fox squirrel, and grey squirrel are common throughout much of the area.

Currently there are at least six Karner blue butterfly sites in the Yellow River Focus Area. Friendship and Plainfield sands soils, which support necessary habitat for the endangered Karner blue butterfly are found throughout the area. Those soil types offer potential restoration of oak savanna, habitat important to the butterfly. Table 9 is a summary of land cover types found in the Yellow River Focus Area.

**Table 9: Land Cover Types in the Yellow River Focus Area<sup>1</sup>**

Land Cover Type	Acres
Open Landscapes (grasslands, savanna, shrublands, old fields)	2,593
Coniferous Forests	483
Mixed Deciduous and Coniferous Forests	1,329
Broad-leaf Deciduous Forests	3,909
Emergent Wetlands and Wet Meadows	1,847
Forested Wetlands	10,259
Lowland Shrubs	1,485
Open Water Areas	45
<i>Total</i>	21,953

1. Data Source: WISCLAND (1994)

### 3.3 Geology

The Refuge lies along the northeastern edge the Wisconsin Driftless Area. The topography of the Refuge is therefore not the result of glaciation, but of erosion and the inundation by Glacial Lake Wisconsin. The topography of the area is extremely flat with a few interspersed sandstone buttes and mesas which are outstanding landmarks in contrast to the general flatness of the terrain. The Refuge is underlain by a Precambrian Crystalline bedrock complex, the surface of which varies in elevation from approximately 860 Mean Sea Level at the north end of the Refuge to approximately 760 M.S.L. at the south end. The Precambrian bedrock is overlain by an estimated 30 to 100 feet stratum of late Cambrian sandstone.

Soils on and around the Refuge represent three major soil associations consistent with central Wisconsin landscapes: Aus Gres loamy sands and Morocco silt loams, Plainfield and Nekoosa loamy sands, and muck and peat soils (see Figure 10 in the CCP). The dominant soil association is the Plainfield and Nekoosa loamy sands. Newson and Dawson peat soils are found in the impoundments, along drainage ditches, and in marshes. These soils are usually inundated and consist of partially decayed organic matter and mineral soils.

### 3.4 Description of the Biological Environment

#### 3.4.1 Listed Species

As stated in Chapter 2, Federally listed threatened or endangered species that use the Refuge and the adjacent Yellow River Area include the Bald Eagle, Eastern timber wolf, and Karner blue butterfly. The Yellow River Focus Area also supports the Eastern massasauga rattlesnake, which is a candidate for federal listing.

State-listed threatened or endangered species that use the Refuge include the Bald Eagle, Red-shouldered Hawk, Blanding's turtle, Eastern massasauga rattlesnake, and Trumpeter Swan. The Refuge also supports several state-listed species of plants. These include the prairie fameflower, small skullcap, oval-leaved milkweed, and wooly milkweed.

### Bald Eagle

The Bald Eagle, America's national symbol, experienced a drastic decline throughout the country from the 1950s into the early 1970s. This decline was caused by the bio-accumulation of organochlorine pesticides (DDT and dieldrin) in fish and habitat destruction. The use of pesticides which contained DDT or dieldrin were banned in 1972, and shortly there after the number of successful eagle nests increased steadily. Bald Eagles were listed as an endangered species in 1976. Due to successful conservation efforts, the Bald Eagle was recently upgrade to a threatened species. One occupied eagle nest currently occurs at the Refuge.

### Eastern Timber Wolf

Eastern timber wolves lived throughout Wisconsin prior to the 1830s. As settlers transformed native habitat into farmland, prey species declined and wolves began feeding on livestock. In 1865, the Wisconsin Legislature paid a \$5.00 state bounty for every wolf killed. The wolf bounty was later increased to \$20.00 for adults and \$10.00 for pups to protect the dwindling deer herd. By 1960, few wolves remained throughout the lower 48 states and were declared extirpated from the State of Wisconsin.

In 1973, the wolf was listed as a federal endangered species and as a state endangered species in the State of Wisconsin. Between 1979-1986, studies showed that four to six wolf packs (15-25 animals) roamed two areas of northern Wisconsin. Since this period, wolf packs continue to increase throughout Wisconsin. Currently there are at least 66 confirmed wolf packs (248-259 animals) in northwestern and central Wisconsin and 11 established wolf packs in the central Wisconsin forest complex (Wydeven et al. 2000). Territories of four packs, Suk Cearney, Yellow River, Dead Creek, and South Bluff, may extend onto the Refuge. The Suk Cearney pack's territory appears to be concentrated on the southern end of the Refuge. This pack has numbered as many as seven individuals at one time. Based on winter wolf track surveys, there may be two dens and/or rendezvous sites on the Refuge, although howling surveys have not detected wolf pups as of yet. For the most recent map of wolf pack distribution in Wisconsin, see the Wisconsin Department of Natural Resources website at: [http://www.dnr.state.wi.us/org/land/er/publications/wolf\\_progress\\_reports/00wolfprogress/map99-00.gif](http://www.dnr.state.wi.us/org/land/er/publications/wolf_progress_reports/00wolfprogress/map99-00.gif).

### Karner Blue Butterfly

Karner blue butterflies have undoubtedly been long time residence of the Refuge property. As previously mentioned, savanna habitat was present on Refuge land at the time of the original land surveys. Karner blue butterflies most likely occurred on these savannas. However, definitive proof is lacking. The butterflies undoubtedly benefitted from the drainage and expanded burning that occurred at the beginning of the 20th century. Presently, Karner blue butterflies are known to occur in 12 population complexes within the Refuge (see Table 10), which constitutes the world's largest remaining population of Karner blue butterflies. The butterfly was listed as an endangered species in 1993.

### Eastern Massasauga Rattlesnake

Eastern massasauga rattlesnakes have already disappeared from most of Wisconsin. Once widespread and plentiful in southern and western Wisconsin, the Eastern massasauga has been reduced to just five populations in the state. One of those populations is located next to the Refuge in the Yellow River. The Yellow River was long considered Wisconsin's best massasauga population in terms of the species abundance. Evidence of this is found in bounty records indicating that bounty was paid on over 4,000 massasaugas between 1952 and 1972.

The Yellow River population produced 25 Eastern massasauga rattlesnakes in the 1990s. Nineteen of these snakes were neonates from two different clutches. Of the six adults, three were located during routine surveys and three were road-killed animals. No new snakes have been located in the Yellow River since 1995, despite intensive survey effort by the Refuge and Wisconsin Department of Natural Resources. The Eastern massasauga was listed as a state endangered species in 1975.

**Table 10: Karner Blue Butterfly Population Levels, Necedah NWR, 1993-2000<sup>1</sup>**

Complex Name	Size acres	Ref. #	Year							
			1993	1994	1995	1996	1997	1998	1999	2000
South Rynearson	19.5	1	685	682	353	1,361	1,482	155	345	719
North Rynearson	14.3	5	211	314	838	521	179	0	0	146
Old Barrens	15.3	6	N/A	299	624	519	84	26	104	0
Goose Pool	27.4	9	160	215	501	865	282	1,249	3,861	1,952
East Sprague	27.9	10	278	536	1,263	3,896	993	669	844	955
East Rynearson	47.4	2	359	199	105	157	131	310	115	35
Cranberry Loop	28.9	4	N/A	N/A	N/A	N/A	N/A	N/A	298	153
Research/ Natural Area	13.6	8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0
Clauson Burn	5.3	12	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0
Pool 19	35.8	11	N/A	N/A	N/A	N/A	N/A	N/A	N/A	660
Middle Refuge	21.5	7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	171

*1. All population estimates are derived from Pollard-Yates surveys. The software "Distance" was then used to convert survey results to population estimates.*

The Refuge is currently working with landowners on the Yellow River to conserve massasaugas through habitat improvements. Similar efforts are under way with landowners around three other massasauga populations. These populations are in LaCrosse, Monroe, and Buffalo counties. The Refuge is developing Candidate Conservation Agreements with landowners on all of these areas.

Whooping Crane

Whooping Crane chicks were introduced at the Refuge in the summer of 2001 as part of a Whooping Crane reintroduction project to establish a migratory population in the eastern U.S. to contribute toward recovery of the species. The population has been designated as a non-essential population (NEP) in a rule making action finalized on June 26, 2001. The crane chicks were rearing in a pen situation and trained to follow ultralight aircraft in migration to a selected wintering site at Chassahowitzka National Wildlife Refuge. Yearling cranes returned to the Refuge in the spring of 2002. Annual Whooping Crane introduction, rearing, and release activities are expected to continue for a period of 10 years.

Rare Plants

There may be rare species of plants that have not been identified on the Refuge, particularly those that may be living in remote locations. While several studies have been done on plant abundance and distribution, a comprehensive inventory of Refuge plants is needed. The Refuge and the Yellow River area have populations of several rare and declining plant species (or provide habitat that would support these species) that are described in Table 11.

### 3.4.2 Waterfowl and Other Migratory Birds

For centuries, birds have descended upon the Refuge area during their annual migrations between Central and South America and their northern U.S., Canadian, and Arctic breeding grounds. In total, more than 230 different species of birds have been observed on the Refuge since its inception. The Refuge has long been considered an important migratory stopover area for Mallards, Blue-winged Teal, Ring-necks, and Wood Ducks. Other migrant species that utilize the Refuge during spring, summer, or fall include: Canada, Snow, and White-fronted Geese; Sandhill Cranes; Woodcock; Snipe; Great Blue Herons; swans; egrets; Dickcissels; warblers; Brown Thrashers; several different species of sparrows; meadowlarks; Sora Rails; Black-crowned Night Herons; Bobolinks; bitterns; Red-headed Woodpeckers; and Red-tailed Hawks; just to name a few. During migrations, three species of geese, 10 species of dabbling ducks, nine species of diving ducks, and Trumpeter and Tundra Swans are commonly found in significant numbers on the Refuge. Waterfowl are most abundant in the fall, with fall counts of ducks averaging around 20,000. Resident bird species include Wild Turkeys, Ruffed Grouse, Sharp-tailed Grouse, Woodpeckers, and Nuthatches.

In 1999, the Great Lakes-Big Rivers Region of the Service initiated a process to identify its top species priorities in terms of those in need of the greatest conservation attention in the Region. Appendix I includes a list of regional priority species that occur on the Refuge and/or the Yellow River Focus Area. In addition, the Refuge and the adjacent Yellow River area contain habitat that supports or historically supported several species of birds on the Service's List of Migratory Nongame Birds of Management Concern. Appendix I contains those species as well.

### 3.4.3 Native Biological Diversity

The Keystone Center, 1991, defines biological diversity as the variety of life and its processes including the variety of living organisms, the genetic differences among them, and the communities and ecosystems in which they occur. Biological diversity can be considered at a minimum of four levels: *genetic level*, *species level*, *ecosystem level*, and *landscape level*. In order to manage the biological resources at the Refuge, it is necessary for the Refuge to work at the species, ecosystem, and landscape levels. Species are how we typically measure biological diversity and they historically represent the principal focus of wildlife managers.

### 3.4.4 Species Level Biological Diversity

The Refuge supports an assortment of mammals that contribute to the ecological, economic, and aesthetic value of central Wisconsin. Within the past 3 years, timber wolves are thought to have established two packs on Refuge land. Timber wolves are a top predator that play an important ecological role, as well as provide educational opportunities for Refuge visitors. Black bear and bobcat are also present in low numbers.

White-tailed deer are very abundant and can be seen on the Refuge almost anywhere, and at anytime. Cottontail rabbits; snowshoe hare; gray, red, fox and flying squirrels; woodchucks; raccoon; skunks; red and gray fox; coyotes; muskrat; mink; otter; opossum; weasels; and badger are mid-sized mammals that serve as both predators and prey in Refuge plant and animal communities. Small mammalian residents include meadow voles, white-footed and deer mice, shrews, and moles. These small animals are a primary food source for many larger animals.

Reptiles and amphibians are important Refuge residents. Snake species include hog-nosed snakes, eastern garter snakes, smooth green snakes, northern water snakes, fox snakes, and eastern massasauga rattlesnakes. Five-lined skinks are a species of lizard that call the Refuge home. Painted, softshell, and snapping turtles can be seen in wetland environments; Blanding's turtles are most frequently seen in upland savanna environments. Frog and toad species that inhabit the Refuge include leopard frogs, green frogs, wood frogs, grey tree frogs, spring peepers, and the American

**Table 11: Rare Plants Found on the Refuge and Within the Yellow River Focus Area<sup>1</sup>**

Common Name	Scientific Name	State Status*	Habitat/Location
Round-stemmed false foxglove	<i>Agalinus gattingeri</i>	State threatened (Federal status assessment in progress)	Southern Juneau County in dry prairies and bedrock glades
Woolly milkweed	<i>Asclepias lanuginosa</i>	State threatened	Dry savannas (oak barrens) in Juneau County, just south of Necedah Refuge
Brittle prickly pear	<i>Opuntia fragilis</i>	State threatened	Dry, sandy habitats in neighboring Adams County; may occur in similar habitats in Juneau County
Dwarf bilberry	<i>Vaccinium cespitosum</i>	State endangered	Sandy pine and oak savanna habitats, bracken grasslands
Sand violet	<i>Viola fimbriolata</i>	State endangered	Sandy pine and oak savanna habitats
Pale false foxglove	<i>Agalinus skinneriana</i>	State endangered	Dry savannas in Adams County
Tuberled or pale green orchid	<i>Plantanthera flava var. herbiola</i>	State threatened	Wet prairies and sedge meadows in Juneau and Adams counties
Umbrella sedge	<i>Fuirena pumila</i>	State endangered	Coastal plain species that inhabit peat and muck flats, wet sands, and fluctuating lake shores
Bald rush	<i>Psilocarya scirpoides</i>	State threatened	Coastal plain species that inhabit peat and muck flats, wet sands, and fluctuating lake shores
Netted nut-rush	<i>Scleria reticularis</i>	State endangered	Coastal plain species requiring recently desiccated mud or sand lake beds with fluctuating water
Bog bluegrass	<i>Poa paludigena</i>	State threatened	Sedge meadows and tamarack bogs; has been documented in western Adams County.
Beak grass	<i>Diarrhena americana</i>	State endangered	Floodplain forest; may inhabit Yellow River bottoms, adjacent and east of Necedah Refuge

1. No federally-listed plants are likely to occur on the Refuge.

toad. Blue-spotted salamanders are fairly common and can be found in dark moist environments, such as under decaying logs or thick leaf litter.

Invertebrates are abundant on the Refuge and play an integral role in maintaining the ecological balance of several Refuge ecosystems. Wisconsin has approximately 20,000 species of insects – far more than any group of animals in the state. The Refuge is home to the world’s largest remaining population of the Federally listed Karner blue butterfly and also to the rare Leonard’s skipper. Other rare insects that use the Refuge include the phlox moth, frosted elfin butterfly, Persius dusky wing, ringed bog haunter dragonfly, and two species of tiger beetles.

