U.S. Fish & Wildlife Service

# Illinois River

## *National Wildlife and Fish Refuges Complex*

# Comprehensive Conservation Plan and Environmental Assessment

**The mission of the U.S. Fish & 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 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 the fish, wildlife and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.
*Mission of the National Wildlife Refuge System*

Comprehensive Conservation Plans provide long-term guidance for management decisions; set forth goals, objectives and strategies needed to accomplish refuge purposes; and, identify the Fish and Wildlife Service's best estimate of future needs. These plans detail program planning levels that are sometimes substantially above current budget allocations and, as such, are primarily for Service strategic planning and program prioritization purposes. The plans do not constitute a commitment for staffing increases, operational and maintenance increases, or funding for future land acquisition.

**Cover Photograph: U.S. Fish & Wildlife Service**

# Illinois River

*National Wildlife and Fish Refuges Complex*

**Comprehensive Conservation Plan Approval**

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# Chapter 1: Introduction and Background

## 1.1 Introduction

The Illinois River National Wildlife and Fish Refuge Complex stretches along 124 miles of the Illinois River in west central Illinois (Figure 1). The Complex includes three refuges: Meredosia National Wildlife Refuge (NWR), Chautauqua NWR and Emiquon NWR. The three refuges, which together total 12,163 acres, are a mix of backwater lakes, bottomland forests, floodplain wetlands and a small amount of upland forest and prairie.

The Refuge Complex provides habitat for between 60 percent and 70 percent of the waterfowl that migrate along the Illinois River and has been designated as an "Important Bird Area" and accepted into the "Western Hemisphere Shorebird Reserve Network." In addition to being important to migratory birds, the refuges' backwater lakes serve as spawning and nursery habitat for a highly productive river fishery.

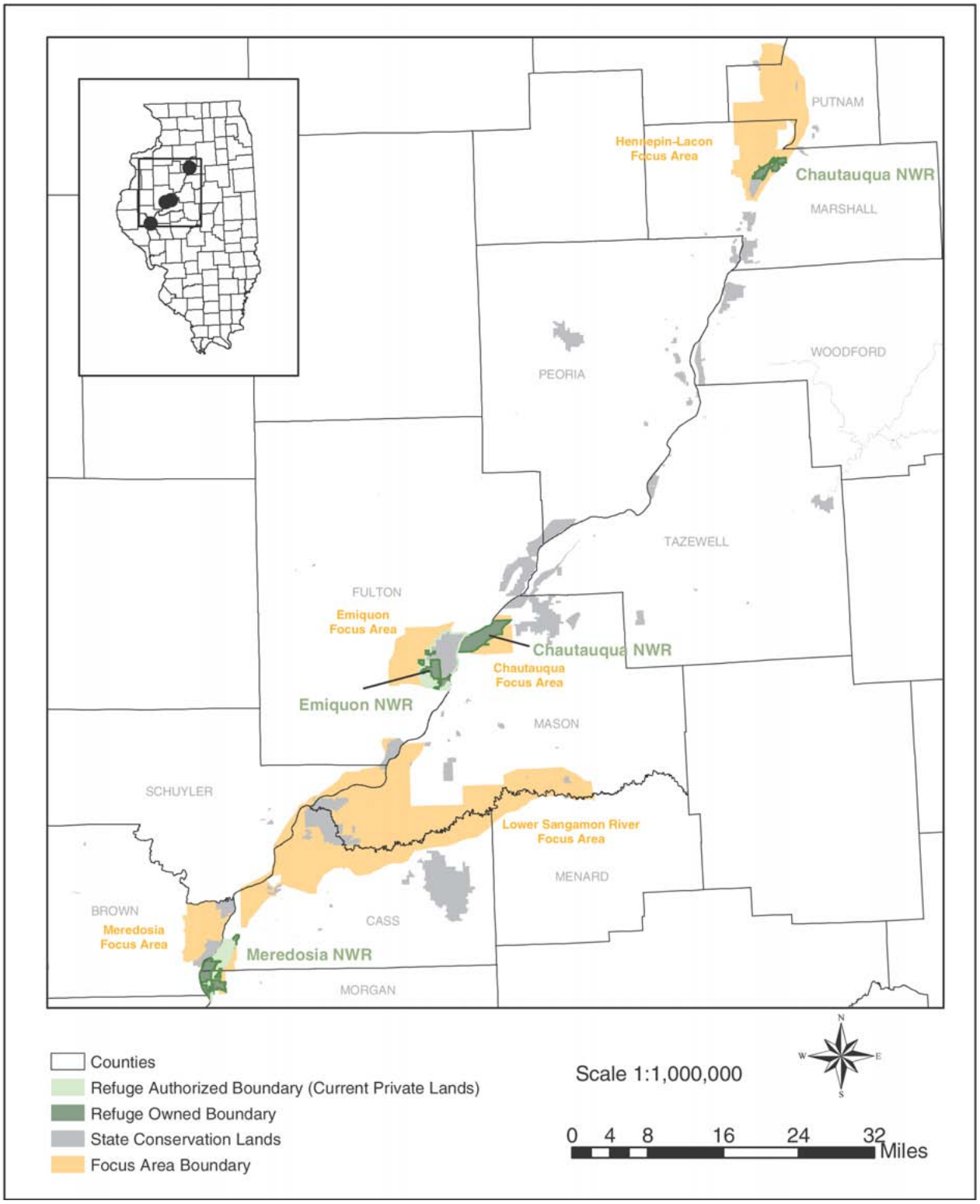
## 1.2 History and Establishment

### 1.2.1 Chautauqua National Wildlife Refuge

Located along the Illinois River from river mile 124 to 129 in Mason County, Chautauqua NWR is 4,488 acres in size. The Refuge serves as the headquarters for the Complex and also manages the Cameron-Billsbach Division, which is located in Marshal County between Sparland and Henry, Illinois. The 4,488-acre refuge includes roughly 3,250 acres of backwater lake, 930 acres of bottomland hardwoods, and 320 acres of woodlands and prairie.

The area was one of many floodplain wetlands along the Illinois River that was diked and drained for crop production in the 1920s. Shortly after the area was acquired by the federal government, dikes were repaired and water control structures constructed to allow for flood control and management. By the late 1930s, water levels in the area could be managed during moderate to low river stages. As a result, waterfowl food plants such as long-leaf pondweed and coontail were abundant in the lake during 1939 and 1940, as was waterfowl use. In 1939, 500,000 Mallards were recorded on the area during fall migration. Those num-

**Figure 1: Illinois River National Wildife and Fish Refuges**



bers increased to 1,050,540 in 1943, and in 1945 the number of Mallards using the area reached an all-time high of 1,500,000. Diving duck use of the area was also common.

During the 1990s, Chautauqua NWR was rehabilitated to a functioning backwater lake, bottomland forest, and floodplain wetland complex through force account and contract efforts of the Fish and Wildlife Service and through the Environmental Management Program of the Corps of Engineers. The water management system allows Refuge Complex staff to mitigate some of the human induced impacts associated with navigation, the diversion of Lake Michigan water down the Illinois River, and conversion of the tallgrass prairie and wetlands to cropland production and other uses. These factors have artificially eliminated the historic dry season associated with the river and its floodplain due to a 4-foot increase in average low water levels and irregular and abrupt spikes in river levels. Refuge Complex personnel approximate the historic hydrograph using a series of low level levees, spillways, and water control structures to mimic the historical flood cycle, especially during spring fish migration and the summer dry period.

The Cameron-Billsbach Division (a unit of Chautauqua NWR) is located in Marshal County, between Sparland, Illinois, and Henry, Illinois. The Cameron-Billsbach Division is bisected by the Illinois River creating two separate areas – the Cameron Unit and Billsbach Unit. They extend from river mile 192 to 195 and are 64 miles up river from the Refuge Headquarters. The purpose of each unit is to serve as an inviolate sanctuary for migratory birds. The Illinois Department of Natural Resources Sparland Conservation Area is contiguous to the south boundary.

The Cameron unit includes 1,064 acres of backwater lake habitat, 634 acres of bottomland hardwood forest, and 10 acres of upland forest. The unit includes the 177-acre Cameron Research Natural Area, which was established in 1972. The late Judge Glen J. Cameron of Pekin, Illinois, donated the land to create the Cameron Unit on May 17, 1958. The unit supports a population of decurrent false aster plants and has a Bald Eagle nest. Waterfowl peak numbers commonly exceeded 50,000 birds in the fall but declined precipitously after 1973 because of habitat degradation.

The 1,072-acre Billsbach Unit is located along the east side of the Illinois River and joins the center portion of Billsbach Lake. The Illinois Chapter of the Nature Conservancy purchased the land from the Armour Hunt Club and then sold the land to the Fish and Wildlife Service on December 22, 1981, for $30,000. The Billsbach unit supports an active Bald Eagle nest (probably the same pair that build a nest on the Cameron Unit). Billsbach Lake is badly degraded because of excessive sedimentation and continuous resuspension of silt by wind, tows, and exotic fish.

### 1.2.2 Meredosia National Wildlife Refuge

Meredosia NWR is located in Cass and Morgan counties within the Illinois River floodplain in the upper end of Alton Pool and extending from river mile 71.5 on the south to river mile 76.7 to the north. The Refuge presently owns and manages 3,852 acres of land within the approved 5,255-acre boundary. Meredosia Lake is a meandered lake and, therefore, is under the control of the Illinois Division of Water Resources. The Illinois Department of Natural Resources manages waterfowl hunting and fishing on Meredosia Lake.