Fish species are also important members of the Refuge biological community. They cycle nutrients in aquatic systems and serve as food sources for a variety of birds and mammals. Although many fish species are at a disadvantage due to the drainage of Refuge pools for waterbird management, many people travel to the Refuge for rewarding year-round fishing opportunities on Refuge pools and ditches. Muskellunge; northern pike; large mouth bass; yellow perch; black crappie; pumpkinseed; black, brown, and yellow bullhead are some common species sought by anglers.

### **3.4.5 Ecosystem Level Biological Diversity**

Ecosystems are defined as the interacting parts of the physical and biological worlds (Ricklefs 1990). There are three ecosystems of primary importance with respect to the Refuge: wetlands, forests, and open landscapes. Descriptions of these ecosystems are provided in Description of the Physical Environments section “Physiography”.

### **3.4.6 Landscape Level Biological Diversity**

Landscape is defined as a number of interacting stands or ecosystems repeated in similar form over a kilometer wide area (Forman and Godron 1986). For convenience, we can think of it as a regional view of biological diversity. Until recently, there has been very little work, particularly in the Midwest, to protect biological diversity at the landscape scale.

In order for the Refuge to exist as part of a functioning landscape, the Refuge will have to:

- Conserve and restore ecosystems historically occurring in the landscape across a portion of the Refuge area.
- Arrange protected areas so that the arrangement of ecosystems mimics the natural organization.
- Work cooperatively with a broad array of partners to manage public and privately owned land in order to mimic natural processes, e.g., fire, flooding, succession, and providing connectivity to the matrix in which the Refuge occurs.

The Refuge is promoting biological diversity at the species, ecosystem, and landscape level by using different management regimes. For example, locally some savannas are burned often while others haven't been burned in 8 years. Some savannas are mowed while others have never been mowed. The Refuge is contributing to Regional biological diversity by restoring and maintaining rare habitats including sedge meadows and savannas. Nationally, the Refuge is contributing to biological diversity by providing habitat for endangered species.

## **3.5 Description of the Socioeconomic Environment**

In 1998, the Refuge contracted with Industrial Economics Inc. to complete an economic impact assessment to estimate the regional economic and national social welfare benefits of the Refuge. However, some of the data used to generate the economic report is associated with significant uncertainty, as well as dated. As a result, the estimates in the report should be interpreted with uncertainty in mind. Some of the values used to generate that report have been updated to reflect more current figures. Also, it should be noted that the report was not commissioned to support any of the action items contained in the CCP. It was prepared to facilitate a better understanding of the economic contribution national wildlife refuges in general have on local and regional economies.

Within the four-county region surrounding the Refuge (Wood, Juneau, Adams, and Monroe counties), agricultural activities constitute an important component of the economy. This sector includes both dairy farms and farms that grow row crops (e.g., sweet corn, potatoes, snap peas). Cranberry

production is also important. It is considered a premium crop in that it commands a high price in the market. Cranberry beds, while representing a small percentage of the total land area, are scattered throughout the region. The total acreage of cranberry beds currently in Juneau and Wood counties alone is estimated to be 4,500. Because the region has large tracts of both private and public forest land, the timber industry is important to the economy as well. Wood County is the most populous and strongest economically of the four.

These four counties offer a variety of recreational activities on both public and private land. Along with the Refuge, there are several other public recreation areas. These include Sandhill Wildlife Area, Wood County Wildlife Area, and Meadow Valley Wildlife Area. Other recreational and camping areas nearby include Buckhorn State Park, Castle Rock, and Petenwell County Parks, which are adjacent to the Refuge. These offer substitute sites and opportunities to the Refuge for hunting, fishing, wildlife viewing, photography, and other recreational activities.

Commercial activities on the Refuge include timber harvesting and trapping for pelts. Several of the surrounding towns maintain roadways that pass through the Refuge. Funding for road maintenance on Federal property helps supplement the tax base used to fund road projects. The Refuge's annual budget (> \$1 million dollars in 2001) supports employee salaries, operation and maintenance, education, and improvement projects such as bridges, dams, and roads.

Commercial and Refuge management economic activities on the Refuge include:

- The annual budget for staff salaries, maintenance, operations, small capital purchases and educational programs exceeded \$1,000,000 in 2001.
- Each year, sections of the Refuge are selected for timber harvesting to maintain quality habitat for plants and animals. In 1996-97, 3,237 cords of wood were harvested worth \$155,758.
- Trapping is an important management tool used to reduce or prevent damage to Refuge roads, dikes, and water control structures. Trapping may also reduce predation on nesting birds. Trapping is also a recreational opportunity afforded by the Refuge. Trapped species include mink, beaver, muskrat, and raccoon. The annual average value of pelts taken between 1980 and 1995 was \$6,858.
- In addition to maintenance of land by the Refuge, certain roads within the boundary of the Refuge are maintained by the surrounding townships of Necedah, Finley, Cutler, Remington, and Kingston. These townships spend, on average, approximately \$96,000 annually for road maintenance, with a large part of this cost for snow removal.

Conclusions drawn from Refuge-dependent commercial and Refuge management economic activities include:

- Refuge spending contributes over \$1 million and roughly 18 jobs to the regional economy.
- Refuge road maintenance and timber harvesting produce similar effects on the regional economy, accounting for approximately \$150,000 each year.
- Furbearer trapping plays a minor role in the overall regional economy, accounting for only \$7,000 of regional output and less than one job.
- Refuge fire support to the Necedah Fire Department accounted for \$9,500 in 2001 through Wildland Urban Interface Funding.

The Refuge also has an indirect economic impact on the local economy through recreational activities it supports. Among these are hunting, fishing, wildlife observation and photography, berry picking, and cross-country skiing. Although the Refuge charges no entrance fee, individuals who visit the Refuge and participate in these activities often purchase a variety of goods and services in the

communities surrounding the Refuge (e.g., food, lodging, fuel, equipment). In 2000, Juneau County contributed \$84 million to Wisconsin's tourism industry (Wisconsin Department of Tourism).

Some of the more popular recreational activities on the Refuge are:

- Hunting for both large (white-tailed deer) and small game species (grey, red, and fox squirrel; rabbit; snowshoe hare; ruffed grouse; waterfowl; wild turkey; and raccoon). In 1996, an estimated 10,000 trips were made to the Refuge for the purpose of hunting.
- Fishing on Refuge waters, primarily for northern pike, bullheads, crappie, yellow perch, and sunfish. In 1996, approximately 7,000 trips were made to the Refuge for the purpose of fishing.
- Wildlife viewing accounted for over 106,000 trips to the Refuge in 1996.
- Blueberry, raspberry, and blackberry picking are popular during summer months.

Conclusions drawn from Refuge-dependent recreational activities include:

- Wildlife viewing has the greatest effect on the regional economy, accounting for between \$1.9 million and \$2.3 million of regional output and between 48 and 67 jobs.
- Recreational hunting has the second greatest effect on the regional economy, accounting for \$250,000 and 6.8 jobs.
- Fishing produces the third greatest regional economic effects, accounting for \$220,000 of regional output and 5.9 jobs.

# Chapter 4: Environmental Consequences

- 
- General impact analysis
  - A description of impacts associated with Service trust resources
  - A description of impacts associated with visitor services
  - A description of impacts associated with habitat management
  - A description of impacts associated with the Yellow River Focus Area
  - A summary of table of environmental impacts
- 

This chapter evaluates three alternatives on the basis of environmental consequences or impacts relative to the issues identified in Chapter 1. The chapter is organized by issue. Environmental impacts are summarized in Table 15 on page 179

## 4.1 General Impact Analysis

### 4.1.1 Unavoidable Adverse Impacts

Under Alternative 1 and Alternative 3, the potential development of access roads, dikes, control structures, visitor parking areas, and reclamation of former building sites could lead to local and short-term negative impacts to plants, soil, and some wildlife species. Increased use of the Refuge may result in increased littering, noise, and vehicle traffic.

### 4.1.2 Short-Term Use Versus Long-Term Productivity

The local, short-term uses of the environment under Alternatives 1 and Alternative 3 include habitat restoration and enhancement activities for the benefit of Service trust resources. Alternatives 1 and 3 could also include the development of additional public use facilities to further the public's understanding and appreciation of the natural world. The resulting long-term effect of these alternatives includes increased protection of threatened and endangered species, increased waterfowl and songbird production, and long-term recovery of a myriad of species dependent on quality wetland and grassland habitats. In addition, local and regional people will gain long-term opportunities for wildlife-dependent recreation and education.

### 4.1.3 Irreversible and Irretrievable Commitments of Resources

Funding and personnel commitments by the Service or other organizations under Alternatives 1 and 3 would be unavailable for other programs. Fee-title acquisition of lands by the Service would make them “public lands” and preclude other use of these lands in accordance with individual desires. Traditional land uses may change since uses on Service lands must be shown to be compatible with the

purposes for which the land is acquired. Any lands purchased will lose their potential for future development by the private sector as long as they remain in public ownership. Structural improvements that are purchased with any land may be declared surplus to government needs and sold and/or demolished on site. Land that a new visitor center would be built on would no longer be available for hunting purposes or provide habitat for wildlife and plants.

## 4.2 Cumulative Effects

Cumulative effects (or impacts) are those effects on the environment resulting from incremental consequences of the alternatives when added to other past, present, and reasonably foreseeable future actions, regardless of who undertakes these actions. However, accurately summarizing cumulative effects is difficult in that while one action increases or improves a resource in an area, other unrelated actions may decrease or degrade that resource in another area.

Over many years the cumulative effects of wetland drainage, conversion of native prairies into crop land, and the clearing of bottomland forests and savannas have been severe on listed species, waterfowl and other migratory birds, and native biological diversity, both at the local, state, and national levels.

The State of Wisconsin has lost over 53 percent of its original wetlands and 99 percent of its original prairies and oak savannas. Prior to European settlement, Wisconsin is estimated to have had approximately 10 million acres of wetlands and 4 million acres of savannas. Today less than 5 million acres of wetlands remain. Savannas have been reduced to less than 60,000 acres statewide. At the national level, of the estimated 221 million acres of wetland habitat present in the lower 48 states at the time of colonial America, only 103 million acres remain (47 percent). Draining, dredging, filling, leveling, and flooding have reduced wetlands to the point where 22 states have lost 50 percent or more of their original wetlands, and 10 states have lost 70 percent or more (Dahl, 1990). The consequences of this intensive conversion of wetlands, prairies, and oak savannas have been significant declines in migratory birds populations, water quality degradation in lakes, rivers, and the Gulf of Mexico, and probable increased flood frequency and intensity along mainstem rivers and their major tributaries.

The wide-scale loss of oak savanna and pine barren ecosystems across twelve states and the province of Ontario, Canada, has had a severe negative impact on the Karner blue butterfly. Over the past century, the number of Karner blue butterflies have declined by at least 99 percent. Over 90 percent of that decline has occurred in the last 15 years. Loss of habitat resulted in a rapid decline in Karner population numbers, and extirpation of large populations across its range. Today scattered populations are only found in portions of New Hampshire, New York, Michigan, Wisconsin, Indiana, and Minnesota. As a result, the Karner blue butterfly was proposed for federal listing on January 21, 1992, and listed as endangered on December 14, 1992. Presently the Refuge is home to the world's largest remaining population of the Federally listed Karner blue butterfly, supporting 12 population complexes.

The long-term declines in early successional forests across the north-eastern and north-central United States has contributed to the decline of many bird species as well. Selective harvesting, fire suppression, urban sprawl, and cessation of agricultural abandonment contributed to the present imbalance in distribution of young forests (Oliver and Larson, 1999).

The continent's only migratory population of Whooping Cranes winters at Aransas National Wildlife Refuge on the Texas Gulf Coast and is vulnerable to a catastrophic event such as a major hurricane. In the summer of 2001, a population was introduced on the Refuge as part of an effort to establish a migratory population in the eastern U.S. and to contribute toward recovery of the species.

The original tallgrass prairie, which extended from western Indiana to the eastern part of Kansas, Nebraska, and North and South Dakota and south to Oklahoma and Texas, has been virtually eliminated throughout its historic range. Recent surveys suggest that 82.6 to 99.9 percent declines in the acreage of tallgrass prairie have occurred in 12 states and one Canadian province since European settlement. Loss and fragmentation of prairie landscapes combined with changes in natural processes (e.g., fire suppression) have had negative consequences for many grassland plants and associated animals

For years following the initial conversion of native Midwestern prairies, many prairie-dependent wildlife species remained relatively stable through their ability to colonize agricultural grasslands. However, 20th century agricultural grassland loss has followed a similar path of decline as native prairie loss in the 19th century. In many parts of the Midwest, agricultural grassland are at their lowest level in more than 100 years

Consequently, grassland-dependent birds have shown steeper, more consistent, and geographically more widespread declines (25-65 percent) than any other group of North American birds (Samson and Knopf 1994). Other grassland associated mammals, insects, and microorganisms are threatened with a similar fate. Currently there are 55 grassland species in the U.S. considered threatened or endangered (Samson and Knopf 1994). Species using the Refuge that are experiencing serious declines include the Bobolink, Henslow's Sparrow, Grasshopper Sparrow, Vesper Sparrow, Savannah Sparrow, Lark Sparrow, Field Sparrow, Dickcissel, Eastern Meadowlark, and American Bittern (National Biological Survey 1995). The Grasshopper Sparrow and Dickcissel have declined over 80 percent in Wisconsin since the mid-1960s.

Alternatives 1 and 3 could reverse many of the above mentioned population declines (at least locally) for many bird species and Karner blue butterflies by restoring and managing additional savanna habitat. Under the preferred alternative (Alternative 3), the Refuge would be restoring approximately 3,000 additional acres of savanna habitat, bringing its total savanna habitat to approximately 3,500 acres. The 3,500 acres will be distributed between 35 sub-sites that are distributed over approximately 15 square miles. Through these efforts the Refuge aims to insure a minimum Karner population of 6,000 to 7,000 second flight adults and constitute a major step toward the recovery of that species. Restoration and preservation of additional savanna on the Refuge would also help reverse the long-term decline in early successional forests across the region.

Alternative 3 would also result in the restoration and management of an additional 3,500 acres of grasslands on the Refuge for nesting waterfowl and other migratory birds, thus contributing to the recovery of many grassland-dependent species of regional concern. Alternative 2 would allow past trends to continue; and conditions at the local level for Karner blue butterflies, savanna and grassland-dependent birds, and native biological diversity would worsen.

All of the alternatives described in this EA would contribute to the recovery of Bald Eagle, Whooping Crane, and gray wolf. Efforts to establish a migratory population of Whooping Cranes on or near the Refuge would not only restore the Whooping Crane to part of its historic range, but also provide a geographically distinct migratory population, leading toward the long-term recovery of that species.

All of the alternatives described in Chapter 2 offer opportunities for additional actions relating to the conservation, restoration, and management of habitat for the benefit of Service trust resources independent of Service operations. These other actions, if initiated by other Federal agencies, the state, local communities, non-governmental organizations or private individuals, could be coordinated with the Service through cooperative agreements, mutual aid agreements, matching challenge grants, etc. or through technical assistance between cooperators. Typical cumulative actions that could be taken by these other entities include the acquisition of land in fee title, acquisition of conservation easements or access rights-of-way, protection of water quality, cleanup of contaminants, implementation of various agricultural management practices and techniques, management of private lands for wildlife and timber stand improvement through county and state programs, protection of

endangered species through the Endangered Species Act and state laws and regulations, management of resource uses by the states and non-governmental organizations, management of non-game species by the state, predator and damage control by U.S. Department of Agriculture's Animal and Plant Health Inspection Service and the state, implementation of grants through the Endangered Species Act, Federal Clean Water Act, Federal Reclamation Act and to the state through the Federal Aid in Fish and Wildlife Restoration Program and to private landowners through the Service's Partners for Wildlife program, to name a few. These cooperative actions are all possible, and the chances for initiating any of these cooperative actions by others may increase by the mere presence of the Refuge and Refuge staff in the area.

In the final analysis, the integrity of the natural resource values encompassed within the state and country (all inclusive) will depend on actions taken by others. Refuge land, even with the acquisition of additional land in the Yellow River Focus Area, would exist only as a small portion of the total acreage within the state and nation.

Cumulative effects on property taxes paid to the local taxing bodies (townships, county, school districts) by the Service and others would likely be neutral, since the taxing bodies have discretion in adjusting their revenue stream in order to account for their expenses. While the Service does not pay taxes, it does make an annual Refuge Revenue Sharing payment (see Chapter 2 "Elements Common to all Alternatives") to the townships where Service-owned land is present. Since these payments are based on land value, an acre of land valued at \$1,000.00 would generate a \$7.50 payment each year, or \$7,500.00 per million of land value (at full entitlement). In Juneau County, Refuge Revenue Sharing payments at full entitlement are roughly 32 percent of what taxes would be if lands had remained in private ownership (based on personnel communication with Juneau County, Wisconsin). Alternative 3 below provides additional analysis/clarification of Refuge Revenue Sharing.

Further, the presence of a national wildlife refuge is often considered an asset to an area contributing to the quality of life. Not only does it offer public recreation potential and greatly enhance the educational opportunities of the local schools, it serves as an attraction for people looking to relocate from urban areas. Therefore it can be expected that as more people relocate to the two counties (due in part to the presence of the Refuge), taxable real estate such as new homes, cabins, and other land improvements will increase, thereby increasing the local private property tax base.

As natural habitats in the area are destroyed and fragmented into smaller parcels by new development activities, acquisition and management of land in the Yellow River Focus Area will represent a compensating factor to make up for the loss. Long-term environmental benefits would be gained from habitat conservation and enhancement resulting from Service activities in this area. Biodiversity, including numbers and variety of non-game species, would be enhanced. Threatened and endangered species would benefit from specific management actions and monitoring programs. As more of the area becomes conserved and managed, the more important and recognized it will become for natural resource values and as a special place for people to find enjoyment and educational benefits.

The trend in demand for wildlife-dependent recreation (e.g., wildlife observation) is expected to continue into the foreseeable future, due in part to the increasing population of retirement-age Americans. As the number of visitors to the Refuge area increases, private enterprises would be likely to develop support facilities and services such as campgrounds, motels, restaurants, sporting goods stores, etc. to meet the increased demand. Increased visits to the Refuge could result in additional on-site facilities such as a visitor center, parking areas, trails, observation towers, etc. These new facilities both on- and off-site could reduce available habitat and create localized damage to vegetation, soil compaction and erosion, while increasing the chance of wildlife disturbance and disturbance to other visitors. These potential negative effects could be minimized through careful planning and management. Popular activities on site specific areas could be controlled to reduce impacts through proper design, site selection and construction technique or by restructuring participation through

registration and fee systems. Although control of development would be exercised on Refuge land, off-site development would be controlled by other state and Federal regulations such as the Clean Water Act.

Restoration of the relatively small amount of crop land found in the Yellow River Focus Area to wildlife habitat would have minimal effects on total county employment, population, and the unemployment rate. Willing seller landowners would be appropriately compensated, while their employees, suppliers and brokers could experience some income reduction. Cumulative loss of crop land in the two-county area (due to such things as road construction, commercial and residential development, and other factors) would not jeopardize the agriculture infrastructure in the area.

## 4.2.1 Listed Species

Federally listed threatened or endangered species that use the Refuge include the Bald Eagle, Eastern timber wolf, and Karner blue butterfly. The Yellow River Focus Area supports a small population of Eastern massasauga rattlesnakes, which is a candidate for federal listing. The Refuge is currently a re-introduction site for an experimental population of Whooping Cranes. Under all alternatives, the Service is required by law to accommodate the needs of threatened and endangered species. Thus the following section would apply to all alternatives.

### 4.2.1.1 Bald Eagles

One occupied Bald Eagle nest currently occurs at the Refuge. However, numerous migrating Bald Eagles utilize Refuge habitats for resting and feeding.

#### Potential Impacts to Bald Eagles

*Water Level Management:* Current management practices on dozens of water impoundments on the Refuge provide Bald Eagles with a constant, year-round food source. Eagles feed primarily on fish but are known to prey on muskrats, waterfowl, American coots, and even white-tailed deer fawns. The Refuge manages most of its large water impoundments for moist soil plant production and to lower rough fish populations. This is accomplished by draining these pools every third year. During undrained years, water on these pools is held as high as possible. The Refuge staggers management of these pools so the northern and southern end of the Refuge have at least one large drained pool per year. Management of this type is conducted to provide food for waterfowl migrating south during the fall. As a consequence, fish populations are reduced, which reduces the areas appeal for nesting Bald Eagles. However, these management practices simultaneously make the large water impoundments attractive for migrating Bald Eagles during the fall.

*Aircraft Activity:* Currently eagles on the Refuge face sporadic flights of both fixed and rotary-wing military aircraft. These aircraft are usually participating in training at Hardwood Bombing Range or Fort McCoy. Eagles don't currently nest in close proximity to any proposed Whooping Crane release sites. If eagles nest by one of these sites and Whooping Cranes are reintroduced, they would be exposed to daily ultra-light aircraft activity during Whooping Crane fledging.

*Refuge Staff Activities:* Refuge staff sometimes need to approach the eagle nest to perform other activities such as wildfire suppression, water level management, or other endangered species surveys. Too much activity around the nest could cause desertion.

*Prescribed Burn Activities:* At this time the Refuge's only active eagle nest is located in a prescribed burn unit. Prescribed burning during nesting could cause nest desertion.

*Water Level Management Next to an Active Nest:* The Refuge's only active eagle nest is located near a large water impoundment. Drainage of this pool could result in take by causing nest desertion or making food for the eaglets more difficult to obtain.

*Access by the Public:* The Refuge's only active eagle nest is located near a hiking trail in an area open to blueberry picking. Activity near the nest by the public could result in its abandonment.

#### Measures to Reduce Impacts on Bald Eagles

In regard to all forms of disturbance, with the exception of overhead flights by the Air National Guard and ultra-light aircraft activity associated with Whooping Crane releases, the "Bald Eagle Management Guidelines" (USFWS undated) will be incorporated on the Refuge.

In regard to overhead flights by the Air National Guard (ANG), locations of active nests will be provided to the ANG. As in the past, the ANG will provide these locations to their pilots and a half mile no-fly zone will be established around and above each active nest. If a pair of eagles should nest near a Whooping Crane release site, ultra-light aircraft activity will continue. However, the pilots will be notified of the eagle nest and required to maintain a half-mile flight distance from the nest.

While active, no prescribed burns or water level draw-downs will occur within one-quarter mile of the nest. "Active nests" will include all site used within the two previous years. As eagles nest in oaks on the Refuge, their nest trees are unaffected by prescribed fires. As the conservation measures outlined above meet or exceed those outlined in the Bald Eagle Management Guidelines, all of these disturbances will have no effect on Bald Eagles.

#### Monitoring Bald Eagles

Bald Eagle nests will be observed to document activity. Once a nest is deemed active, personnel will periodically observe the nest to determine if it was successful and how many young fledged.

### **4.2.1.2 Timber Wolves**

#### Potential Impacts on Timber Wolves

*Land Conversion:* Early successional forests provide the maximum prey base for Eastern timber wolves (USFWS 1992). Converting forested land to grassland could therefore reduce the prey available for wolves.

*Public Access:* Currently turkey hunters have nearly total access to all of the Refuge. Since wolf pups are born between early and mid-April, excessive activity around a den site could cause abandonment. As pups grow, the den site is abandoned and a rendezvous site is used (WIWP 1999). During this time (July 1st), almost the entire Refuge is open to berry pickers. Again, excessive disturbance around a rendezvous site could lead to abandonment.

*Prescribed Burning:* The Refuge has the ability to prescribe burn several thousand acres in a day. Prescribed burns of this size can overcome wildlife. Therefore, burning around den or rendezvous sites could result in wolf pup mortality.

*Refuge Activities:* Throughout the year, staff from the Refuge visit most of the property while conducting various activities. Excessive disturbance around a den or rendezvous site could lead to abandonment.

*Hunting:* The greatest perceived threat to wolves in Wisconsin is the 9-day gun deer season. During the gun deer season, all of the 600,000 hunters who possess a small game license are eligible to shoot coyotes while deer hunting in most of the state. The Refuge is an exception. However, most gun deer hunters on the Refuge are not from the area and may not know that coyote hunting is prohibited on the Refuge. Therefore, opening up nearly 100 percent of the Refuge to gun deer hunting has resulted in wolf mortality in the past and may continue to do so.

#### Measures to Reduce Impacts on Timber Wolves

Human-caused mortality is a major factor in many wolf populations. Hunters and residents within occupied wolf range have greater potential to directly impact wolf populations than the general public

(Tucker and Pletscher 1989). Reduction of these contacts has been achieved on most of the Refuge by gating-off interior roads. The policy of maintaining gates on interior roads and berming access roads upon completion of timber sales will be continued.

Coyote hunting and trapping on the Refuge are prohibited and will remain closed year-round. In an effort to inform hunters about this closure, the Refuge will issue press releases yearly prior to the gun deer season. The Refuge will also post signs reminding hunters of the closure. The closure has been posted in the Federal Register and is printed in all of the Refuge's hunting pamphlets, which are available in leaflet boxes throughout the property.

Possibly the most critical portion of timber wolf habitat are den and rendezvous sites (Wydeven and Schultz 1993). Wolf packs usually use one or two dens per year with movement to a new den site associated with disturbance. After the denning period, the alpha female moves the litter to a home site(s) or activity site(s) called a 'rendezvous site.' The potential for wolf populations to increase and expand is directly related to pup survival. Therefore, all actively used wolf home sites (den and rendezvous sites) verified by a wildlife biologist and used within the last 2 years will be protected. Active den and rendezvous sites will be protected by following guidelines established in the Wisconsin Wolf Management Plan (1999), which requires all disturbances within 100 meters of a den or rendezvous site be eliminated. The only exceptions to this will be activities associated with proposed Whooping Crane releases and for safety reasons such as dam operations on large water impoundments and wildfire suppression. The Refuge will meet or exceed guidelines established in Wisconsin Wolf Management Plan, and there will be no effect on wolves.

#### Monitoring Timber Wolves

Personnel will continue to track wolf distribution and will conduct winter tracking surveys. Personnel will conduct howling surveys in late May or early June to monitor pack production and aerial monitoring of radio collared wolves to determine pack territory and obtain dispersing information.

### **4.2.1.3 Karner Blue Butterflies**

#### Potential Impacts on Karner Blue Butterflies

*Wildfire Suppression:* Wildfire is one of the driving forces in savanna creation and maintenance. Both the Wisconsin Department of Natural Resources and U.S. Fish and Wildlife Service aggressively control all wildfires on the project lands for financial and legal reasons. Wildfire suppression is mandatory for these reasons, but has a very negative effect on Karner blue butterfly habitat. In an effort to mitigate the effects of wildfire suppression, the Refuge will conduct prescribed burns. As the purpose of these burns will be to mimic the effects of wildfires, some units will be burned in consecutive years if succession is threatening a Karner blue butterfly population.

*Prescribed Fire:* Prescribed fire is currently used on the project lands to maintain KBB habitat. Surveys on the Refuge show a strong positive correlation between the frequency of prescribed burning and Karner blue butterfly densities. The Refuge tested the effects of burning on Karner blue butterfly habitat with a study design that incorporated both replicates and control sites (King in litt b). No other research of this quality exists. This work concluded that wild lupine as well as nectar sources (Karner blue butterfly habitat) were unaffected by the treatments. Again, the effects of burning of KBB populations was tested with a study design that incorporated both replicates and controls. Again, prescribed burning had no short (1 year) or long-term (2 or 3 years) detectable effect on KBB populations (King in litt b). Although all evidence indicates that Karner blue butterflies survive fire as adults and eggs (King in litt a; King in litt b), it is conceivable that individual butterflies could be lost during prescribed burning operations.

*Mowing:* Similar to prescribed burning, controlled and replicated experiments have demonstrated that mowing has no detectable effect on butterfly habitat or populations (King in litt b). However, it is conceivable that an individual butterflies could be killed by mowing.

*Refuge Activities:* Silviculture practices are the only other Refuge activities that have the potential to impact Karner blue butterflies. Land conversion through tree plantings is often cited as negatively affecting butterfly population, however the Refuge doesn't plant trees. Timber sales aimed at controlling disease and pest outbreaks like oak wilt, jack pine budworm, and two-lined chestnut borer for silvicultural purposes have a negative impact on Karner blue butterflies because these are natural processes that help to create and maintain butterfly habitat.

*Foot Travel:* Foot travel through Karner blue butterfly habitat on existing trails could have negative impacts on butterflies if eggs or larvae are stepped on. Maintenance of existing trails is accomplished by annual mowing, which could conceivably result in the loss of an individual butterfly, although this would be very unlikely. Establishment of more trails on the Refuge could result in the take of butterflies if wild lupine plants are destroyed.

*White-tailed Deer:* White-tailed deer browse on savanna plants, including wild lupine, has been high on the Refuge. The Refuge surveyed the number of browsed and unbrowsed lupine flower stems on one Karner blue butterfly site in the spring of 1994 and found that 85 percent of all wild lupine stems were browsed.