Much of what is now the Meredosia National Wildlife Refuge was previously owned and managed by the Chicago Meredosia Gun Club (Club), which was responsible for developing the area for waterfowl management through the construction of levees, water control structures, and a network of ditches needed to transport water to backwater sloughs and small impoundments. The area was later purchased by a club member, Mr. James Anderson, who stipulated in his will that upon his death, the Club and its belongings would be donated to a conservation agency for management. In May 1972, the Anderson estate donated 1,780 acres to The Nature Conservancy for ultimate management by the Service. On May 9, 1973, The Nature Conservancy deeded the property to the Service. However, at the request of Mr. Anderson, deed restrictions would encumber the land to ensure perpetual protection. These include:

1) The area shall not be used for hunting except that deemed necessary for proper management of the waterfowl resource;

2) Cutting of timber from the area shall not be undertaken except that deemed necessary for wildlife and habitat improvement; and

3) Public use of the area shall not include motorized vehicles, except upon roads authorized for public use.

Meredosia NWR is a backwater lake component of the Illinois River floodplain. There are currently eight small impoundments with associated levees, ditches, and water control structures on the Refuge. The impoundments range in size from 4 to 20 acres in size and are primarily managed for moist soil vegetation. Controlled flooding of impoundments is conducted by pumping from the river or Meredosia Lake. There are roughly 5.2 miles of river bank habitat.

### 1.2.3 Emiquon National Wildlife Refuge

Emiquon NWR is located along the Illinois River at river mile 121 in Fulton County. As of April 2002, the Service owned and managed 2,114 acres of land within the 11,122-acre authorized boundary. Approximately 90 percent of the land within the area where the Service is authorized to purchase land, or authorized boundary, is cropland. However, the partnership restoration of wetlands and associated upland habitats should result in a highly productive, functioning system to support historical biological diversity for the enjoyment and use by American people.

Historically two backwater lakes (Thompson Lake with 1,800 acres and Flag Lake with 1,000 acres) provided excellent habitat for migratory birds, fish, and resident wildlife. Nearly the entire Thompson Lake Drainage District was owned by Wilder Farms. The Nature Conservancy purchased Wilder Farms in 2000 and now owns 7,063 acres within the acquisition boundary for Emiquon NWR. Most of the land within the acquisition boundary was ditched, cleared, leveed, tiled, and pumped in the early 1900s to facilitate row crop agriculture. Because of the levees, Thompson Lake and Flag Lake basins have not been subjected to heavy annual sedimentation and contaminants as most other backwater lakes along the Illinois River. Restoration of clearwater aquatic habitat approximating original depths and contours is possible without substantial dredging or earth moving. Public involvement, detailed hydrologic, engineering, and environmental data will be required for specific site planning and development. The Nature Conservancy

is developing plans for restoration of the Wilder Farms property. Wilder Farms retained farming rights through 2002. The Conservancy cash-rented the farm ground in 2003 and 2004. Restoration of Thompson and Flag lakes will begin in 2005.

Following restoration of the wetlands on Service-owned lands, water levels will be managed to provide conditions essential for sustaining the diverse plant and animal communities that existed prior to the devastating human induced impacts on the watershed and river ecosystem. This will require maintaining levees, water control facilities, and management of water levels to simulate hydrologic conditions prior to the 1900s and to protect the wetland areas from the effects of unnatural hydrology, sedimentation, contamination, and non-native species. The Globe Drainage District lands could be opened for spring flooding to provide river fish spawning and nursery habitat while managed as an open marsh.

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

The U.S. Fish and Wildlife Service (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 of more than 530 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 the 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 at facilities across the country, with a headquarters in Washington D.C., seven geographic regions, and nearly 700 field units.

The Illinois River National Wildlife and Fish Refuge Complex 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.

### 1.3.1 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.

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

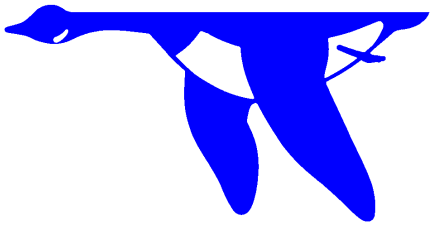
*Sustainability of Fish and Wildlife Populations:* Migratory birds, endangered fish and wildlife species, interjurisdictional fish, and marine mammals are conserved, protected, enhanced, or restored. The Service is participating in conservation of other species when its expertise, facilities, or land can enhance state, tribal, or local efforts.

*Habitat Conservation:* Network of Lands and Waters: An ecologically diverse network of lands and waters, of various ownerships, is conserved to provide habitats for marine mammals and migratory, interjuristictional, 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.

## 1.3.3 The National Wildlife Refuge System



America's 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 540 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 United States and several U.S. territories. Like Pelican Island, many early wildlife refuges were created for herons, egrets, and other water birds. Other refuges were set aside for large mammals like elk and bison. However, most national wildlife refuges were created to protect waterfowl. This is a result of the United States' responsibilities under international treaties for migratory bird conservation and legislation such as the Migratory Bird Conservation Act of 1929. Refuges dot the map along the four major "flyways" that waterfowl follow from their northern nesting grounds to southern wintering areas.

National wildlife refuges play a vital role in preserving endangered and threatened species and their habitat. Among these are Aransas National Wildlife Refuge in Texas, the winter home of the Whooping Crane; the Florida Panther National Wildlife Refuge, which protects one of the Nation's most endangered mammals; and the Necedah National Wildlife Refuge, which provides critical habitat for the federally-listed endangered Karner blue butterfly.

### 1.3.3.1 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

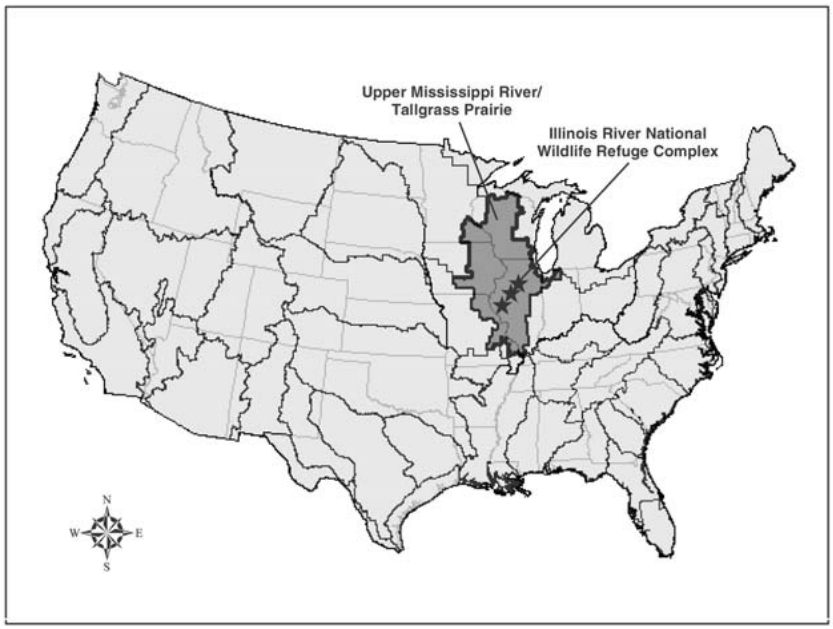
appropriate, restoration of fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

#### 1.3.3.2 Goals of the National Wildlife Refuge System

The administration, management, and growth of the System are guided by the following goals:

- To fulfill our statutory duty to achieve refuge purpose(s) and further the System mission.
- To conserve, restore where appropriate, and enhance all species of fish, wildlife, and plants that are endangered or threatened with becoming endangered.
- To perpetuate migratory bird, interjurisdictional fish, and marine mammal populations.
- To conserve a diversity of fish, wildlife, and plants.
- To conserve and restore where appropriate representative ecosystems of the United States, including the ecological processes characteristic of those ecosystems.
- To foster understanding and instill appreciation of native fish, wildlife, and plants, and their conservation, by providing the public with safe, high-quality, and compatible wildlife-dependent public use. Such use includes hunting, fishing, wildlife observation and photography, and environmental education and interpretation.

**Figure 2: Illinois River Basin Within Upper Mississippi River/ Tallgrass Prairie Ecosystem**




## 1.4 Upper Mississippi River/Tallgrass Prairie Ecosystem

The Refuge Complex lies within the Upper Mississippi River/Tallgrass Prairie Ecosystem, one of eight ecosystems managed by Region 3 of the U.S. Fish and Wildlife Service (Figure 2). The Ecosystem is a large and ecologically diverse area that encompasses land in the states of Illinois, Iowa, Minnesota, Missouri, and Wisconsin. Six ecotypes are focus areas for this ecosystem. The Refuge Complex lies within the Mississippi River Corridor ecotype. The Upper Mississippi River and tributary corridors provide the largest area of contiguous fish and wildlife habitat remaining in the Central United

States. The Mississippi River and the tributaries have always provided an important haven and migration route for fish and wildlife, but because of the continuing loss of wetlands, loss of forests, expansion of urban and agricultural areas, navigation, and channelization of many rivers, its importance has greatly increased in recent history.

The goals for the Upper Mississippi River/Tallgrass Prairie Ecosystem are:

Goal 1: Protect, restore, and enhance populations of native and trust species and their habitats.

Goal 2: Restore natural ecosystem processes, including hydrology and sediment transport to maintain species and habitat diversity.

Goal 3: Promote environmental awareness of the ecosystem and its needs with emphasis on sustainable land use management.

Goal 4: Identify water quality problems affecting native biodiversity and habitat of trust species.

Goal 5: Reduce conflicts between fish and wildlife needs and other uses.