*Succession:* If unchecked, succession will destroy butterfly habitat and eliminate populations. Currently three Karner blue butterfly populations are located on unmanaged tracts of land and face certain extirpation unless some form of disturbance or disturbances are returned to the landscape.

#### Measures to Reduce Impacts on Karner Blue Butterflies

The effects of each potential impact of land management activities on Karner blue butterfly population on the project lands will not be monitored. Instead, the effects of all potential impacts will be mitigated by restoring and maintaining enough habitat to restore one large Karner blue butterfly population on the Refuge. The Refuge will be restoring approximately 3,000 additional acres of savanna, which will bring its total savanna habitat to approximately 3,500 acres. The 3,500 acres will be distributed between 35 sub-sites that will be distributed over approximately 15 square miles. Enough savanna habitat will be restored and managed on the Refuge to insure a minimum population of 6,000 to 7,000 second flight adults.

In regard to all outlined activities that have the potential to effect existing Karner blue butterfly populations, the Refuge will incorporate the terms set forth in the Biological Opinion prepared for the Refuge CCP. Specifically, the Refuge will incorporate the following conservation measures:

*Foot travel:* The public will be encouraged to restrict foot travel to existing trails through occupied Karner blue butterfly habitat. Blueberry pickers will be allowed to travel throughout occupied butterfly habitat as the blueberries they seek are also distributed throughout the savannas. The Refuge staff will keep foot travel activities to a minimum while on occupied Karner blue butterfly habitat. Netting, handling, and marking butterflies will also be kept to minimum.

*Untreated Land:* The Refuge will leave at least one untreated Karner blue butterfly site on the southern end (south of Hanson Road) of the Refuge in any given year. Likewise, one untreated Karner blue butterfly unit will be left on the north end of the Refuge in any given year. All other units can be treated (mowed or burned) in a given year. Recently published Karner blue butterfly dispersal research on the Refuge (King 1998) demonstrates that leaving one untreated unit on the southern portion of the Refuge and one on the north will provide "refugia" for the entire Refuge. The dispersal ability of the Karner blue butterfly makes the refugia approach work for the Refuge. Within the open landscapes of the Refuge, 10 percent of all Karner blue butterflies with multiple captures were shown to travel at least 1.4 miles during the second flight of 1995. One individual, a female, traveled at least 4.1 miles during the same flight (King 1998).

As previously stated, research on the Refuge has shown that butterfly populations are unaffected by burning or mowing. Therefore, even if we conservatively assume that mowing or burning result in take of some individual Karner blue butterfly eggs or larvae, research on the Refuge has demonstrated that this take has no effect at the population level. In that respect, leaving refugias on the Refuge will be a back-up plan should the effects of burning or mowing differ dramatically from the past. The Refuge will take the same approach when mitigating the effects of succession. If succession is threatening a population, that unit will be burned or mowed repeatedly, in consecutive years, until the threat of succession is removed. As burning and mowing have no effect on Karner blue butterfly populations (King in litt a, King in litt b) these conservation measures will pose no threat to butterfly populations even if we conservatively assume that some individual Karner blue butterflies could be affected. In fact, most of the Refuge's best Karner blue butterfly sites, in regard to density, have a history of being burned in two or more consecutive years.

*Mowing:* For Karner blue butterfly areas that are mowed, including trails, blade height will be at least 8 inches from the ground. Mowing will not occur between April 15 and August 15 when butterfly larvae may be present.

By implementing the conservation measures listed above, Necedah NWR will be effectively eliminating all Karner blue butterfly take. In the cases of burning and mowing, the Refuge will be conservatively assuming take of individual butterfly eggs or larvae can occur, although there is no support for this in peer reviewed literature. However, the potential effects of that take will not be mitigated as, if they occur, they have been shown to have absolutely no effect on Karner blue butterfly populations (King in litt a).

#### Monitoring Karner Blue Butterflies

The Refuge will monitor all Karner blue butterfly populations on the Refuge with Pollard-Yates type surveys during only the butterflies' second flight each year. Surveys will be conducted only on the dedicated savanna sites and only during the second flight. The surveys will be done on each site three times during the second flight. Spacing of 7 days will be used between subsequent surveys on each site. Spacing of 7 days will be used between counts because mark-release-recapture research at the Refuge has shown that the risk of counting the same butterfly on subsequent surveys is reduced to 5 percent with this spacing (King 1998). Assuming that each Karner blue butterfly counted is a separate individual is useful because a sum of all the counts on a unit as opposed to a mean can be used. The number of butterflies annually counted on the units will then be used to show trends on the Refuge, which will be used to demonstrate that the Refuge is still meeting the criteria for a large population.

#### **4.2.1.4 Eastern Massasauga Rattlesnake**

##### Potential Impacts on the Eastern Massasauga Rattlesnakes

*Wetland Drainage:* Eastern massasauga rattlesnakes hibernate below the water-line. They therefore require high, stable water levels in the winter. Drainage of a wetland could eliminate an area as suitable habitat for hibernating Eastern massasauga Rattlesnakes.

*Prescribed Burning:* Eastern massasauga rattlesnakes have been burned during prescribed burn operations on other National Wildlife Refuges. Burning after snakes emerge from hibernation can result in mortality.

*Mowing:* Mowing while Eastern massasauga rattlesnakes are active can result in mortality. This mortality can be hard on populations as gravid females often seek-out areas that are both dry and warm. Mowing these areas at the wrong time can eliminate gravid females as well as her young.

*Succession:* Massasauga require open landscapes. In closed canopy forests they lose basking opportunities, which are particularly critical for gravid females. As trees grow-up, they also provide perches for raptors that have been shown to substantially affect massasauga populations. Succession has degraded habitat both on the Refuge and the Yellow River area.

#### Measures to Reduce Impacts on Eastern Massasauga Rattlesnakes

The Refuge will not be conducting any massasauga-related activities on the Refuge proper. In regard to the Wildlife Management Agreements with landowners, the Refuge will incorporate methodology outlined in “*The Eastern Massasauga Rattlesnake: A Handbook for Land Managers: 2000*” (Johnson et al. 2000). By following this handbook, the Refuge will be eliminating all take of Eastern massasauga rattlesnakes.

#### Monitoring Eastern Massasauga Rattlesnakes

The Refuge will conduct massasauga surveys for all the Candidate Conservation Agreements it is working on. The Refuge will survey Eastern massasauga rattlesnakes with the methodology set forth in the “Recommended Standard Survey Protocol for the Eastern Massasauga, *Sistrurus catenatus catenatus*” (Capser et al. 2001).

#### **4.2.1.5 Whooping Cranes**

Whooping Crane chicks were introduced at the Refuge in the summer of 2001 as part of a Whooping Crane reintroduction project to establish a migratory population in the eastern U.S. to contribute toward recovery of the species. The population has been designated as a non-essential population (NEP) in a rule making action finalized on June 26, 2001. The crane chicks are being reared in a pen situation and trained to follow ultra light aircraft in migration to a selected wintering site at Chassahowitzka National Wildlife Refuge. Annual Whooping Crane introduction, rearing, and release activities are expected to continue for a period of 10 years.

The introduction project itself is covered by a separate EA and separate Biological Opinion prepared by the Service’s Green Bay Ecological Service’s Field Office.

#### **4.2.2 Maintenance of Roads and Existing Right-Of-Ways**

State, county, and townships retain maintenance obligations for roads and their rights-of-way under their jurisdiction within Refuge boundaries. Some township roads may be suited for abandonment (but not necessarily closure) and their maintenance assumed by the Service. Any such abandonments would only be with the consent of the appropriate governing body. Existing rights-of-ways and terms of other easements will continue to be honored. New rights-of-ways and easements will be considered in relation to Refuge System regulations and likely impacts of the rights-of-way or easement to Refuge resources.

The Refuge would cooperate with state, county and township officials in the maintenance of roads that cross the Refuge. Roadside mowing would be completed in accordance with State and local laws.

#### **4.2.3 Cultural Resources**

Under all alternatives, the Service will take into consideration impacts on historic properties and other cultural resources from Refuge undertakings (e.g., activities, projects, and uses). Nevertheless, some loss could still occur. Any development (e.g., dikes, roads, buildings, etc.) would only be carried out after a thorough review or survey of possible cultural resources likely to be disturbed, and plans for avoidance or minimizing impacts are in place. The Service will inform state Historic Preservation Officers of any acquisition of lands and structures. Structures considered to meet the criteria for the National Register will be maintained until the Service’s Regional Historic Preservation Officer can complete an evaluation and appropriate mitigation is accomplished. Buildings and other structures will be maintained until the Service can consider how the historic property can be retained and used for Refuge purposes.

A description of undertakings for all Refuge lands would be provided by the Refuge Manager to the Regional Historic Preservation Officer who will analyze the undertaking for potential effects on historic properties. The Refuge Manager will inform the Regional Historic Preservation Officer of

each undertaking during early planning. The Regional Historic Preservation Officer will enter into consultation with state Historic Preservation Officers and other parties as appropriate. No undertakings will proceed until the Section 106 process is complete. Also, the Refuge Manager will, with the assistance of the Service's Regional Historic Preservation Officer, develop a program for conducting Section 110 inventory surveys, and will attempt to obtain funding for those surveys. The Refuge Manager will similarly involve the Regional Historic Preservation in other cultural resources issues on the Refuge.

#### **4.2.4 Environmental Justice**

Within the spirit and intent of Executive Order 12898, no minority or low income populations would be impacted by any Service action under any alternative.

#### **4.2.5 Climate Change**

The increase of carbon 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 to be considered in planning. The U.S. Department of Energy's "Carbon Sequestration Research and Development" (U.S. DOE, 1999) defines carbon sequestration as A...the capture and secure storage of carbon that would otherwise be emitted to or remain in the atmosphere."

The land is a tremendous force in carbon sequestration. Terrestrial biomes of all sorts are effective both in preventing carbon emission and acting as a biological "scrubber" of atmospheric carbon monoxide. 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 water, and would enhance carbon sequestration. This will contribute positively toward efforts to mitigate human-induced global climate changes.

### **4.3 Impacts Associated with Service Trust Resources**

#### **4.3.1 Alternative 1 (No Action)**

Under Alternative 1, the Refuge would continue to operate under the 1979 Master Plan and subsequent step-down management plans (maintains the status quo in management). The Refuge's Forest Management and Fire Management plans articulate future open landscape developments, which would benefit some Service trust resources (see Habitat Management section below). However, Alternative 1 does not provide the Refuge a future vision, prioritize management activities Refuge-wide, or hold the Refuge accountable for management results through a monitoring and evaluation program. With less coordination among the conservation organizations, this alternative would probably result in less efficient conservation efforts of Service trust resources on the Refuge and within the Yellow River Focus Area. In the meantime, opportunities to work at the landscape scale for the benefit of Service trust resource in the Yellow River Focus Area would rapidly disappear.

##### **4.3.1.1 Listed Species**

Alternative 1 would have a positive impact on threatened and endangered species that utilize Refuge open landscape lands. Protection of federally-listed species on the Refuge would continue under existing laws and regulations. This alternative might not, however, focus Service restoration and habitat management activities to benefit both federally and state-listed species.

Since the Refuge's Forest Management Plan and Fire Management Plan articulate restoration and conservation of additional open landscape habitats on the Refuge, local populations of Karner blue butterflies would likely increase over the long-term. However, management actions aimed at restoring and maintaining open landscape habitat (mowing, burning, hydro-axing) could impact individual Karner blue butterflies and Eastern massasauga rattlesnakes (see section 1.5 above). However, over the long-term, these populations would benefit from the net gain in savanna habitat that would be restored and conserved.

Nesting Bald Eagles on the Refuge would be afforded protection from human disturbance consistent with the Service's Bald Eagle Management Guidelines (USFWS undated).

Refuge habitat would be managed to support Whooping Cranes and Eastern timber wolves, which would benefit their populations over the long-term. A separate EA has been prepared to evaluate the re-introduction of an experimental population of Whooping Cranes on the Refuge. The "General Impact Analysis" section above provides additional detail relative to potential impacts to listed species, including Eastern timber wolves.

#### **4.3.1.2 Waterfowl and Other Migratory Birds**

Under this alternative, the Refuge would not produce any major change in waterfowl production or use at the Refuge, since there would not be an appreciable increase in nesting, resting, or feeding habitats (grasslands and wetlands) in the immediate area, or the quality of existing Refuge habitats would not improve appreciably (see "Habitat Management" section below). In the long-term, local waterfowl populations could decline as existing wetland habitats degrade and other natural and anthropogenic forces take their toll.

Alternative 1 would benefit savanna species of concern (Red-headed Woodpeckers, Bobolinks, etc.) through additional savanna habitat management on the Refuge. However, other species on the Refuge, such as those associated with mature closed-canopy upland forests (Scarlet Tanagers, Wood Thrushes, Eastern Wood Peewees) would probably experience local declines as those forests are converted to open landscape lands. However, the landscape surrounding the Refuge provides an abundance of mature closed-canopy forest habitat (see Table 7 in Chapter 3) and those bird species would be expected to relocate into those adjacent habitats. Further, conversion of closed-canopy forests to savanna landscapes would occur gradually over an extended period of time (>15 years).

Grassland bird species of concern would probably continue to decline on the Refuge as the Refuge would not make restoration and conservation of additional grasslands a priority under this alternative.

Many bird species considered priority conservation species by the Service and the state, and which are found in the forested wetlands and associated habitats in the Yellow River Focus Area (Cerulean Warbler, Red-shouldered Hawk, Acadian Flycatcher, Yellow-crowned Night Heron, Sedge Wren, Prothonotary Warbler, Louisiana Waterthrush) would not be afforded any habitat conservation under this alternative. As the area develops and degrades due to lack of habitat management actions, many of these species would likely decline.

#### **4.3.1.3 Native Biological Diversity**

Under Alternative 1, we anticipate increased biological diversity on the Refuge from additional savanna restoration and management efforts per guidance contained in the Refuge's Forest Management Plan and Fire Management Plan. This would include increased numbers of many game species also, including Turkey and Sharp-tail Grouse, as well as small mammals, invertebrates, reptiles, and amphibians. However, since the Refuge would not take an active role in restoring and conserving habitats in the Yellow River Focus Area aside from its private lands effort, we anticipate that the quantity and quality of wetlands, bottomland forests, and open landscapes in the area would

continue to decline due to lack of habitat management and development, as well as wildlife species richness and abundance.

## **4.3.2 Alternative 2**

Under Alternative 2 management actions relative to the significant issues identified during scoping would follow guidance contained in the 1979 Refuge Master Plan.