# 1.5 Goals and Objectives for Other Landscape Level Plans

## 1.5.1 Migratory Bird Conservation Initiatives

Over the last decade, bird conservation planning has become increasingly exciting as it has evolved from a largely local, site-based focus to a more regional, landscape-oriented perspective. Significant challenges include locating areas of high quality habitat for the conservation of particular guilds and priority bird species, making sure no species are inadvertently left out of the regional planning process, avoiding unnecessary duplication of effort, and identifying unique landscape and habitat elements of particular tracts targeted for protection, management and restoration. Several migratory bird conservation initiatives have emerged to help guide the planning and implementation process. Collectively, they comprise a tremendous resource as refuges engage in comprehensive conservation planning and its translation into effective on the ground management.

*The North American Waterfowl Management Plan*
Signed in 1986, the North American Waterfowl Management Plan (NAWMP) outlines a broad framework for waterfowl management strategies and conservation efforts in the United States, Canada, and Mexico. The goal of the NAWMP is to restore waterfowl populations to historic levels. The NAWMP is designed to reach its objectives through key joint venture areas, species joint ventures, and state implementation plans within these joint ventures.

The Refuge Complex is found within the Upper Mississippi River and Great Lakes Joint Venture area of the NAWMP – Illinois River Focus Area and contributes to the achievement of waterfowl objectives outlined in the Imple-

mentation Plan for this area. One of 12 habitat based joint ventures, this Joint Venture encompasses the states of Michigan and Wisconsin in their entirety, plus portions of Minnesota, Iowa, Nebraska, Kansas, Missouri, Illinois, Indiana and Ohio. The goal of this Joint Venture is to increase populations of waterfowl and other wetland wildlife by protecting, restoring and enhancing wetland and associated upland habitats within the Joint Venture region.

The objectives of this Joint Venture are:

Objective 1: Conserve 9,118,884 acres of habitat capable of supporting an annual breeding duck population of 1,542,000, under average environmental conditions, by the year 2013.

Objective 2: Conserve 532,711 acres of habitat on migration focus areas capable of supporting 266 million duck use days during annual fall migration, under average environmental conditions, by the year 2013.

Objective 3: When consistent with Objectives 1 and 2, contribute to the protection and/or increase of habitats for wetland and associated upland wildlife species in the Joint Venture, with emphasis on declining non waterfowl migratory birds.

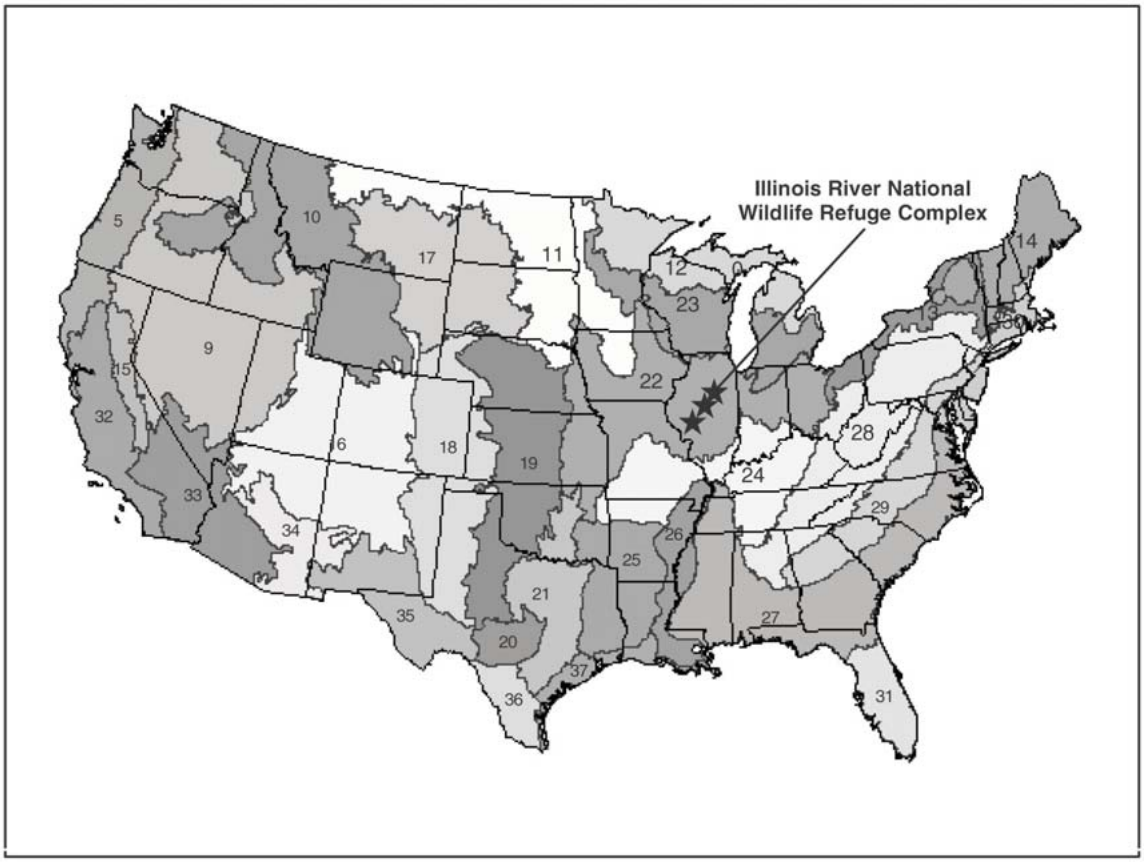
*Partners In Flight*
Formed in 1990, Partners in Flight (PIF) is concerned with most landbirds and other species requiring terrestrial habitats. Partners in Flight has developed Bird Conservation Plans for numerous Physiographic Areas across the U. S. (see http://www.partnersinflight.org). These plans include priority species lists, associated habitats, and management strategies.

The U. S. Shorebird Conservation Plan and the North American Waterbird Conservation Plan address the concerns for shorebird and waterbirds. These larger scale plans identify priority species and conservation strategies.

In a continental effort, the Partners in Flight, North American Waterfowl Management, U. S. Shorebird Conservation, and the North American Waterbird Conservation plans are being integrated under the umbrella of the North American Bird Conservation Initiative (NABCI). The goal of NABCI is to facilitate the delivery of the full spectrum of bird conservation through regionally based, biologically driven, landscape oriented partnerships (see http://www.dodpif.org/nabci/index.htm). The NABCI strives to integrate the conservation objectives for all birds in order to optimize the effectiveness of management strategies. NABCI uses Bird Conservation Regions (BCRs) as its planning units. Bird Conservation Areas are becoming increasingly common as the unit of choice for regional bird conservation efforts. The Refuge Complex lies within Eastern Tallgrass Prairie (BCR 22).

Each of the four bird conservation initiatives has a process for designating conservation priority species, modeled to a large extent on the PIF method of calculating scores based on independent assessments of global relative abundance, breeding and wintering distribution, vulnerability to threats, area importance (at a particular scale, e.g. physiographic area or BCR), and population trend. These scores are often used by agencies in developing lists of bird species of concern; e.g., the U. S. Fish and Wildlife Service based its assessments for its 2002 list of nongame Birds of Conservation Concern primarily on the Partners in Flight, shorebird, and waterbird status assessment scores.

**Figure 3: North American Bird Conservation Initiative-designated Bird Conservation Regions**




## 1.5.2 Region 3 Fish and Wildlife Resource Conservation Priorities

The Resource Conservation Priorities list is a subset of all species that occur in the Region and was derived from an objective synthesis of information on their status. The list includes all federally listed threatened and endangered species and proposed and candidate species that occur in the Region, migratory bird species derived from Service wide and international conservation planning efforts, and rare and declining terrestrial and aquatic plants and animals that represent an abbreviation of the Endangered Species program's preliminary draft "Species of Concern" list for the Region.

Although many species are not included in the priority list, this does not mean that we consider them unimportant.

The list includes 129 species or populations for the Service's Upper Mississippi River/Tallgrass Prairie Ecosystem (Appendix I).

## 1.6 Purposes of the Refuges

The purpose for which a national wildlife refuge is established provides the basic framework for developing management direction for the refuge. It is within the guidelines of the refuge purpose that management functions are developed from and from which appropriate uses and facilities can be determined.

Chautauqua NWR was established by Executive Order 7524 on December 23, 1936, which authorized the Federal government (U.S. Biological Survey) to purchase land owned by the former Chautauqua Drainage and Levee District (District). Under that order, the purpose of Chautauqua NWR is defined as: "... as a refuge and breeding ground for migratory birds and other wildlife." (Executive Order 7524) Under the Migratory Bird Conservation Act, the Refuge's purpose is: "... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." (Migratory Bird Conservation Act)

Meredosia NWR was established in 1973 under the authority of the Migratory Bird Conservation Act of 1929. Under that Act, the purpose is defined as "...for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." (Migratory Bird Conservation Act) Under the Refuge Recreation Act, the Refuge's purpose further states: "...suitable for 1) incidental fish and wildlife-oriented recreational development, 2) the protection of natural resources, 3) the conservation of endangered species or threatened species...the Secretary...may accept and use...real..property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors..." (Refuge Recreation Act)

Emiquon NWR was established under the Emergency Wetlands Resources Act of 1986 and the purchase of the first tract of 283.71 acres occurred on December 29, 1993. The purpose the Emiquon NWR is for "...the conservation of the wetlands of the nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions."

## 1.7 Refuge Complex Vision Statement

The vision for the future of the Illinois River Complex of Refuges is:

Illinois River National Wildlife and Fish Refuge Complex is a wild and thriving place where abundant grasslands and savannas, bottomland forests, and backwater lakes support diverse and productive populations of plants and animals. With numerous opportunities to learn about and utilize its resources, the Refuge Complex serves as a regional and national destination for visitors seeking high quality educational and recreational experiences. Through outreach with others, the Refuge Complex has expanded the publics understanding and appreciation of Illinois River fish and wildlife resources, and in doing so, has perpetuated these resources within the communities surrounding the Refuge Complex.