Significant changes have occurred in the art and science of natural resource management since the writing of the 1979 Master Plan. The Service's "ecosystem approach" is an example of the implementation of a new management paradigm, as is the development of regional resource conservation priority species (see CCP chapter 2). Waterfowl, migratory birds, and listed species would not benefit from this new knowledge if the Refuge continued to be guided by an outdated plan and information. Also, the status of Service trust resources has changed since the writing of the 1979 Master Plan due to successful conservation strategies (e.g., the recovery of the Bald Eagle), and unsuccessful conservation strategies (e.g., the declining status of many grassland-dependent bird populations across the region). The 1979 Master Plan does not take into account these or many other changes, and would not enable the Refuge to adequately address Service trust resource needs. In addition, with less coordination among the Service and the conservation community, this alternative would result in less efficient conservation efforts of Service trust resources. In the meantime, like Alternative 1, opportunities to work at the landscape scale in the Yellow River Focus Area for the benefit of Service trust resources would rapidly disappear as development and other anthropogenic forces take their toll.

### **4.3.2.1 Listed Species**

Alternative 2 would have little or no direct impact on threatened and endangered species that utilize the Refuge, with the exception of Karner blue butterflies. Protection of federally-listed species on the Refuge would continue under existing laws and regulations. This alternative might not, however, focus Service restoration and habitat management activities to benefit both Federally and state-listed species. Since no major effort would be made to restore and conserve additional open landscape habitats on the Refuge or Yellow River Focus Area, local populations of Karner blue butterflies would likely remain the same.

Under certain circumstances, management action aimed at restoring and maintaining habitats for listed species, such as mowing, burning, and hydro-axing, may have short-term adverse effects on some listed species the Refuge is trying to benefit (Karner blue butterflies and Eastern massasauga rattlesnakes) (see section 1.5 above).

Eastern massasauga rattlesnakes would likely decline over the long-term as development encroaches the Yellow River Area.

Nesting Bald Eagles on the Refuge would still be afforded protection from human disturbance consistent with the Service's Bald Eagle Management Guidelines (USFWS undated).

The Refuge would manage habitat to support Whooping Cranes and Eastern timber wolves, which would benefit their populations over the long-term (a separate EA and separate Biological Opinion was prepared by the Service's Green Bay Ecological Service's Field Office to cover re-introduction and management of Whooping Cranes).

### **4.3.2.2 Waterfowl and other Migratory Birds**

Alternative 2, like Alternative 1, would result in no direct change in waterfowl production or use at the Refuge since there would not be an appreciable increase in nesting, resting, or feeding habitats (see "Habitat Management" section below) within the Refuge or the Yellow River Focus Area, or the quality of existing Refuge and Yellow River Focus Area habitats would not improve appreciably. In the

long-term, local waterfowl populations could decline as existing wetland habitats degrade and other natural and anthropogenic forces take their toll.

Similarly, Alternative 2 would result in no direct change in migratory bird production or use at the Refuge since there would not be an appreciable increase in nesting, resting, or feeding habitats within the Refuge, nor would the quality of existing habitats improve appreciably. In the long-term, local wetland and grassland-dependent migratory bird populations would likely decline as existing habitats degrade and predation, artificially heightened by fragmented landscapes, continues to take its toll on nesting females and their young.

Many bird species considered priority conservation species by the Service and the state, and which are found in the forested wetlands and associated habitats in the Yellow River Focus Area (Cerulean Warbler, Red-shouldered Hawk, Acadian Flycatcher, Yellow-crowned Night Heron, Sedge Wren, Prothonotary Warbler, Louisiana Waterthrush) would not be afforded any habitat restoration or conservation under this alternative. As the area develops and degrades due to lack of habitat management and conservation, many of these species would likely decline.

#### **4.3.2.3 Native Biological Diversity**

Under Alternative 2, no effort would be made to manage for increased biological diversity on either Refuge land or land within the Yellow River Focus Area by the Refuge (i.e. no new wetlands, savannas, or grasslands restored). Over the long-term, species richness and abundance on the both the Refuge and within the Yellow River Focus Area would be expected to decline. No additional open landscape land (grasslands/savannas) would be developed on the Refuge or within the Yellow River Focus Area. No new wetlands would be restored and managed on the Refuge. Some small increases of wetland habitat could occur in the Yellow River Focus Area through other non-Service programs.

### **4.3.3 Alternative 3**

Alternative 3 would have the greatest positive impact on Service trust resources.

#### **4.3.3.1 Listed Species**

Alternative 3 would have the greatest benefit to listed species by restoring, conserving, and managing additional wetland and open landscape habitats on the Refuge and within the Yellow River Focus Area (see “Habitat Management” section below).

Under certain circumstances, management action aimed at restoring and maintaining habitats for listed species, such as mowing, burning, and hydro-axing, may have short-term adverse effects on some listed species the Refuge is trying to benefit (Karner blue butterflies and Eastern massasauga rattlesnakes).

Through additional savanna habitat management, local populations of Karner blue butterflies would likely increase over the long-term.

Local populations of massasauga rattlesnakes would likely increase as additional habitat is restored and conserved in the Yellow River Area.

Nesting Bald Eagles on the Refuge would still be afforded protection from human disturbance consistent with the Service’s Bald Eagle Management Guidelines.

Refuge habitat would be managed to support Whooping Cranes and Eastern timber wolves, which would benefit their populations over the long-term (a separate environmental assessment (EA) was prepared by the Service’s Green Bay Ecological Service’s Field Office to cover re-introduction and management of Whooping Cranes).

### **4.3.3.2 Waterfowl and Other Migratory Birds**

Alternative 3 would increase waterfowl production (primarily Mallards, Teal, and Pintails) and use at the Refuge by increasing the quantity and quality of nesting, resting, and feeding habitats available to local and migratory populations (see “Habitat Management” section below and attached CCP). As more grasslands are established, nesting success would increase as birds disperse their nests over a larger area, thus creating a larger area that predators must search. Additional resting and feeding habitats (wetlands) would also disperse staging birds over a larger area and decrease the chance of catastrophic accident or disease, such as avian botulism. Additional feeding habitats on the Refuge would help ensure that migrating ducks arrive on their northern breeding grounds in better reproductive condition.

Alternative 3 would benefit other migratory bird species also by providing additional nesting, resting, and feeding habitats (wetlands, grasslands, and savannas). Several species of special management concern would benefit directly. These include the American Bittern, Upland Sandpiper, Least Bittern, Black Tern, Red-shouldered Hawk, Northern Harrier, Dickcissel, Short-eared Owl, Sedge Wren, Loggerhead Shrike, Grasshopper Sparrow, Vesper Sparrow, Savannah Sparrow, Field Sparrow, Bobolink, and Eastern Meadowlark.

However, other species on the Refuge, such as those associated with mature closed-canopy upland forests (Scarlet Tanagers, Wood Thrushes, Eastern Wood Peewees) could experience declines on the Refuge as those forests are converted to open landscape lands. However, the landscape surrounding the Refuge provides an abundance of mature closed-canopy forest habitat (see Table 7 in Chapter 3) and those bird species could relocate into those adjacent habitats. Further, conversion of forest land to open landscape habitat would occur over an extended period of time (>15 years).

Restoration, conservation, and management of riparian areas, wetlands, wet prairies, sedge meadows, and associated grasslands on the Refuge and in the Yellow River Focus Area would create and conserve habitats essential for many nesting and migrating songbirds, and should contribute to the long-term recovery of some neotropical migrant populations (Cerulean Warbler, Red-shouldered Hawk, Acadian Flycatcher, Yellow-crowned Night Heron, Sedge Wren, Prothonotary Warbler, Louisiana Waterthrush).

### **4.3.3.3 Native Biological Diversity**

Alternative 3 would increase and conserve biological diversity by restoring and conserving additional diverse habitats on the Refuge and within the Yellow River Focus Area, including seasonal wetlands, wet meadows, native prairies, and riparian associations. Once restored, these areas could create a number of interconnected habitat niches for indigenous and migrant wildlife that currently do not exist at the Refuge, thus increasing the overall biological diversity of the Refuge and surrounding area. This would include increased numbers of many game species also, including Turkey and Sharp-tail Grouse. In particular, this alternative would focus the restoration of large, native grassland blocks, and the management of the surrounding landscape that will establish a favorable landscape for the management of area-sensitive grassland birds. Moreover, Alternative 3 would attempt to restore the links (i.e. suitable matrix) between the historic wetlands, prairies, and oak savanna ecosystems found on the Refuge, which would also contribute to enhanced biological diversity.

Since this alternative emphasizes the greatest habitat conservation, restoration and enhancement, it would also result in the greatest benefit to resident wildlife, such as those species that help sustain natural biological systems that support Service trust resources like muskrat, raccoon, mink, weasel, reptiles, river otter, amphibians and reptiles. In addition, as water quality improves from habitat treatments in the Yellow River Watershed, important resident game fish populations would be expected to increase in proportion to the amount of quality habitat made available on the Refuge, thus increasing the food supply for many fish-eating wildlife.

## 4.4 Impacts Associated with Visitor Services

### 4.4.1 Alternative 1

Under Alternative 1, the 1979 Master Plan and associated step-down plans (e.g., public use, sign, law enforcement plan, etc.) would be used to guide visitor services on the Refuge. Visitation at the Refuge would continue to increase due to recent Refuge developments (Whooping Crane project, savanna restorations) while the quality of visits would probably decline due to lack of adequate infrastructure.

Increased visitation could generate the development of additional on-site facilities, such as improvements to visitor facilities, parking areas, trails, observation towers, etc. These new facilities and infrastructure could reduce available habitat and create localized damage to vegetation, soil compaction and erosion, while increasing the chance of wildlife disturbance and disturbance to other visitors. These potential negative effects would be minimized through careful planning and management. Popular activities on site-specific areas could be controlled to reduce impacts through proper design, site selection and construction technique.

One feature of this alternative would include expanding the current Refuge headquarters building (per guidance contained in the 1979 Master Plan and public use plan), which would help accommodate large groups of visitors that have been drawn to the Refuge by the Whooping Crane and savanna restoration projects. It would not however provide for the larger-scale visitation and use changes (more people coming to the Refuge, and the trend in more people coming to see wildlife rather than harvest related reasons) that Refuge staff and stakeholders feel are necessary for accomplishing the Refuge's mission, as well as accommodating the desires of local towns, townships, and counties in making the Refuge a regional attraction for outdoor enthusiasts. The land area that would be used for the current headquarters expansion is not an area currently used by large numbers of refuge visitors (e.g., hunters, bird watchers, anglers). There are no federally-listed species or Region 3 conservation priority species located in the area. There are no sensitive habitats located in the area. There are no known cultural or archaeological resources located in the area. Thus, adverse impacts to current Refuge uses (such as hunting) and habitat and other resources would be minimal.

Relative to staffing patterns, the Refuge currently supports two part-time Park Ranger positions devoted to visitor services. In the past this has been insufficient to handle the number of requests for Refuge programs. With the popularity of the Refuge's savanna restoration and the Whooping Crane project growing each day, staff shortages will continue to get worse. Alternative 1 would provide no new staff for the visitor services program. Volunteers would be emphasized to help with the additional workload associated with the Whooping Crane project. If this effort fails, some staff and resources may need to be redirected from current activities.

### 4.4.2 Alternative 2

Refuge visitation has increased yearly since the development of the 1979 Master Plan. Again, the reasons that people come to the Refuge have also changed. Uses like wildlife observation and relaxation are surpassing hunting and fishing as the most common reasons for visitors to come to the Refuge and Refuge area. The Refuge also has additional attractions, such as examples of globally rare savannas, the federally listed Karner blue butterfly and, potentially, the Whooping Crane, one of the rarest birds in the world.

Under Alternative 2, the Refuge's visitor services program would remain roughly status quo. No additional emphasis would be placed on providing quality wildlife-dependent public uses of the Refuge. Visitation would probably continue to increase due to recent Refuge developments (Whooping Crane project, savanna restoration). The Refuge would not attempt to either enlarge the existing Refuge headquarters building (per guidance contained in the Master Plan) or build a new visitor

center (Alternative 3). Without additional infrastructure, the quality of Refuge visits would probably decline.

Relative to staffing patterns, the Refuge currently supports two part-time Park Ranger positions devoted to visitor services. In the past this has been insufficient to handle the number of requests for Refuge programs. With the popularity of the Refuge's savanna restoration and the Whooping Crane project growing each day, staff shortages will continue to get worse. Like alternative 1, Alternative 2 would provide no new staff for the visitor services program. Volunteers would be emphasized to help with the additional workload associated with the Whooping Crane project. If this effort fails, some staff and resources may need to be redirected from current activities.

### **4.4.3 Alternative 3**

Under Alternative 3, the Refuge has outlined its goals for public education and recreation and specific objectives, strategies, and projects that would support the Refuge in meeting those goals (see attached CCP). The CCP incorporates visitor services with other Refuge work, such as Service trust resource management, into one cohesive management planning effort. While Alternative 2 would allow for updated step-down plans, it does not provide for strategic implementation of all Refuge programs to achieve the Refuge's purpose and vision.

Alternative 3 also recognizes substantial changes in visitor numbers and use patterns brought on by demographic shifts (more people are using refuges for wildlife viewing and relaxation, fewer users are hunting and fishing) and new initiatives and projects such as savanna restoration and the reintroduction of whooping cranes on the Refuge. These new initiatives and projects could reduce available habitat and create localized damage to vegetation, soil compaction and erosion, while increasing the chance of wildlife disturbance and disturbance to other visitors. However, these potential negative effects would be short-term and be minimized through careful planning and management. Popular activities on site specific areas could be controlled to reduce impacts through proper design, site selection and construction techniques.

One of the projects called for under this alternative is the construction of a new visitor center. There are two areas under consideration for locating the visitor center (Figure 18 in the CCP). The site near Highway 21 is not currently used by large numbers of refuge visitors (e.g., hunters, bird watchers, anglers). The second site is in the vicinity of the current learning center. There are no federally-listed species or Region 3 priority species located in either proposed area. There are no sensitive habitats located in the areas. There are no known cultural or archaeological resources located in the areas. Thus, adverse impacts to current Refuge uses (such as hunting) and habitat and other resources would be minimal.

There are several notable positive impacts associated with a new visitor center at the Refuge. Having a facility located on state highway 21 will increase the Refuge's profile in the local community, and for users of one of Wisconsin's most traveled east-west travel corridors. The current main office is 3 miles north of State Highway 21. The Highway 21 site would have greater accessibility than the current Refuge main office. However, the second site under consideration, near the existing learning center, would be only about 500 yards from the existing office complex. The expanded facilities and proximity to wetlands and other diverse habitats would provide environmental education and interpretive opportunities not available at the Highway 21 site. Either visitor center site would also allow the Refuge to be more effective at transmitting Service messages to a broader group of stakeholders, through quality education and interpretation programs.