## 1.8 Purpose of and Need for the Plan

This Comprehensive Conservation Plan, CCP or "Plan," identifies the role the Refuge Complex will play in supporting the mission of the National Wildlife Refuge System and provides guidance for Refuge management. The Plan articulates management goals for the next 15 years and specifies objectives and strategies that will achieve these goals. Congress mandated that the Service would prepare CCPs for every national wildlife refuge within the NWRS in the National Wildlife Refuge System Improvement Act of 1997. Legislative mandates and other policies, including the National Wildlife Refuge Improvement Act of 1997, have guided the development of this plan. These mandates include:

- Wildlife has first priority in the management of refuges.
- Wildlife-dependent recreation activities, namely hunting, fishing, wildlife observation, wildlife photography, environmental education and interpretation are priority public uses of refuges. We will facilitate these activities when they do not interfere with our ability to fulfill the Refuge's purpose or the mission of the Refuge System.
- Other uses of the Refuge will only be allowed when determined appropriate and compatible with Refuge purposes and mission of the Refuge System.

The plan will guide the management of Illinois River National Wildlife and Fish Refuges Complex by:

- Providing a clear statement of direction for the future management of the Refuge Complex.
- Making a strong connection between Refuge activities and those activities that occur off-Refuge.
- Providing Refuge Complex neighbors, users, and the general public with an understanding of the Service's land acquisition and management actions on and around the refuges.
- Ensuring that Refuge Complex actions and programs are consistent with the mandates of the National Wildlife Refuge System.
- Ensuring that Refuge Complex management is consistent with federal, state, and county plans.
- Establishing long-term continuity in Refuge Complex management.
- Providing a basis for the development of budget requests on the refuges' operational, maintenance, and capital improvement needs.

## 1.9 Existing Partnerships

The Refuge Complex continues to serve as a leader, facilitator and source of information for a variety of natural resource initiatives or issues to enhance the quality and quantity of fish and wildlife habitats along the Illinois River. These include efforts such as serving on the Illinois River Coordinating Council, serving as the leader of the Illinois River Focus Team of the Midwest Natural Resources Work Group, serving on the executive board of the Upper Mississippi River/Tall Grass Prairie Ecosystem Team, serving as a member of the planning team for the 2005 Governors Conference on the Illinois River and working closely with partners and support groups such as Ducks Unlimited, The Nature Conservancy, Friends of the Illinois River and others.

The Illinois River NWR Complex is also working with ecosystem partners and other local, state, and federal organizations to restore the Illinois River watershed by various enhancement projects to slow siltation and promote a system of highly diverse and healthy habitats. Two excellent examples are the Department of Agriculture's Conservation Reserve Enhancement Program and the Illinois Department of Natural Resource's Illinois River 2020 Initiative.

The North American Waterfowl Management Plan is a partnership effort to restore waterfowl populations to historic levels, with objectives and strategies evolving through North American Waterfowl Management Plan Updates. The Illinois River NWR Complex is found within the Upper Mississippi River and Great Lakes Joint Venture area of the Plan and contributes to the achievement of waterfowl objectives outlined in the implementation plan for this area.

The Refuges' Partners for Fish and Wildlife Program provides technical assistance and cost sharing to complete habitat restoration or enhancement projects provided that the land owner agrees to maintain the project for a period of 10 years or more. The program focuses on restoring and enhancing habitats that provide wildlife, fisheries, water quality, aesthetic, and recreation benefits. The Illinois River Private Lands District covers 11 counties and includes working with 365 hunt clubs encompassing 34,000 acres along the Illinois River. Over the past 10 years, roughly 6,000 acres of habitat have been restored by the Service in Illinois River Focus Areas through partnership efforts. Other agencies provide invaluable contributions in research, restoration, protection and maintenance of wildlife habitat. Partnerships with private groups greatly enhance public investment in the Refuge Complex, building enthusiasm for its mission and support in funding issues. The Refuge Complex has established partnerships with the U.S. Army Corps of Engineers, the Illinois Department of Natural Resources, the Illinois Natural History Survey, the Forbes Biological Station, and several other notable conservation interests, including:

- Private landowners
- The Wetland Initiative
- Ducks Unlimited
- Refuge volunteers
- Pheasants Forever
- The Nature Conservancy
- The Izaak Walton League of America
- The Natural Resources Conservation Service

- Soil and Water Conservation Districts
- Rural Fire Districts

## 1.10 Legal and Policy Guidance

Management and administration of the Refuge Complex is accomplished in accordance with authority delegated by Congress and interpreted by regulations and guidelines established in accordance with such delegations. In addition to the legislation establishing each individual refuge and the National Wildlife Refuge System Improvement Act of 1997, numerous other federal laws, executive orders, and regulations govern the management and administration of the Refuge Complex. See Appendix E for a complete list.

# Chapter 2: The Planning Process

This Comprehensive Conservation Plan (CCP) and associated EA were prepared in compliance with the National Wildlife Refuge System Improvement Act of 1997, the National Environmental Policy Act of 1969, and Service policy set forth in the Departmental Manual on National Wildlife Refuge System Planning (part 602 FW 1).

The planning area used for this CCP spanned the Illinois River Corridor from roughly Hennipen, Illinois, downstream to Meredosia, Illinois. Management direction was developed for land within the authorized boundaries of the refuges within the Illinois River National Wildlife and Fish Refuge Complex and associated land within the Illinois River Corridor.

## 2.1 Meetings and Other Forums

This planning project was launched with public meetings aimed at giving neighbors, the community, state and local government, and state and federal agencies an opportunity to describe the issues they believe should be addressed in long-term planning. Public meetings were held between April 19-21, 1999, in the communities of Meredosia, Henry and Lewistown, Illinois, to solicit public comment on refuge planning. Refuge staff have met with the Illinois Division of Water Resources, the Illinois Department of Natural Resources, and several non-government organizations. Staff have participated in several technical groups and have met with local organizations. Refuge staff and planners hosted a public meeting at the Dickson Mounds Museum to discuss the CCP. In addition, Refuge staff and planners have asked for regional office comment on the issues that should be considered in planning.

The Draft Comprehensive Conservation Plan was released for public review in September 2003. The Service asked that comments be returned by October 20, 2003. Three open house meetings were conducted to give people interested in the future of the Refuge Complex a chance to speak directly with Refuge staff and Service planners. These meetings were conducted on September 23, 2003, in Meredosia, Illinois; September 24, 2003, in Lewistown, Illinois; and September 25, 2003, in Henry, Illinois.

A summary of the comments received on the draft plan and how Refuge staff and Service planners responded to the comments is included in Appendix K.

## 2.2 Planning Issues and Concerns

The following paragraphs briefly describe the issues and concerns we heard in the scoping process when the planning project began.

### 2.2.1 Wildlife Management Issues and Concerns

- Protection of endangered and threatened species and restoring them to secure status in the wild. Federally listed species found on the Refuge Complex or species that could be candidates for reintroduction on Refuge Complex land include three threatened plants (Decurrent false aster, Mead's milkweed, and prairie white-fringed orchid); one endangered mollusk (Higgin's eye pearlymussel); one endangered bird (Least Tern), one threatened bird (Bald Eagle), and one endangered mammal (Indiana bat).

- Twenty-eight species of waterfowl are known to use the Refuge Complex, including Trumpeter and Tundra swans. The north and south pools of Lake Chautauqua provide prime habitat for diving ducks and dabbling ducks. Chautauqua NWR in particular provides a haven for more than 40 percent of the waterfowl that use the Illinois River segment of the Mississippi River flyway. Maintaining its major role in supporting waterfowl of the Mississippi River flyway since its inception is a concern for the Refuge Complex.

- Habitat loss and degradation have been identified as crucial factors in the decline of many grassland bird species.

- Habitat fragmentation increases the rate of predation and brood parasitism among bird species along the Illinois River.

- Approximately 102 species of fish, 37 species of mollusks, and 10 species of crustaceans have been collected within the vicinity of the Refuge Complex (Appendix C), including four state-listed endangered species (lake sturgeon, blacknose shiner, weed shiner, Iowa darter) and two state-listed threatened species (cisco and bantam sunfish). With improvements to habitat and water quality, populations of fish and mussels within the Illinois River Corridor could increase, and natural communities could become reestablished in areas where they have been eliminated or altered.

- The introduction of exotic and non-native species into the Refuge (e.g., carp, goldfish, zebra mussels, purple loosestrife, garlic mustard, reed canary grass, shattercane) represents a major threat to maintaining diverse and productive biological systems on Refuge land.

- Other exotic species present in the Illinois River have been intentionally introduced to the detriment of native species. The common carp was introduced as a valuable commercial fish, but is now regarded as a nuisance because of its habit of retarding the growth of aquatic vegetation by consuming it and by roiling the water so that increased turbidity reduces photosynthetic efficiency. The Asian grass carp was intentionally introduced by the State of Arkansas to control aquatic vegetation, and now appears to be reproducing in the Illinois River, Upper Mississippi River and Ohio River. The grass carp prefers the same types of aquatic plants as some waterfowl, such as the Canvasback, and may compete with them for food or limit the recovery of aquatic vegetation in the Illinois River. Another recent introduction, the silver carp and big-head carp, are plankton feeders and have become a significant portion of the fish biomass in the Illinois River.