Several factors have been considered to minimize the impact of the facility and parking area on the environment. The visitor center would be constructed to blend in with the surrounding landscape (low profile and natural siding materials). Sewage treatment and heating and cooling systems have been chosen to minimize environmental impacts. Parking lot lights would be light-sensing to save

electricity. Native vegetation would be used for all landscaping to provide habitat for Service trust species, minimize runoff from the parking area, and to serve as an interpretive tool for visitors. Finally, recreational and interpretive opportunities at either proposed site would give the Service the largest increase in public exposure with the least impact on Service trust resources by concentrating the increased visitation on the periphery of the Refuge or in areas already disturbed. The Refuge would work with the Wisconsin Department of Transportation to provide for a safe entrance and exit from State Highway 21 to the visitor center due to increased visitation regardless of which site is chosen.

Relative to staffing patterns, the Refuge currently supports two part-time Park Ranger positions devoted to visitor services. In the past this has been insufficient to handle the number of requests for Refuge programs. With the popularity of the Refuge’s savanna restoration and the Whooping Crane project growing each day, staff shortages will continue to get worse. Alternative 3 calls for three full-time Park Rangers, one whose position would be dedicated solely to law enforcement. These positions, along with increased funding and the help of Refuge volunteers, would be adequate to meet the Refuge’s visitor service responsibilities. The Refuge anticipates increased funding as a result of the Whooping Crane project, and has already requested additional funding for staff and equipment. If these efforts fail, some staff and resources may need to be redirected from current activities.

## 4.5 Impacts Associated with Habitat Management

### 4.5.1 Alternative 1 (No Action)

Table 12 details the types and amounts of habitats the Refuge would manage by 2015 under Alternative 1, based on guidance contained in the 1979 Master Plan and subsequent step-down plans. No additional habitat management would occur in the Yellow River Focus Area aside from some private lands activities associated with the Refuge’s Partners for Wildlife private lands program.

#### 4.5.1.1 General Considerations

No forest land considered “old growth” would be adversely impacted by the Refuge’s open landscape restoration efforts. No “critical habitat” would be adversely impacted by this alternative. This alternative would not lead to increased runoff or erosion, nor would it contribute to increased sedimentation in Refuge pools or waterways. Existing forest habitats would not be unduly fragmented by timber harvest activities.

**Table 12: Habitat Types on the Refuge by 2015, Alternative 1, Necedah NWR**

Land Cover Type	Acres	Acre Gain/Loss Compared to 2000
Open Landscapes (grasslands, savanna, shrublands, old fields)	6,300	+ 2,600 (savanna)
Coniferous Forests	550	- 350
Mixed Deciduous and Coniferous Forests	8,000	- 2,000
Broad-leaf Deciduous Forests	5,350	- 250
Emergent Wetlands and Wet Meadows	10,500	Status Quo
Forested Wetlands	5,700	Status Quo
Lowland Shrubs	5,500	Status Quo
Open Water Areas	1,800	Status Quo

The use of prescribed fire as a habitat management tool would be governed by the guidelines and provisions contained in the Refuge’s prescribed burn plan. Impacts associated with the use of fire as a management tool on the Refuge are common to all alternatives and are discussed in the “General Impact Analysis” section found above and the Refuges Fire Management Plan.

Specific impacts to Service trust resources (including native biological diversity), visitor services, and the Yellow River Focus Area due to habitat management activities associated with Alternative 1 are discussed in those sections.

## 4.5.2 Alternative 2

Under Alternative 2, through guidance contained in the 1979 Master Plan, the Refuge would manage the habitat types and amounts described in Table 13 by 2015. The Refuge’s savanna restoration program, which began in the early 1990s, would be discontinued. Habitats would be maintained in proportion to what is there presently. Timber harvest as a tool in habitat restoration and establishment (savanna and grasslands) would cease. The Service would not pursue additional habitat management in the Yellow River Focus Area.

**Table 13: Habitat Types on the Refuge by 2015, Alternative 2, Necedah NWR**

Land Cover Type	2015 Acres	Acre Gain/Loss Compared to 2000
Open Landscapes (grasslands, savanna, shrublands, old fields)	3,700	Status Quo
Coniferous Forests	900	Status Quo
Mixed Deciduous and Coniferous Forests	10,000	Status Quo
Broad-leaf Deciduous Forests	5,600	Status Quo
Emergent Wetlands and Wet Meadows	10,500	Status Quo
Forested Wetlands	5,700	Status Quo
Lowland Shrubs	5,500	Status Quo
Open Water Areas	1,800	Status Quo

### 4.5.2.1 General Considerations

No forest land considered “old growth” would be adversely impacted by the Refuge’s open landscape restoration efforts. No “critical habitat” would be adversely impacted by this alternative. This alternative would not lead to increased runoff or erosion, nor would it contribute to increased sedimentation in Refuge pools or waterways. Existing forest habitats would not be unduly fragmented by timber harvest activities.

The use of prescribed fire as a habitat management tool would be governed by the guidelines and provisions contained in the Refuge’s prescribed burn plan. Impacts associated with the use of fire as a management tool on the Refuge are common to all alternatives and are discussed in the “General Impact Analysis” section found above and the Refuges Fire Management Plan.

Specific impacts to Service trust resources (including native biological diversity), visitor services, and the Yellow River Focus Area due to habitat management activities for Alternative 2 are discussed in those sections.

## 4.5.3 Alternative 3 (Preferred Alternative)

Table 14 describes the types and amounts of habitats the Refuge would manage under Alternative 3 by 2015, based on guidance contained in the Refuge CCP.

**Table 14: Habitat Types on the Refuge by 2015, Alternative 3, Necedah NWR**

<b>Land Cover Type</b>	<b>Acres</b>	<b>Acre Gain/Loss Compared to 2000</b>
Open Landscapes (grasslands and savannas)	9,800	+ 2,600 acres savanna + 3,500 acres grassland
Coniferous Forests	550	- 350 acres
Mixed Deciduous and Coniferous Forests	4,500	- 5,500 acres
Broad-leaf Deciduous Forests	5,350	- 250 acres
Emergent Wetlands and Wet Meadows	12,500	+ 2,000 acres
Forested Wetlands	5,700	Status Quo
Lowland Shrubs	3,500	- 2,000 acres
Open Water Areas	1,800	Status Quo

### **4.5.3.1 General Considerations**

No forest land considered “old growth” would be adversely impacted by the Refuges open landscape restoration efforts. No “critical habitat” would be adversely impacted by this alternative. This alternative would not lead to increased runoff or erosion, nor would it contribute to increased sedimentation in Refuge pools or waterways. Existing forest habitats would not be unduly fragmented by timber harvest activities.

The use of prescribed fire as a habitat management tool would be governed by the guidelines and provisions contained in the Refuge’s prescribed burn plan. Impacts associated with the use of fire as a management tool on the Refuge are common to all alternatives and are discussed in the “General Impact Analysis” section found above and the Refuges Fire Management Plan.

Specific impacts to Service trust resources (including native biological diversity), visitor services, and the Yellow River Focus Area due to habitat management activities for Alternative 3 are discussed in those sections.

## **4.6 Impacts Associated with the Yellow River Focus Area**

### **4.6.1 Alternative 1 (No Action)**

Under Alternative 1, the Refuge would only intensify and concentrate its private lands program in the Yellow River Focus Area. The Service would not seek to acquire any realty interests by fee-title or conservation easements in land and water in the Yellow River Focus Area. The Service would continue to develop Wildlife Management Agreements with landowners in the area.

At the time of printing the draft CCP, of the 230 landowners in the Yellow River Focus Area, 121 had signed up with the Service for technical assistance. Of those, 16 landowners owning 1,233 acres have signed Wildlife Management Agreements. Restoration work accomplished as of mid 2002 includes: three sedge meadow restorations (62 acres), three wetland restorations (33 acres), one bottomland hardwood restoration (54 acres) and six savanna/prairie restorations (135 acres). All work was performed by landowners and Refuge Private Lands personnel. These efforts, however, offer very little long-term conservation of habitats, as most are short-term in nature.

#### **4.6.1.1 Habitat Considerations**

Under this alternative, we would expect small increases in wetland and upland habitats to be restored in the Yellow River Focus Area through existing USDA, county, and the Service’s Partners for Wildlife

private lands program. Currently these programs offer restoration to small tracts of habitat scattered throughout large geographic areas (as opposed to larger single blocks). Similar increases in habitat could be realized through the Refuge's Partner for Wildlife program.

However, many of the existing wetland and upland habitats in the area could be impacted by the lack of a central management plan for the area, which may lead to increased residential development in undesirable locations or proportions, unmonitored water quality changes, declines in quality recreational and aesthetic experiences, and declines in the overall value of the Yellow River to local communities. Waterfowl, sandhill crane, other waterbirds, songbirds, fish, and many resident wildlife species would likely decrease over time as habitat degradation occurred. Unique plant communities could be degraded or lost due to conversion of additional wetlands to agricultural lands, namely cranberry production. Archeological resources would be offered little protection and subject to loss. Public use opportunities would be limited to private landowners, others with permission from landowners, and the general public on the public lands in the area.

Many areas of bottomland forest not considered wetlands under the Swampbuster provisions of the Food Security Act could eventually be cleared and put into other uses not beneficial to wildlife. The many water quality and wildlife habitat benefits associated with these areas would be lost. Although many current landowners in the area demonstrate a laudable conservation ethic, lack of a Service presence could result in timber harvest decisions on un-managed woodlands that are based primarily on maximizing short-term income. Continued high-grading of timber could further reduce tree species diversity, and the heavy mast component (oaks) of the forest community could be reduced, thus reducing food for waterfowl. Emergent, scrub-shrub and open water wetlands would continue to receive limited conservation afforded by present regulatory processes.

#### **4.6.1.2 Land Acquisition and Property Taxes**

Under Alternative 1 the Refuge would only intensify and concentrate its private lands program in the Yellow River Focus Area. The Service would not acquire any realty interests (e.g., fee-title or conservation easements) in land and water in the Yellow River Focus Area. No land would be removed from the tax rolls. No Refuge Revenue Sharing Payments would be made to the affected townships, since no additional land would be removed from the tax rolls.

### **4.6.2 Alternative 2**

Alternative 2 would not provide staff and funding to provide a leadership role in facilitating pro-active conservation approaches in the area. This would mean the Service would not intensify and concentrate its private lands efforts in the area or seek to acquire realty interests in lands and waters. All efforts aimed at developing Wildlife Management Agreements with landowners in the Yellow River Focus Area would cease. Efforts at conserving the habitat work accomplished to-date through the Refuge's Partners for Wildlife program would be abandoned.

#### **4.6.2.1 Habitat Considerations**

Like Alternative 1, small increases in wetland and upland habitats would be restored in the Yellow River Focus Area through existing USDA and county programs. Again, most of these programs restore small tracts of habitat scattered throughout large geographic areas (as opposed to larger single blocks). While important habitat for migratory birds and other diverse wildlife would be restored, there is no provision for the conservation of a large, regionally important landscape such as the Yellow River Focus Area.

Again, many of the existing wetland and upland habitats in the area could be impacted by the lack of a central management plan for the area, which may lead to increased residential development in undesirable locations or proportions, unmonitored water quality changes, declines in quality recreational and aesthetic experiences, and declines in the overall value of the Yellow River to local communities. Waterfowl, Sandhill Crane, other waterbirds, songbirds, fish, and many resident wildlife

species would likely decrease over time as habitat degradation occurred. Unique plant communities could be degraded or lost due to conversion of additional wetlands to agricultural lands, namely cranberry production. Archeological resources would be offered little protection and subject to loss. Public use opportunities would be limited to private landowners, others with permission from landowners, and the general public on the public lands in the area.

Like Alternative 1, many areas of bottomland forest not considered wetlands under the Swampbuster provisions of the Food Security Act could eventually be cleared and put into other uses not beneficial to wildlife. The many water quality and wildlife habitat benefits associated with these areas would be lost. Timber harvest decisions on un-managed woodlands could likely be based primarily on maximizing short-term income (again, given current landowners' conservation ethic, this is possible but not necessarily certain). Continued high-grading of timber could further reduce tree species diversity, and the heavy mast component (oaks) of the forest community could be reduced, thus reducing food for waterfowl. Emergent, scrub-shrub and open water wetlands would continue to receive limited conservation afforded by present regulatory processes.

#### **4.6.2.2 Land Acquisition and Property Taxes**

Under Alternative 2, the Service would not seek to acquire any realty interests (fee-title or conservation easements) in land and water in the Yellow River Focus Area. No land would be removed from the tax rolls. Therefore, no Refuge Revenue Sharing Payments would be made to the affected townships.

### **4.6.3 Alternative 3**

Implementation of the CPP would provide the Refuge with additional tools to restore and conserve the Yellow River Focus Area in a way that supports Service trust resources and the diverse group of stakeholders owning land in the area (willing sellers only). The Refuge would continue to employ a private lands biologist devoted to working in the Yellow River Focus Area. A staff person dedicated to the Yellow River Focus Area conservation effort would provide the attention and continuity necessary to maintain stakeholder trust and allow for wetland and prairie restorations to continue in other areas of the 12-county Private Lands District.

#### **4.6.3.1 Habitat Considerations**

Like Alternatives 1 and 2, small increases in wetland and upland habitats would be restored in the Yellow River Focus Area through existing USDA and county programs. Again, most of these programs restore small tracts of habitat scattered throughout large geographic areas (as opposed to larger single blocks). Under Alternative 3, like Alternative 1, Refuge private lands staff will continue providing landowners technical and funding assistance to manage fish, wildlife, and plants on their land and seek to augment other non-Service conservation efforts.

As of September 2000, of the 230 landowners in the Yellow River Focus Area, 121 had signed up with the Service for technical assistance. Of those, 16 landowners owning 1,233 acres have signed Wildlife Management Agreements. Restoration work accomplished to date includes: three sedge meadow restorations (62 acres), three wetland restorations (33 acres), one bottomland hardwood restoration (54 acres) and six savanna/prairie restorations (135 acres). All work was performed by landowners and Refuge Private Lands personnel. Refuge private lands staff will continue providing landowners technical and funding assistance to manage fish, wildlife, and plants on their land, and seek to augment these other non-Service conservation efforts. In addition, under this alternative the Service would seek to conserve these and other areas by offering to purchase a realty interest in properties with high natural resource values (willing seller only).

#### **4.6.3.2 Land Acquisition and Property Taxes**

Alternative 3 would expand the Refuges private lands conservation effort by offering conservation easements and fee title purchases to willing landowners, further conserving the restoration work done

through the Refuge's Wildlife Management Agreements and other non-Service programs. While the Yellow River Focus Area program emphasizes conservation of quality wildlife habitat in private ownership, land acquisition by the Service could involve approximately 3,750 acres (250 acres/year) over the next 15 years (based on a future funding scenario and the presence of willing sellers). In reality, this figure could be more or less given the uncertainty of future funding scenarios and the presence of willing participants. All lands acquired by the Service would be administered and managed by the National Wildlife Refuge System, Necedah National Wildlife Refuge. Tracts in which less than fee-title agreements are negotiated would remain in private ownership. All restoration and conservation would be carried out on a tract-by-tract basis as participants and fiscal resources become available over a 15-year time period. Funding for land acquisition would be from the Migratory Bird Conservation Fund (proceeds from the sale of Federal duck stamps) using the authority of the Migratory Bird Conservation Act and the Land and Water Conservation Fund using the authority of the Fish and Wildlife Act of 1956. Participation with the Service in any aspect of the Yellow River Focus Area is voluntary, and all land acquisition would be from willing sellers only.

The Refuge Revenue Sharing Act of June 15, 1935, as amended, provides for annual payments to counties or the lowest unit of government that collects and distributes taxes based on acreage and value of National Wildlife Refuge lands located within the county. The monies for these payments come from two sources: (1) net receipts from the sale of products from National Wildlife Refuge System lands (oil and gas leases, timber sales, grazing fees, etc.) and (2) annual Congressional appropriations. Annual Congressional appropriations, as authorized by a 1978 amendment, were intended to make up the difference between the net receipts from the Refuge Revenue Sharing Fund and the total amount due to local units of government.

Payments to the counties are calculated based on whichever of the following formulas as set out in the Act provides the largest return: (1) \$.75 per acre; (2) 25 percent of the net receipts collected from refuge lands in the county; or (3) three-quarters of 1 percent of the appraised value. In the state of Wisconsin, three-quarters of 1 percent of the appraised value always brings the greatest return to the taxing bodies. Using this method, lands are re-appraised every 5 years to reflect current market values.

According to the Refuge Revenue Sharing Act, which authorizes the Service to make these payments:

“Each county which receives payments....shall distribute, under guidelines established by the Secretary, such payments on a proportional basis to those units of local government (including, but not limited to, school districts and the county itself in appropriate cases) which have incurred the loss or reduction in real property tax revenues by reason of existence of such area.”

In essence, the Act directs the counties or lowest unit of government that collects and distributes taxes to distribute Refuge Revenue Sharing payments in the same proportion as it would for tax monies received.

Evaluating the environmental consequences for Alternative 3 is complicated by the Service's willing-seller-only acquisition policy. Because the Service would be buying land from willing sellers only (easements and fee-title acquisitions), and nearly all of the land in the Yellow River Focus Area is in private ownership, there is no reliable way to predict when or where particular land parcels might be purchased. However, in the spring of 2001 Refuge staff and regional office personnel held a public meeting at the Town of Necedah town hall to discuss the Yellow River Focus Area project. The following analysis of potential tax implications to the Town of Necedah was prepared for that meeting using the following assumptions.

Town of Necedah

<i>Total Assessments</i>	\$82,170,792
<i>Tax Rate</i>	\$23.50 per \$1,000 assessed value
<i>Total Revenue Received</i>	\$1,931,013

The assessment makes the following three assumptions:

- The U.S. Fish and Wildlife Service acquires 250 acres of land in fee-title in the Town of Necedah.
- The value of the land is \$1,000 per acre (estimated).
- The total valuation of the land is \$250,000 (250 acres X \$1,000 per acre).

Based on the above assumptions, the total amount of lost property tax revenue as a result of the Service's hypothetical purchase of 250 acres would equal \$5,875 per year ( $\$250,000 / \$1,000 \times \$23.50$ ). After the land was acquired, the Service would make a Refuge Revenue Sharing payment to the Town of Necedah. The Service's Refuge Revenue Sharing payment (at 100 percent) would be \$1,875 per year ( $\$250,000 \times .0075$ ).

The Service's Refuge Revenue Sharing payment to the Town of Necedah at 53 percent of entitlement would be \$993.75 per year.

The difference between the taxes on the 250 acres used in this example (had they remained in private ownership) and the Service's Refuge Revenue Sharing payment would be \$5,875 (taxes) - \$993 (revenue sharing payment) = \$4,882 per year.

The amount of revenue lost as a percentage of total revenue received by the Town of Necedah ( $\$4,882 / \$1,931,013$ ) would equal .25 percent (one-quarter of 1 percent).

Since roughly 60 percent of the tax revenue received by the Town goes to the school district, and the state makes up any shortfall in school funding due to public land ownership, the actual loss would be \$1,952 ( $.4 \times \$4,882$ )(the state would pay the other \$2,929 to the school district).

The amount of tax revenue lost after the state payment to the school district (expressed as a fraction of total tax revenues) would be .10 or one-tenth of 1 percent ( $\$1,952 / \$1,931,013$ ).

Lastly, for comparison purposes and using the above analysis, if someone is currently paying roughly \$1,000 in property taxes for living in the Town of Necedah, they could expect their taxes to increase by roughly \$1.00 as a result of Service fee-title acquisition of land in the Yellow River Focus Area (for every 250 acres valued at \$1,000 per acre).

Since the draft CCP was written, the Wisconsin Department of Revenue prepared an analysis of the potential tax impacts on local taxes due to hypothetical Service fee acquisition in the Yellow River Focus Area. The analysis considered the impact on the municipal, school district, and county taxes due to the hypothetical purchases of lands of varying acreages by the Service in eight different taxing authorities in Wood and Juneau counties. The Department of Revenue assumed that the Service revenue sharing payment would equate to .75 percent of the fair market value and that the Service would pay 51 percent of the full Refuge Revenue Sharing entitlement. The calculated tax impact ranged from a decrease of \$.09 to an increase of \$.17 in taxes for an average residential parcel.

**Table 15: Summary of Environmental Impacts, Necedah NWR**

<b>ISSUE</b>	<b>ALTERNATIVE 1 (Guidance contained in the 1979 Master Plan and associated Step-down Management Plans)</b>	<b>ALTERNATIVE 2 (Guidance contained in the 1979 Master Plan)</b>	<b>ALTERNATIVE 3 (Guidance contained in the Refuge CCP)</b>
<b>1. Service Trust Resources</b>			
<i>Listed Species</i>	Populations of listed species on the Refuge would likely remain the same or increase slightly. Eastern massasauga rattlesnakes in the Yellow River Focus Area (YRFA) may decline as development encroaches the area.	Populations of listed species on the Refuge would likely remain the same or increase slightly. Eastern massasauga rattlesnakes in the YRFA may decline as development encroaches the area.	Populations of all listed species on the Refuge and in the YRFA would likely increase. This alternative would have the greatest contribution to listed species.
<i>Waterfowl and other Migratory Birds</i>	Would not increase waterfowl use and production. Would not increase grassland species of concern. Would increase savanna species of concern through additional savanna management.	Would not increase waterfowl use and production. Would not increase grassland species of concern. Would not increase savanna species of concern through additional savanna management. Local populations in the YRFA would likely decline.	Would increase waterfowl use and production at the Refuge through additional habitat management. Would increase grassland species of concern through additional grassland management. Would increase savanna species of concern through additional savanna management.
<i>Biological Diversity</i>	Would increase native biological diversity on Refuge land through savanna restoration efforts and in the YRFA through the Refuge's Private Lands Program.	Would not increase native biological diversity on either Refuge land or land within the Yellow River Focus Area.	Would increase native biological diversity on both Refuge land and land within the YRFA.
<b>2. Visitor Services</b>			
	The quality of Refuge visits would likely decline as visitation increases due to recent developments (e.g., Whooping Crane introduction).	The quality of Refuge visits would likely decline as visitation increases due to recent developments (e.g., Whooping Crane introduction).	Many upgrades to existing facilities would occur. The quality of Refuge visits would improve most.
<b>3. Habitat Management</b>			
	Would restore native savanna and contribute to the recovery of early successional forests.	Could lead to further degradation of forest land (over mature closed-canopy forests).	Would restore native savanna and contribute to the recovery of early successional forests. Would establish native prairies and contribute to the recovery of those ecosystems as well.
<i>Fire Management</i>	Would be safely done	Would be safely done.	Would be safely done.

**Table 15: Summary of Environmental Impacts, Necedah NWR (Continued)**

<b>ISSUE</b>	<b>ALTERNATIVE 1 (Guidance contained in the 1979 Master Plan and associated Step-down Management Plans)</b>	<b>ALTERNATIVE 2 (Guidance contained in the 1979 Master Plan)</b>	<b>ALTERNATIVE 3 (Guidance contained in the Refuge CCP)</b>
<b>Yellow River Focus Area</b>			
	No impact to private property rights. No impact to taxes. Most likely would lead to further degradation of the natural resources.	No impact to private property rights. No impact to taxes. Most likely would lead to further degradation of the natural resources.	No impact to private property rights. Could result in reduced tax revenues as land is purchased in fee-title. Would conserve existing and restorable natural resources in the area.

# Chapter 5: List of Preparers

<i>Gabe DeAlessio</i>	Biologist/GIS, Division of Conservation Planning, Great Lakes/Big Rivers Regional Office, Ft. Snelling, Minnesota. Responsible for GIS mapping.
<i>Jeff Gosse</i>	Regional National Environmental Policy Act Coordinator, Great Lakes-Big Rivers Regional Office, Ft. Snelling, Minnesota. Responsible for environmental assessment review and editing and NEPA compliance.
<i>Jane Hodgins</i>	Technical Writer/Editor, Great Lakes-Big Rivers Regional Office, Ft. Snelling, Minnesota. Responsible for CCP/environmental assessment review and editing.
<i>Sean Killen</i>	Cartographer, Great Lakes-Big Rivers Regional Office, Ft. Snelling, Minnesota. Responsible for GIS development and maps.
<i>Richard King</i>	Biologist, Necedah National Wildlife Refuge, Necedah, Wisconsin. Responsible for CCP/environmental assessment preparation and review.
<i>Jane Lardy Nelson</i>	Editorial Assistant, Division of Conservation Planning, Great Lakes/Big Rivers Regional Office, Ft. Snelling, Minnesota. Responsible for production assistance and review.
<i>Thomas Larson</i>	Chief, Division of Conservation Planning, Great Lakes-Big Rivers Regional Office, Ft. Snelling, Minnesota. Responsible for CCP/environmental assessment review.
<i>Thomas Magnuson</i>	Fish and Wildlife Biologist, Great Lakes-Big Rivers Regional Office, Ft. Snelling, Minnesota. Responsible for project coordination and CCP/environmental assessment preparation and review and editing.
<i>Mary Mitchell</i>	Regional GIS Coordinator, Great Lakes-Big Rivers Regional Office, Ft. Snelling, Minnesota. Responsible for GIS development.
<i>Rebecca Power</i>	Park Ranger, Necedah National Wildlife Refuge, Necedah, Wisconsin. Responsible for public involvement, CCP/environmental assessment preparation and review and editing.

*Claudia Wondra*

Former Editorial Assistant, Ascertainment and Planning, Great Lakes-Big Rivers Regional Office, Ft. Snelling, Minnesota. Responsible for CCP/environmental assessment review and editing.

*Larry Wargowsky*

Refuge Manager, Necedah National Wildlife Refuge, Necedah, Wisconsin. Responsible for CCP/environmental assessment review and editing.

# Chapter 6: Consultation and Coordination with the Public

The Service used a highly participatory planning process to develop the Necedah National Wildlife Refuge CCP and associated EA. Throughout the planning process, the Service initiated outreach to diverse stakeholders, including representatives from other Federal and state agencies, county and township governments, local drainage districts, special interest groups such as birders, hunters, and anglers, industry and non-profit organizations, landowners living adjacent to the Refuge and within the Yellow River Area, Refuge visitors, and Service employees.

Information about the CCP was provided to stakeholders and the general public through news releases, presentations, interviews, informational letters, newsletters, public meetings, briefings, and the Internet. Questionnaires, focus groups, public meetings, and one-on-one discussions were used to gather input from Refuge visitors, neighbors, and other stakeholders. A geographic information system was developed to aid in the analysis and transfer of information.

The following table (Table 16) is a summary of opportunities afforded the public in the Refuge's Comprehensive Conservation Planning (CCP) process. This summary covers the majority of formal outreach efforts by the Service and the Refuge. A number of informal outreach efforts, particularly in the Juneau County and Wood County area, occurred throughout the CCP process and are not documented here. These efforts include contacts with Refuge visitors (approximately 5,000 Refuge hunters responded to a questionnaire), informing local service organizations and county boards at regularly scheduled meetings, and informing/updating other agencies at meetings scheduled for purposes other than to discuss the Refuge CCP.

**Table 16: Summary of Opportunities for Public Involvement in the CCP Process, Necedah NWR**

<b>Date</b>	<b>Action or Event</b>	<b>Message</b>
January 1997	Juneau/Adams County interagency meeting	Informed local, state, and federal resource management personnel about the upcoming Refuge planning process
February 1997	Refuge staff met with representatives of the Wisconsin Bowhunters Association, the Wisconsin Muzzleloaders Association, and the Wisconsin Traditional Archers Association, at their request	Discussed the future of special hunts and game management on the Refuge
March 1997	Press release	Happy birthday Necedah Refuge and call for input into CCP
March 1997	Letter to the editor - Juneau County Star Times	Refuge asks for help planning the future of the Refuge
April 1997	Press release	Publicizing National Wildlife Week and opportunities to comment on the CCP
April 1997	National Wildlife Week Open House	Request public input into Refuge and Yellow River planning efforts
April 1997	Press release	Publicize International Migratory Bird Day events and requesting input into the Refuge CCP
May 1997	Refuge staff meet with local drainage district personnel at Refuge	Scoping of issues/opportunity for input into CCP
May 1997	International Migratory Bird Day Open House	Request public input into the Refuge CCP and Yellow River planning efforts
June 1997	Mailing to property owners within a 4-township area, plus over 90 groups with an interest in conservation issues (to approx. 4,200 people and groups)	The Refuge wants your input on the future of Refuge management.
June 1997	Refuge public scoping meetings/open houses (2)	CCP and CCP process. Public input is important
June 1997	Press coverage - Juneau County Star Times	Refuge seeks citizen input
July 1997	Interview - Tomah Tribune	CCP process
July 1997	Interview - WKTY AM 580 (La Crosse)	CCP process
October 1997	Press release	National Wildlife Refuge Week Open House and CCP input opportunity
October 1997	National Wildlife Refuge Week Open House	Request public input into Refuge and Yellow River planning efforts