### 2.2.2 Habitat Management Issues and Concerns

- Over browsing by deer produces significant changes to forest structure and composition. As such, many grazing-sensitive species have probably been eliminated from many forest remnants on Refuge Complex land and within the Illinois River Corridor, while those more tolerant to browsing (e.g., thorn-bearing taxa such as red haw, honey locust, gooseberry, blackberry) have probably become more abundant. Non-native species also tend to increase from over browsing, such as garlic mustard and buckbrush.

- Stemming the loss of habitat has been cited as a concern. Past damage to the Illinois River's biological diversity has mainly occurred at the species, ecosystem, and landscape scale. At the species scale, of the species present in the State of Illinois in 1900, about one in five fish, one in three amphibians and reptiles, more than half of all freshwater mussels, and one in five crayfish have been eliminated from the state or threatened by extinction (Illinois DNR 1996). The Refuge Complex and associated lands support diverse and abundant flora and fauna populations found along the Illinois River. These include over 404 species of plants, 45 species of mammals, 102 species of fish, 48 species of reptiles, 19 species of amphibians, 37 species of molluscs, 10 species of crustaceans, and 264 species of birds. Species-level protection has occurred mainly through federal and state efforts (i.e., Endangered Species Act of 1973,) and state regulatory programs.

- A primary goal for the Refuge Complex has been managing floodplain land to improve native biological diversity of the Illinois River Valley. The Refuge Complex has sought to accomplish this through appropriate management of the properties within the boundaries of each Refuge and in providing technical and financial assistance to landowners around each Refuge Unit who are interested in restoring or enhancing habitat on their lands. However, progress has been limited due to personnel and financial considerations. Of late, the Refuge Complex has been tasked with providing habitat for several regional species of management concern. However, the Refuge Complex currently lacks management guidance to direct these new efforts.

- The total wetland acreage in the Illinois River Corridor at the time of European settlement was approximately 350,000 acres. Today, less than half remain. State and federal management areas protect approximately 16,500 acres of palustrine-type wetlands. Another 16,000-plus acres are estimated to be protected by private duck hunting clubs. Currently only 53 backwater lakes survive along the full length of the Illinois River, and many of them are sterile systems devoid of aquatic vegetation. The once dynamic floodplain of the river has been reduced to roughly 200,000 acres, half the size it was 100 years ago. Once a river valley of diverse and productive wetlands, the actual water surface area within the corridor now accounts for roughly 60 to 100 square miles (40,000 to 70,000 acres).

- Forest resources along the Illinois River corridor have been impacted substantially by activities of man since European settlement. What was once a nearly continuous ribbon of bottomland forests providing migration and nesting habitat for warblers, Wood Ducks, hawks, woodpeckers, thrushes, and other woodland birds as well as spawning and feeding grounds for fish during spring floods. Many forest birds are declining as a result of destruction and degradation of bottomland forests. Brown-headed Cowbirds are an edge species and parasitize songbird nests along the edges of forests. Large

blocks of forests provided secure nesting habitat for many warblers whereas fragmented habitat favors the cowbirds and can be a biological sink for birds subject to this parasitism. Loss of mast producing species such as pecan and pin oak trees has reduced food resources for waterfowl, deer, turkey, and larger songbirds.

- By 1976, less than 1/100th of 1 percent, or 2,352 acres, of high-quality original native prairie remained in the Prairie State, and four of every five that remained were less than 10 acres in size (Illinois DNR, 1996). Loss of prairie within the Illinois River Corridor combined with changes in natural processes have had negative consequences for many grassland plants and associated animals. Historically, roughly 40 percent of the lower Illinois River was prairie. The loss of bottomland prairies, and the subsequent isolation of those areas, is detrimental to animals that depend upon large natural prairie areas.

- Prior to European settlement, oak savanna covered approximately 27-32 million acres of the Midwest (Nuzzo 1985). This same author indicates that in 1985, only 113 sites (2,607 acres) of high-quality oak savanna remained. Nationwide, over 99 percent of the original savanna has been lost, and midwestern oak savannas are among the rarest ecosystems in the nation. The once widespread oak savannas have become one of the nation's more endangered ecosystems (Noss et al. 1995). Development has destroyed, fragmented, and disrupted natural processes needed to maintain quality oak savanna ecosystems. Currently, no high quality savanna exists within the Refuge Complex nor is the Service aware of any being present in the Illinois River Corridor. The long-term effect of this landscape-scale loss of savanna has yet to be determined.

- Refuge land (as well as other protected land within the Illinois River Corridor) suffers from habitat fragmentation. Some of this results from dams along the river and tributaries, as well as levees that isolate the floodplain lakes from the river (which can be a barrier to fish migrations). Coupled with the levees affecting bottomland forests, there is no longer a continuous canopy along the river. The effects of these gaps in the corridor are largely unknown, although it is likely they impact the use of the corridor by migratory bird species.

- It is estimated that each year more than 14 million tons of sediment are transported through the Illinois River watershed. More than half of this is deposited in the Illinois River Valley. Peoria Lake, the largest and deepest bottomland lake along the Illinois River, lost 68 percent of its capacity between 1903 and 1985 (Illinois DNR, 1996). Problems associated with erosion and sedimentation are recognized as the number one ecological problem in the Illinois River-floodplain ecosystem and has taken its toll.

### 2.2.3 Visitor Services Issues and Concerns

- There is a strong demand for high quality, wildlife-dependent recreational activities on Refuge Complex land, including wildlife observation and photography, public hunting, and fishing.

- The Service and the public have identified several new facilities that will expand Refuge Complex recreational opportunities and support the long-term goals of the Refuge, watershed, and Illinois River Corridor.

- Some people have expressed interest in the Refuge Complex providing additional places to see wildlife (including access points) as well as additional lands to hunt and fish. In particular, there is an increasing demand for public hunting opportunities (mainly waterfowl and deer hunting) on the Refuge.

- Many of the existing visitor facilities at the Refuge need upgrading or lack accessibility for some visitors (internal issue). There has been expressed interest (internally and externally) for improving existing Refuge Complex infrastructure for safety and accessibility, improving visitor information systems (signs and brochures), and bringing Refuge facilities up to Service standards.

- Many individuals and groups have expressed concern that the Refuge is not well known and understood within the local area. Some area residents are unaware of the Refuge and of the many programs it offers. Several people commented that because it was a national wildlife refuge, they always assumed it was closed to the public, especially for hunting. Others commented they did not differentiate Refuge land from Illinois DNR land.

### 2.2.4 Other Issues Cited

- Several people have expressed concern that the 3x3 structure at the mouth of Quiver Creek should remain open until waterfowl hunting season closes for the purpose of keeping ice off Lake Chautauqua beyond natural freeze-up.

- Some neighboring farmers say that they are experiencing crop losses due to grazing by geese, squirrels and deer. Early season losses following emergence of corn and/or soybeans occur from all species on lands bordering the Refuge. Canada Geese graze on soybeans, and to a lesser degree corn, for several weeks after emergence. White-tail deer feed on crops throughout the growing season. Crop damage varies by species and location with some neighbors suffering greater losses than others.

- Avian botulism has been a serious problem on Lake Chautauqua with a loss of over 8,000 birds in 1997 and a loss of 2,623 birds in 1998. Staff from the Wildlife Health Laboratory in Madison, Wisconsin, provided assistance and confirmed that avian botulism was the agent of death of the birds. Losses were limited to 278 birds in 1999 but the number of birds lost in 2000 was 933. Refuge staff will continue to closely monitor the health of birds on the Refuge and react quickly and decisively to minimize losses to diseases.

- Two written comments and several oral comments from the public expressed concern about the amount of food presently produced for waterfowl on Chautuaqua NWR and the potential for additional food production on Emiquon NWR. Some hunters suggested that the Service should provide only sanctuary for waterfowl and not produce any food. This was proposed so waterfowl would be more likely to fly off the Refuge Complex to private hunting clubs to find a food . Others expressed an opposite concern, saying that without food and sanctuary on Refuge Complex land, waterfowl would most likely pass over the area without stopping.

# Chapter 3: The Refuge Environment

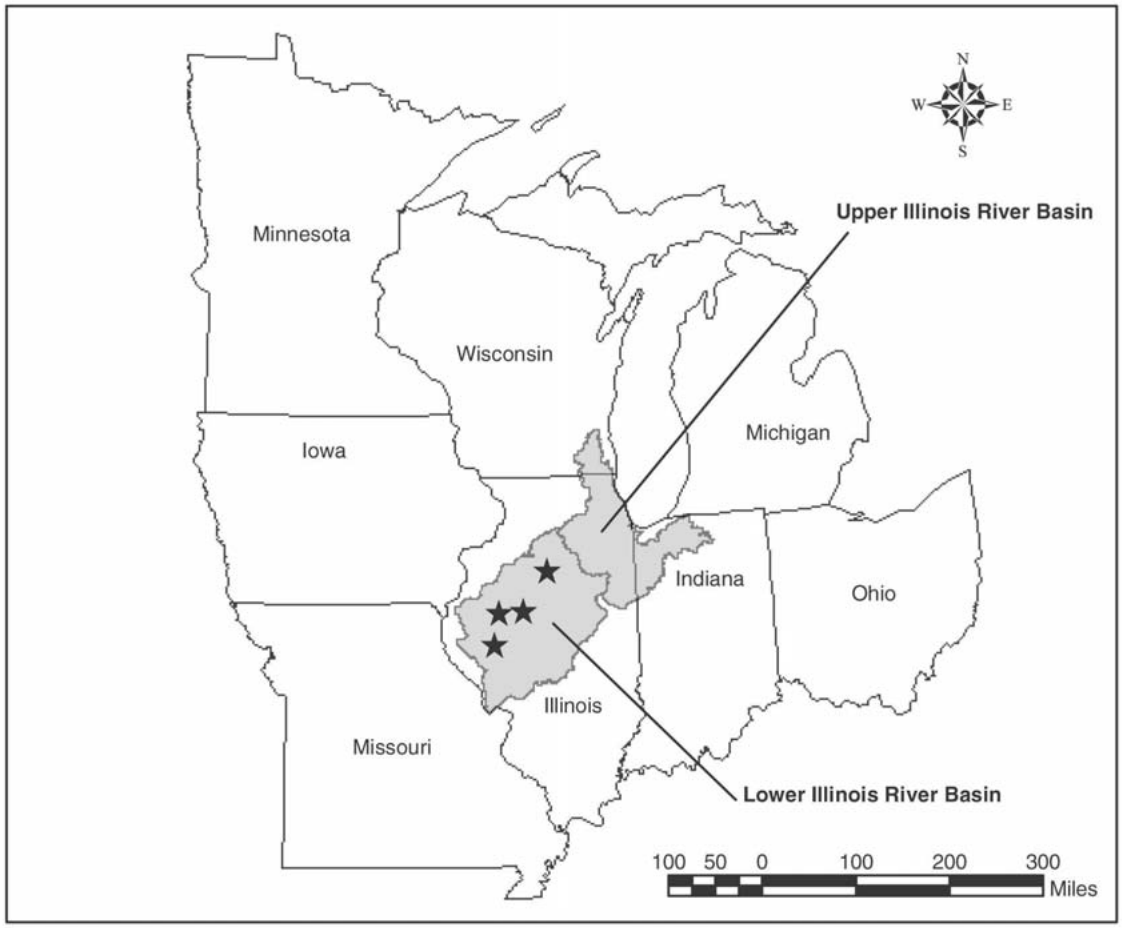
## 3.1 Geographic/Ecosystem Setting

### 3.1.1 Geography, Topography and Hydrology

The Illinois River flows 273 miles from the junction of the Des Plaines River and Kankakee River south of Joliet, Illinois, to Grafton, Illinois, where it joins the Mississippi River and flows south to the Gulf of Mexico. The Illinois River Basin (Figure 4) drains about 30,000 square miles (7.7. million acres) in three states, Wisconsin, Indiana, and Illinois.

Ecologically, the Refuge Complex is located in the Central Tallgrass Prairie Ecoregion (ecoregion), which encompasses 110,468 square miles extending from

**Figure 4: Illinois River Basin Location**



eastern Nebraska and northeastern Kansas east to northwestern Indiana. It comprises the eastern lobe of the Prairie Parkland Province and two ecoregion sections (Central Dissected Till Plains and Central Till Plains) as delineated by Bailey et al. (1994). The ecoregion is characterized by flat, gently rolling topography with steep bluffs bordering major river valleys, three of which traverse the region: the Mississippi, Missouri, and Illinois. During the Pleistocene Epoch, glaciers advanced and retreated at least four times across all or portions of the ecoregion, depositing large areas of glacial drift and loess and creating the characteristic rolling topography seen today. The ecoregion is influenced to some degree by the rain shadow of the Rocky Mountains that create habitat favoring grasses.

### 3.1.2 Surface Hydrology

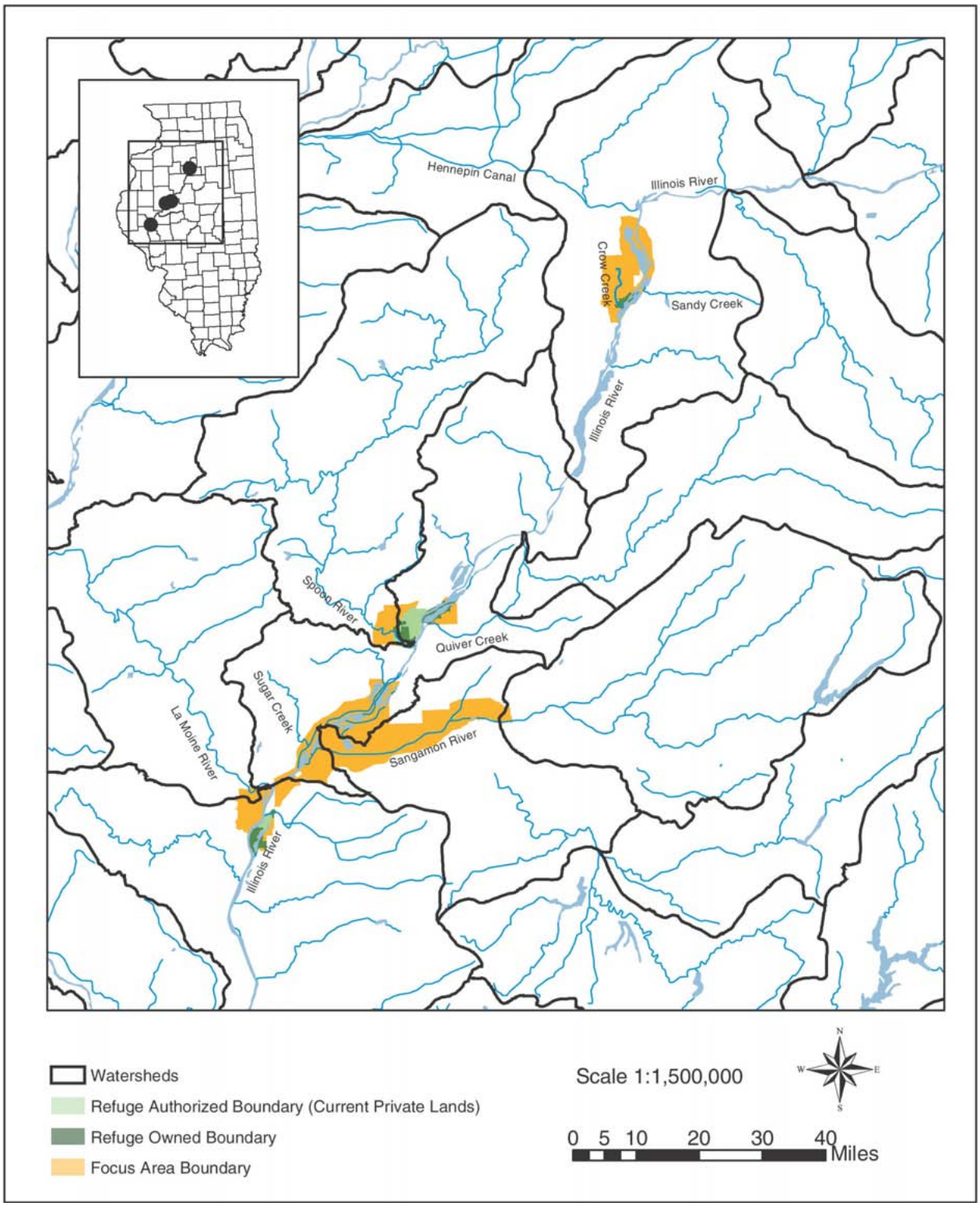
Water supplied to Refuge Complex land comes from four primary sources: the Illinois River, Quiver Creek, Crow Creek, and the Spoon River (Figure 5). The single most important event impacting the surface hydrology of the Illinois River system (and Refuge Complex) was the opening of the Chicago Sanitary & Ship Canal in 1900. This one event introduced major changes to Illinois River surface hydrology, namely it created a major navigation corridor, became the recipient of Chicago's wastewater, and dramatically changing the river's flow pattern, raising the river's average water level by 1.5 to 4 feet, increasing both average flows and the frequency and severity of floods. Water levels for navigation are managed with a series of locks and dams that were constructed in the 1930s to maintain a navigation corridor 300 feet wide and 9 feet deep. Diverted water from Lake Michigan and the locks and dams along the river has increased the mean summer minimum water levels and significantly expanded the open water surface area.

Streamflow in the Illinois River is representative of climatic events and human influences covering the upper Illinois River watershed. Several recent studies have shown that annual peak flows on the Illinois River for the period 1941-1985 have increased about by 50 percent. Higher flows, it was found, were caused by concurrent increases in precipitation in the river's watershed. Northeastern Illinois, in particular, has experienced significant increases in the magnitude and frequency of heavy precipitation (Kunkel et al., 1997). Average flows and low flows have been noticeably greater since 1970 compared to previous periods throughout the mid-1900s, and appear to be related to average annual precipitation. However, average river streamflows vary greatly from year to year, and can also show sizable variation between decades.

### 1.1.3 Floodplain Structure and Function

Water quality, quantity, velocity, timing, frequency, and duration are the primary determinants of the Illinois Rivers floodplain structure and function. When the Illinois River flooded under natural conditions, it typically altered its shape by scouring new channels and inundating riverside lands, depositing sediments, and building new banks and beaches. These functions, called reset mechanisms, are as important to a healthy river systems as a fire is to a prairie. Just as a prairie is sustained by natural fires, a river system and associated plants and animals depend upon the periodic advance and recession of flood waters across their floodplain. For instance, the federally-listed endangered plant decurrent false aster (*Boltonia decurrens*) relies on the exposure of freshly-deposited mud flats for regeneration (Schwegman and Nyboer 1985; U.S. Fish and Wildlife Service

**Figure 5: Watersheds in the Area of the Illinois River NWR**



1990). The cottonwood, favored for perching by Bald Eagles and for nesting by herons and egrets, seems to have similar requirements. The river-floodplain also functions as a corridor for long-distance migrants, mostly birds (raptors, neotropical songbirds, shorebirds, ducks, geese, swans and others) but also for one species of migratory fish, the American eel, which spawns off the coast of Cuba in the Sargasso Sea. Most aquatic animals, however, use the Illinois river-floodplain system as a permanent home, undertaking short migrations within the system to spawning, rearing or feeding areas in rapids, tributaries, backwaters, or on the floodplain. Fish yields and production are strongly related to the extent of accessible floodplain, whereas the river channel may serve as a migration route for most fishes (Junk et al. 1989).