**Table 16: Summary of Opportunities for Public Involvement in the CCP Process, Necedah NWR (Continued)**

<b>Date</b>	<b>Action or Event</b>	<b>Message</b>
January 1998	Juneau/Adams County interagency meeting	Informed local, state, and federal resource management personnel about the ongoing Refuge CCP planning process
June 1998	Central Wisconsin Basin Partnership (CWBP) meeting	First proposal to adopt the Yellow River as a CWBP project; the Yellow River project was subsequently adopted, and the project was discussed quarterly at meetings thereafter
September 1998	Release of the first draft CCP with cover letter requesting and outlining ways to comment	
September 1998	Press coverage - Tomah Monitor-Herald	Waterfowl hunters criticize Refuge conservation plan and deadline for written comments
September 1998	Letter to the editor - Tomah Monitor-Herald	Response to Tomah Monitor-Herald press coverage
January 1999	Juneau/Adams County interagency meeting	Informed local, state, and federal resource management personnel about the ongoing Refuge planning process
April 1999	Newsletter to 800+ Refuge mailing list	Informed public of CCP availability - postage-paid request for a copy of the CCP was included
April 1999	National Wildlife Week Open House	Yellow River slide show about area and project
July 1999	Newsletter to 800+ Refuge mailing list and at local outlets such as libraries and local businesses	CCP update
August 1999	Contact letter to Yellow River landowners	Informing landowners about the Yellow River Focus Area project and resource management services offered by the Refuge
October 1999	Press release and newsletter to 800+ refuge mailing list and at local outlets such as libraries and local businesses	Requesting historic pictures of the Yellow River area for the Yellow River Focus Area project
December 1999	Press coverage - Juneau County Star Times	Yellow River Focus Area project creates new partnerships
January 2000	Newsletter to 800+ Refuge mailing list and at local outlets such as libraries and local businesses	CCP update
March 2000	Newsletter to 800+ Refuge mailing list and at local outlets such as libraries and local businesses	Advertising Yellow River landowner meetings

**Table 16: Summary of Opportunities for Public Involvement in the CCP Process, Necedah NWR (Continued)**

<b>Date</b>	<b>Action or Event</b>	<b>Message</b>
March 2000	Refuge-hosted Yellow River landowner forum	Discussion about landowner's perspective on the issues and information needs in the Yellow River
March 2000	Letter to Yellow River landowners	Summarizing results of first landowner forum and written assurance that participation with the Service in the Yellow River is voluntary and that the Service will not use eminent domain
April 2000	Refuge-hosted Yellow River landowner forum	Tally of responses collected at last meeting, plus "experts" that could address landowners's questions from last meeting
July 2000	Release of revised CCP draft	
August 2000	Mailing to property owners within a 4-township area, plus over 90 groups with an interest in conservation issues (to approx. 4,200 people and groups)	The Refuge wants your input on the final draft CCP and what comes after the plan's approval
August 2000	Press release	Refuge invites comments on revised plan
September 2000	Press release	Draft plan release and publicizing two public meetings
September 2000	Two public meetings	Inviting public comments and answering questions about the draft CCP
February 2001	Press release	Midwest private landowners to receive grants for conservation actions (Yellow River landowners were recipients of these grants)
March 2001	Juneau/Adams County interagency meeting	Informed local, state, and federal resource management personnel about the ongoing Refuge planning process
March 2001	Letter to the editor - Juneau County Star Times	Necedah NWR staff explain Town of Necedah referendum regarding the Yellow River Focus Area
March 2001	Press coverage - Juneau County Star Times	Yellow River referendum to go before Town of Necedah voters; two informational meetings scheduled at the Necedah Town Hall
March 2001	Four public meetings on Yellow River Focus Area; two hosted by the Town of Necedah, two hosted by the Refuge	Discussion and questions about the Yellow River Focus Area

**Table 16: Summary of Opportunities for Public Involvement in the CCP Process, Necedah NWR (Continued)**

<b>Date</b>	<b>Action or Event</b>	<b>Message</b>
April 2001	Two public meetings - Armenia Town Hall and Finley Town Hall	Discussion and questions about the Yellow River Focus Area
June 2001	Letter to Yellow River landowners	Reiterating the scope of the Yellow River Focus Area project and written assurance that participation in the project is voluntary and that the Service will not use eminent domain
August 2001	Booth at Ducks Unlimited Great Outdoors Festival in Oshkosh	Refuge staff explained CCP and YRFA as well as distributed fact sheets and brochures.
August 2001	Meeting with Wood County Conservation Staff	Discussion of various natural resource management efforts in Wood County including the YRFA
September 2001	Booth at Necedah Whooping Crane Festival	Refuge staff explained CCP and Yellow River FA and handed out fact sheets and brochure.
October 2001	Central Wisconsin Basin Partnership Meeting	Discussion of YRFA with partners and the Wisconsin Cranberry Growers Association.
November 2001	Adams County Holiday Fair	Refuge staff explained CCP and Yellow River FA and handed out fact sheets and brochure and mentioned new comment period.
November 2001	Juneau County Board Meeting	Reminded Board of new comment period.
November 2001	Dexter Town Hall Meeting	Discussed the Refuge and the YRFA project
December 2001	Wisconsin Land and Water Conservation Association Conference	Provided an overview of the CCP
December 2001	Juneau County - Land, Forestry, Parks & Zoning Committee	Discussed potential land acquisition and conservation easements in the YRFA
December 2001	Service staff meet with Town Chairman	Discussed Refuge CCP and Revenue Sharing Payments
December 2001	Service staff meet with State Representative Albers, Lippert, and Schultz	Discussed CCP and the YRFA project

# Chapter 7: Glossary

<i>Alluvial</i>	Of and/or relating to river and stream deposits
<i>Amphibian</i>	A class of carnivorous, ectotherms (body temperature regulated by outside heat sources) whose living members have a moist, glandular skin that is permeable to water and gases. Most amphibians have a well-defined aquatic, larval stage in their life cycle and then undergo metamorphosis into adults. Depending on the species, adults may occupy aquatic or terrestrial habitats. Frogs, toads, and salamanders are examples.
<i>Biological Diversity</i>	The variety of life forms and processes, including the complete natural complex of species, communities, genes, and ecological functions.
<i>Biological Integrity</i>	Biotic composition, structure, and functioning at genetic, organism, and community levels consistent with natural conditions, including the natural biological processes that shape genomes, organisms, and communities.
<i>Biomass</i>	The weight of all life in a specified unit of environment or an expression of the total mass or weight of a given population, both plant and animal.
<i>Bloom</i>	A readily visible concentrated growth or aggregation of plankton (plant and animal).
<i>Community</i>	All the groups of organisms living together in the same area, usually interacting or depending on each other for existence.
<i>Cumulative Effects</i>	Those effects on the environment that result from the incremental effect of the action when added to the past, present, and reasonable foreseeable future actions regardless of what agency (Federal or nonfederal) or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time.
<i>Dissolved Oxygen</i>	Amount of oxygen dissolved in water.
<i>Drainage Basin</i>	An area mostly bound by ridges or other similar topographic features, encompassing part, most, or all of a watershed.

<i>Ecology</i>	The study of the relations between organisms and the totality of the biological and physical factors affecting them or influenced by them.
<i>Ecological Integrity</i>	The integration of biological integrity, natural biological diversity, and environmental health; the replication of natural conditions.
<i>Ecosystem</i>	An ecological system; the interaction of living organisms and the nonliving environment producing an exchange of materials between the living and nonliving.
<i>Ecosystem Approach</i>	A strategy or plan to manage ecosystems to provide for all associated organisms, as opposed to a strategy or plan for managing individual or clusters of species.
<i>Ecosystem Management</i>	Management of an ecosystem that includes all ecological, social, and economic components which make up the whole of the system.
<i>Effects</i>	Effects, impacts, and consequences, as used in the environmental assessment, are synonymous. Effects may be direct, indirect, or cumulative.
<i>Endangered Species</i>	Any species of plant or animal defined through the Endangered Species Act as being in danger of extinction throughout all or a significant portion of its range, and published in the Federal Register.
<i>Environmental Analysis</i>	An analysis of alternative actions and their predictable short-term and long-term environmental effects, incorporating physical, biological, economic, and social considerations.
<i>Environmental Assessment</i>	A systematic analysis of site-specific or programmatic activities used to determine whether such activities have a significant effect on the quality of the physical, biological, and human environment and whether a formal environmental impact statement is required; and to aid an agency's compliance with the National Environmental Policy Act when no environmental impact statement is necessary.
<i>Environmental Health</i>	Abiotic composition, structure, and functioning of the environment consistent with natural conditions, including the natural abiotic processes that shape the environment.
<i>Eutrophication</i>	The intentional or unintentional enrichment of water.
<i>Fauna</i>	All the animals of a particular region or a particular era.
<i>Flora</i>	All the plants of a particular region or a particular era.
<i>Food Chain</i>	The dependence of organisms upon others in a series of food. The chain begins with plants or scavenging organisms and ends with the largest carnivores.
<i>Goals</i>	Broad statements of direction; end results or positions to be achieved.

<i>Hardness</i>	A measurement of the content of dissolved calcium and magnesium in water.
<i>Hydrology</i>	The science of water in the hydrological cycle, the sun-driven movement of water between aquatic and terrestrial environments and the atmosphere, including evapotranspiration, condensation, precipitation, and runoff.
<i>Impoundment</i>	A natural or artificial body of water that is held back by a dam.
<i>Interdisciplinary Team</i>	A group of individuals with varying areas of expertise assembled to solve a problem or perform a task. The team is assembled out of recognition that no one scientific discipline is sufficiently broad enough to adequately analyze the problem and propose action.
<i>Invertebrate</i>	An animal without a backbone or internal bony skeleton. Insects, crustaceans, worms, corals, and molluscs are examples.
<i>Mesic</i>	Describing an environment having moderate rainfall and moderately moist, well-drained soils. Mesic plants are those that require moisture.
<i>Monitoring</i>	A process of collecting information to evaluate if an objective and/or anticipated or assumed results of a management plan are being realized (effectiveness monitoring) or if implementation is proceeding as planned (implementation monitoring).
<i>National Environmental Policy Act</i>	An Act passed by the U.S. Congress in 1969 to declare a national policy that encourages productive and enjoyable harmony between humankind and the environment, promotes efforts that prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of humanity, enriches the understanding of the ecological systems and natural resources important to the nation, and establishes a Council on Environmental Quality.
<i>Natural Conditions</i>	Conditions thought to exist from the end of the Medieval Warm Period to the advent of the industrial era (app. 950AD to 1800AD), based upon scientific study and sound professional judgement.
<i>Objectives</i>	Intermediate-term targets necessary for the satisfaction of Refuge goals; quantifiable measures that serve as indicators against which attainment, or progress toward attainment, of goals can be measured.
<i>pH</i>	A measure of the relative concentration of hydrogen ions in a solution; indicating the acidity or alkalinity of the solution. A pH value of 7 indicates a neutral solution; values that are greater than 7 are basic, and those below 7 are acidic. Vinegar has a pH of 3; ocean water has a pH of approximately 8.
<i>Reptile</i>	A class of vertebrates whose skin is dry, lacking in glands, and covered with scales. Claws are present and skull, limb bones, vertebrae, muscles, and so forth are stronger and more advanced

than those of amphibians. Egg fertilization is internal, there is no larval stage, and eggs have a protective, hard shell.

<i>Riparian Area</i>	A geographic area containing an aquatic ecosystem and the adjacent upland areas that directly affects it. This includes floodplain, and associated woodland, rangeland, or other related upland areas. Pertaining to the banks of streams, lakes, wetlands, or tidewater.
<i>Riparian Zones</i>	Terrestrial areas where the vegetation complex and micro-climate conditions are products of the combined presence and influence of perennial and/or intermittent water; associated high water tables, and soils that exhibit some wetness characteristics. Normally used to refer to the zone within which plants grow rooted in the water table of rivers, streams, lakes, ponds, reservoirs, springs, marshes, seeps, bogs, and wet meadows.
<i>Savanna</i>	A community that was historically bordered by the prairies of the west and the deciduous forests of the east. It is a community type that falls in the middle of a continuum from prairie to forest. Savannas characteristically have less than 50 percent tree crown cover.
<i>Sedge</i>	A grass-like plant, usually having a three-sided stem and clearly three-ranked leaves. The pistil, a female flower part, is surrounded by a sac-like or flask-shaped structure called the <i>perygynium</i> .
<i>Sedimentation</i>	The settling-out or deposition of suspended materials.
<i>Sensitive Species</i>	Those plant or animal species for which population viability is a concern as evidence by a significant current or potential downward trend in population numbers, distribution, density, or habitat capability.
<i>Species Richness</i>	The number of different species in a given area.
<i>Stakeholder</i>	Any group or individual who is affected by or who can affect the future of the Refuge.
<i>Step-Down Management Plans</i>	Tactical plans that describe in detail specific strategies and implementation schedules for management functions (e.g., habitat management, public use, fire, safety, etc.).
<i>Strategic Framework</i>	A pattern of purposes, policies, programs, actions, decisions, or resource allocations that describe what the Refuge is, what it does, and why it does it.
<i>Strategies</i>	Step-down approaches that could be used to meet Refuge goals and objectives; provide direction for defining and coordinating operational tasks to effectively perform the Refuge's purpose.
<i>Succession</i>	A gradual change from one community to another and characterized by a progressive change in species structure, an increase in biomass

and organic matter accumulation, and a gradual balance between community production and community respiration.

<i>Threatened Species</i>	Those plant or animal species likely to become endangered species throughout all or a significant portion of their range within the foreseeable future. A plant or animal identified and defined in accordance with the 1973 Endangered Species Act and published in the Federal Register.
<i>Total Dissolved Solids</i>	A measure of the total quantity of dissolved substances contained in water or effluent, including organic matter, minerals, and other inorganic substances.
<i>Viable Population</i>	A viable population is one which has such numbers and distribution of reproductive individuals as to provide a high likelihood that a species will continue to exist and be well-distributed throughout its range.
<i>Warm Season Grasses</i>	A grass that grows most during the warmest seasons of the year.
<i>Watershed</i>	The drainage basin contributing water, organic matter, dissolved nutrients, and sediments to a water body.
<i>Watershed Analysis</i>	A systematic procedure for characterizing watershed and ecological processes to meet specific management and social objectives. Watershed analysis is a stratum of ecosystem management planning applied to watersheds.
<i>Watershed Restoration</i>	Actions taken to improve the current conditions of a watershed to restore degraded habitat, and to provide long-term protection to natural resources, including riparian, terrestrial, and aquatic resources.
<i>Watershed Treatments</i>	Specific actions or tools to satisfy the goals and objectives of a watershed project. These may include establishing permanent vegetation on sensitive areas within the watershed (riparian buffers, stream bank stabilization, erosion-prone areas); establishing permanent wildlife habitat for dependent species (warm/cool season grasses, wetlands, sediment retention, erosion, or water control structure basins, field/farmstead windbreaks, shelter rows, and winter food plots); and encouraging Best Management Practices (BMP's) on agricultural lands (strip-cropping systems, terraces, diversions, contour farming, cropland protective cover, conservation tillage, feedlot and manure management).

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