Flood cycles associated with the Illinois River are characterized by two peaks: a major one in spring and a smaller one in fall. The construction of levees, channels, locks, and dams has altered the natural structure and function of the river-floodplain relationship. The seasonal hydrologic fluctuations that normally provide the vehicle for transfer between the floodplain and the river has been modified. Vast floodplain areas have been virtually excluded from the river system through dike and levee construction.

### 3.1.4 Climate

Wide temperature fluctuations and persistent winds characterize the climate of this ecoregion, with an annual precipitation of 27 to 40 inches.

The climate patterns that support the Illinois River Refuge Complex is typical of many continental locations in that there are wide temperature fluctuations. The average high temperatures (Fahrenheit) in the summer are in the 80s with average lows in the 60s. Winter highs are generally in the 30s with lows in the teens. Temperature extremes range from the minus 20s to highs over 100 degrees.

The average annual rainfall for the Refuge Complex is 34.5 inches, with over 50 percent normally falling during the months of April through August. Snowfall normally accounts for less than 10 percent of the total precipitation. There is an average of 5 months without frost each year.

### 3.1.5 Archaeological and Cultural Values

Responding to the requirement that comprehensive conservation plans include "the archaeological and cultural values of the planning unit," the Service contracted for a cultural resources overview and management study. This short section of the CCP derives mostly from the report, "Cultural Resources Overview Study of the Illinois River National Wildlife and Fish Refuges: Cameron-Billsbach, Chautauqua, Emiquon and Meredosia Wildlife Refuges, Mason, Cass, Fulton, Marshall, and Morgan Counties, Illinois," by William Gordon Howe (draft 2001).

Archeological evidence shows that people have lived in the American Midwest for the past 12,500 years. The earliest culture, Paleoindian, was small groups of highly mobile people subsisting on a hunting and gathering economy, heavily dependent on the megafauna that died out during this period. Site 11-F-682 within the Refuge is reported to have a Paleoindian component.

The following Archaic period lasted from 9,500 to 2,750 years before present. These people developed a more diverse subsistence economy and, as the climate turned cooler and wetter, people became more sedentary, began limited plant cultivation and created extensive trade networks. Within the Refuge, 24 sites contain Archaic components.

Pottery, the bow and arrow, gardening, and religious activities associated with mound building characterized the Woodland period 2,700 to 1,000 years ago. Human populations increased substantially. Woodland cultural components are found within 15 of the reported sites within the Refuge.

The final prehistoric culture in the Refuge area was the Mississippian tradition from 1,000 to 500 years ago. Characteristics of this culture include a stratified society, temple mounds, and farming. Within the Refuge areas, however, cultural practices appear to have been more of a continuation of the late Woodland period. Components of these late prehistoric cultures are found in 11 sites within the Refuge.

The connection between late prehistoric cultures and historic period Indian tribes is not clear. When the first Europeans arrived in the Illinois country, native groups were in a state of flux. The historic period tribes have been identified as the Illini, Miami, Kickapoo, Mascouten, and Potawatomi, all of which lived in summer villages and farmed lands near streams and springs, with a seasonal round of hunting and maple sugaring in winter camps. Tribes became increasingly involved in the fur trade and otherwise adopted European crops and practices.

The first recorded European expedition on the Illinois River was that of Jolliet and Marquette in 1673 on their return from the Mississippi River. The French subsequently built forts, churches, and houses along the Illinois River.

When Illinois entered the Union in 1818, nearly all American settlers lived in the south of the state, but they soon moved into the Illinois River valley. The General Cass and Simon Girty Indian council occurred in the vicinity of the south end of Cameron NWR. The first steamboat ascended the Illinois River in 1828. Settlements grew along the river at ferry crossings, then usually became steamboat landings. Through the 20th century, farming and related essential industries of grist, saw, and flour mills were the basis for economy. The Chautauqua NWR area was a favorite area for hunters and trappers into the mid-20th century.

The Refuge has been subjected to 19 cultural resources studies. Most dealt with the Liverpool Lake site, but intensive archeological surveys have covered 210 acres and reconnaissance surveys have covered 6,630 acres of the Refuge. These studies and other sources have identified 58 sites on Refuge land and 149 sites on identified expansion areas.

The Refuge Complex has no museum, but holds five items of artwork that are covered under the Region-wide scope of collections statement.

A review of the National Register of Historic Places identified 58 properties listed in Brown, Cass, Fulton, Marshall, Mason, and Morgan counties. Most of the properties are houses, buildings, structures, and districts located in towns.

Several bridges are listed, and two farms. Several archeological sites are listed including three in the vicinity of Emiquon NWR. Although no National Register properties are located within the four units of the Refuge, their presence in the surrounding counties can be indicative of the kinds of properties to be found on the Refuge.

The cultural resources management study includes a predictive model of archeological potential on the four units of the Refuge Complex:

- The Cameron-Billsbach unit has high potential for containing prehistoric sites. It has low potential for Paleoindian and for Early Archaic, moderate potential for Middle Archaic, good potential for Late Archaic, moderate potential for Early Woodland, good potential for Middle and Late Woodland, and moderate potential for Mississippian sites.

- Chautauqua NWR has many known prehistoric sites. It has low potential for Paleoindian and low to moderate for Archaic sites. It has low potential for Early Woodland, but good potential for Middle and Late Woodland sites; and low potential for Mississippian sites. Twentieth century cabin sites along the east shoreline are known and can be anticipated.

- Emiquon NWR is in an area of many known important archeological sites. Mastodon skeletons with butcher marks have been found in excavation for drainage ditches in Thompson Lake, which indicates potential for late Pleistocene human use. Thus the Refuge has moderate potential for Paleoindian sites, as well as for Early and Middle Archaic sites and good potential for Late Archaic sites. It has moderate potential for Early Woodland and good potential for Middle and Late Woodland sites and for Mississippian sites.

- The study area of Meredosia NWR has been subject to numerous archeological investigations. Prehistoric sites are typically found on landforms that were slightly higher than the surrounding floodplain. One Paleoindian site is known within the study area and others, deeply buried, are anticipated. Early, Middle, and Late Archaic sites are known and more are likely, some not deeply buried. Likewise many Early, Middle, and Late Woodland sites are known and more can be expected. Mississippian sites are also reported within the study area.

Extensive turmoil among the Indian tribes occupying the Refuge areas in the early period of European contact in North America continued for two centuries. Thus the relationship of late prehistoric cultures represented in the archeological record cannot be tied to historic period tribes, so recognized tribal interests are confined to the historic period.

In the early historic period the Illini tribes had villages along the Illinois River. Illini tribes included the Cahokia, Kaskaskia, Michigamea, Moingwena, Peoria, Tamaroa, Korakoenitanon, Chinko, Tapouro, Omouahoas, and Chepoussa. These tribes disappeared, some merged with related tribes, and the remaining modern tribe is the Peoria.

The Miami tribes moved into the region including the Refuge area. Miami tribes included the Wea, Piankashaw, Atchatchakangouen, Kilatika, Pepicokia, and Menagakonkia. Of these tribes, the Wea and Piankashaw ultimately merged with the Peoria and the Miami.

Throughout the 1680s the Kickapoo and Mascouten migrated into the Illinois River valley. They may have retained permanent settlements in Wisconsin and established only hunting camps in the Refuge area. The two tribes may have merged; in any event, the Kickapoo remain as modern tribes.

The Potawatomi, originally located east of Lake Michigan, arrived in the Chicago area in the 1740s and by the 1760s included the Illinois River in their hunting grounds. A hunting band was reported in the Lake Chautauqua area in 1832. In the Cameron-Billsbach are, the tribe had a village at Lacon. The Potawatomi remain as modern tribes.

The Delaware Tribe has identified interests in the Illinois River valley as well as other areas.

Although Indian tribes are generally considered to have concerns about traditional cultural properties, sacred sites, and cultural practices, other groups such as church groups could also have similar concerns. But no groups other than Indian tribes have been identified.

The Refuge archeological collections contain prehistoric artifacts currently not associated with any modern tribe. Furthermore, the collections contain human remains but no funerary objects, sacred objects or objects of cultural patrimony as defined in the Native American Graves Protection and Repatriation Act. Although sites of historic period Indian occupation have not been identified on the Refuge, they could be located and could contain cultural items.

## 3.1.6 Social and Economic Context

The Refuge Complex and associated Focus Areas presented in this CCP are located in 10 counties–Brown, Morgan, Schuyler, Cass, Menard, Mason, Fulton, Marshall, Putnam and Bureau. Compared to the entire State of Illinois, this 10-county area has a smaller population growth rate and is less racially and ethnically diverse. The area's population has a lower average income and less college education than the state's population.

### 3.1.6.1 Population

The total population of the 10 counties that include the area of this plan was 185,993 in the 2000 Census. The population of the counties increased 1.86 percent during the 1990s while the state's population increased 8.6 percent. There was a great variation in population change among the 10 counties: Brown County increased 19.1 percent, Schulyer County decreased 4.1 percent. The population for the 10-county area is projected to increase to 189,466 by 2015. The 10-county population was 95.3 percent white in 2000; the state population was 73.5 percent white. In Illinois, 19.2 percent of the people 5 years and older speak a language other than English at home; in the 10-county area it is 3.75 percent.

#### 3.1.6.2 Employment

In 2000 there were a total of 85,516 full- and part-time jobs in the 10-county area. Farm employment accounted for 10.4 percent of the jobs across the area. Schuyler County had the highest proportion of farm employment, 19.1 percent. Other sectors with sizable proportions of jobs are the services, retail, and manufacturing sectors.

#### 3.1.6.3 Income and Education

Average per-capita income in the 10-county area was $18,258 in 1999; in Illinois it was $23,104. The median household income in the 10–county area was $37,880 in 1999; in the state it was $46,590.

In the 10-county area, 14.75 percent of persons over 25 years of age hold a bachelor's degree or higher. The comparable figure in the state is 26.1 percent.

# 3.2 Refuge Resources And Public Uses

## 3.2.1 Refuge Resources

Early French explorers of the Illinois River described vast expanses of bottomland forests, clearwater lakes, sloughs and marshes and abundant fish and wildlife populations associated with them. The Illinois River system supported the life needs of native American tribes as evidenced by the numerous archeological sites identified up and down the river. Since those days of pristine habitats, native American populations have been replaced by an agricultural and industrial society of European descent. Human modifications to the Illinois River watershed such as wetland drainage, conversion of prairie and bottomland forests to croplands, construction of navigation locks and dams, diversion of Lake Michigan water, stream channelization, agricultural levees, ditches, field tiles, urbanization, and introduction of non-native species dramatically changed the floodplain function and hydrology of the river. These modifications to the river and floodplain have resulted in substantial changes in the distribution, abundance, and general health of the plant and animal communities along the river.

#### 3.2.1.1 Chautauqua National Wildlife Refuge

The 4,488-acre refuge (Figure 6) includes roughly 3,250 acres of backwater lake, 930 acres of bottomland hardwoods, and 320 acres of woodlands and prairie (Figure 7).

Habitat protected within Chautauqua NWR contributes to the goals of the North American Waterfowl Management Plan. In addition, based on an evaluation of the ecological resources in the State of Illinois, Chautauqua NWR includes the "Roundtree Nature Preserve" and is located in the "Middle Illinois Resource Rich Area." Chautauqua NWR provides a haven for waterfowl, supporting roughly 45 percent of the waterfowl using the Illinois segment of the Mississippi River flyway and nearly 70 percent of the waterfowl that use the Illinois River Corridor. The Refuge has been designated as an Illinois River Valley Partnership "Model Project," an "Important Bird Area" in the American Bird Conservancy's United States Important Bird Areas program, and is included in the Western Hemisphere Shorebird Reserve Network. Chautauqua NWR is a popular desti-

nation for birders throughout the Midwest. Fishing and waterfowl hunting are popular consumptive uses of Refuge resources.

The Cameron-Billsbach Division (a unit of Chautauqua NWR) is located in Marshal County between Sparland, Illinois, and Henry, Illinois (Figure 8). The Cameron unit includes 1,064 acres of backwater lake habitat, 634 acres of bottomland hardwood forest, and 10 acres of upland forest (Figure 9). The unit includes the 177-acre Cameron Research Natural Area, which was established in 1972. The unit supports a population of decurrent false aster plants and has a Bald Eagle nest. Waterfowl peak numbers commonly exceeded 50,000 birds in the fall but declined precipitously after 1973 because of habitat degradation.

The 1,072-acre Billsbach Unit is located along the east side of the Illinois River and joins the center portion of Billsbach Lake. The Billsbach unit supports an active Bald Eagle nest (probably the same pair that built a nest on the Cameron Unit). Billsbach Lake is badly degraded because of excessive sedimentation and continuous resuspension of silt by wind, tows, and exotic fish.

The three backwater lakes that make up Cameron-Billsbach Division exhibit typical characteristics of most backwater lakes within the Illinois River System. They are directly affected by the lock and dams with extreme variability in water levels (as much as 10 to 12 feet in one month) and water is extremely laden with silt.

#### 3.2.1.2 Meredosia National Wildlife Refuge

The Refuge presently owns and manages 3,852 acres of land within the approved 5,255 acre boundary (Figure 10). Meredosia Lake is a meandered lake and, therefore, is under the control of the Illinois Division of Water Resources. The Illinois Department of Natural Resources manages waterfowl hunting and fishing on Meredosia Lake.

Meredosia NWR is a backwater lake component of the Illinois River floodplain (Figure 11). There are currently eight small impoundments with associated levees, ditches, and water control structures on the Refuge. The impoundments range in size from 4 to 20 acres and are primarily managed for moist soil vegetation. Controlled flooding of impoundments is conducted by pumping from the river or Meredosia Lake. There are roughly 5.2 miles of river bank habitat.

Meredosia Lake is a meandered backwater of the Illinois River. The lake is nearly 5 miles long and three-quarters of a mile wide at its widest bay. Water elevations on the lake fluctuate according to Illinois River water levels. A riprap dam with a fixed elevation of 423.2 MSL is located in the lake inlet. A survey in 1978 revealed the average depth to be 2 feet with a maximum depth of roughly 4.5 feet. Much of the lake edge is only inches deep and gently sloping to the middle. Sediment deposition from 1903-56 averaged 1.3 cm annually. Average total sediment in the lake during this period was 68.9 cm. The lake is mostly void of aquatic vegetation.

The Refuge has fertile sand soils classified as mixed loam, ranging from clay to loamy sand. Most of the Refuge is poorly drained. Vegetation includes burr reed, rice cutgrass, smartweed, pigweed, horseweed, buttonbush, foxtail, Walter's millet, and nutgrass. Timber stands includes mature bottomland species including cottonwood, willow, maple, oak, and ash.

**Figure 6: Ownership and Authorized Boundaries, Chautauqua NWR and Emiquon NWR**

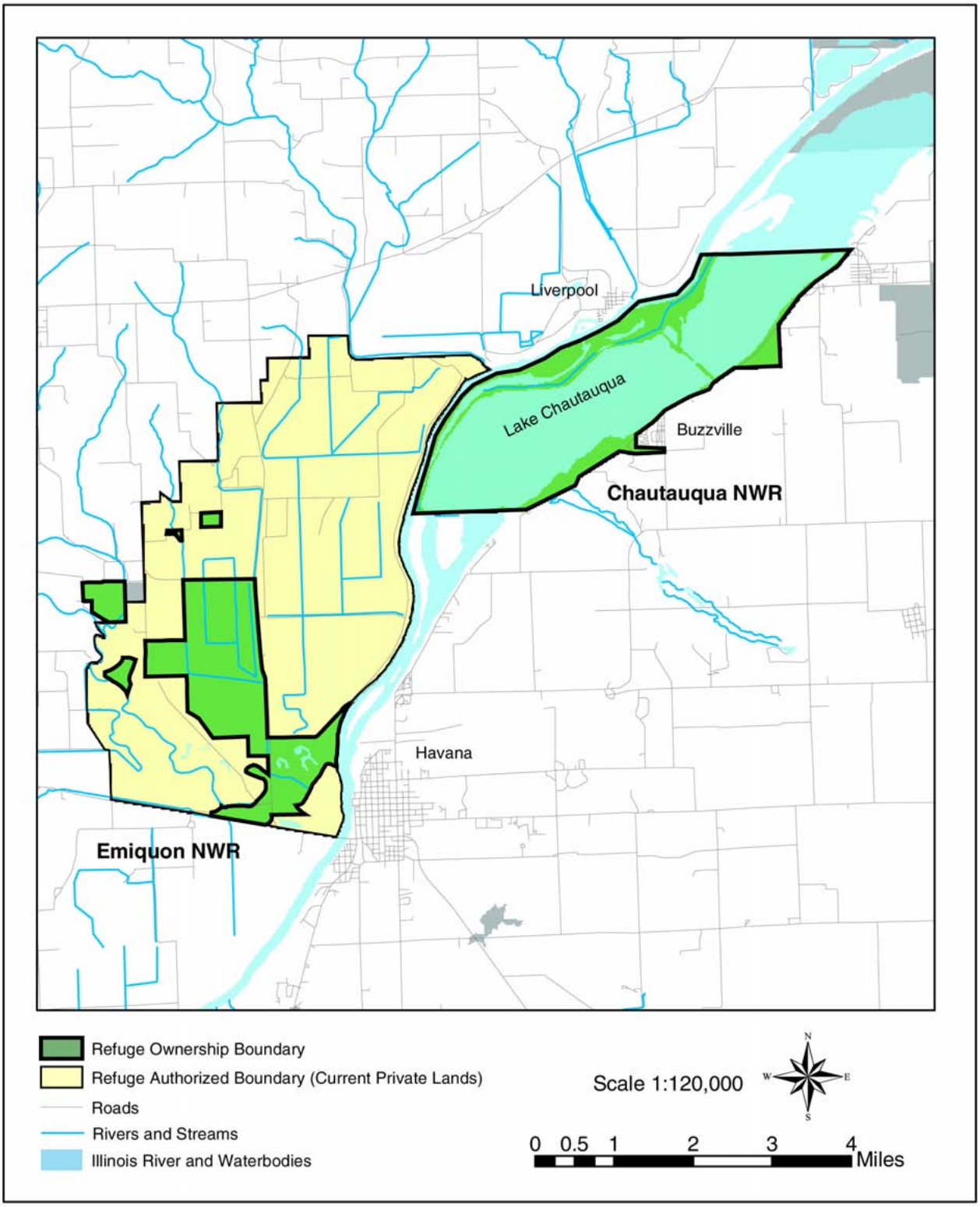


**Figure 7: Land Cover, Chautauqua NWR and Emiquon NWR**

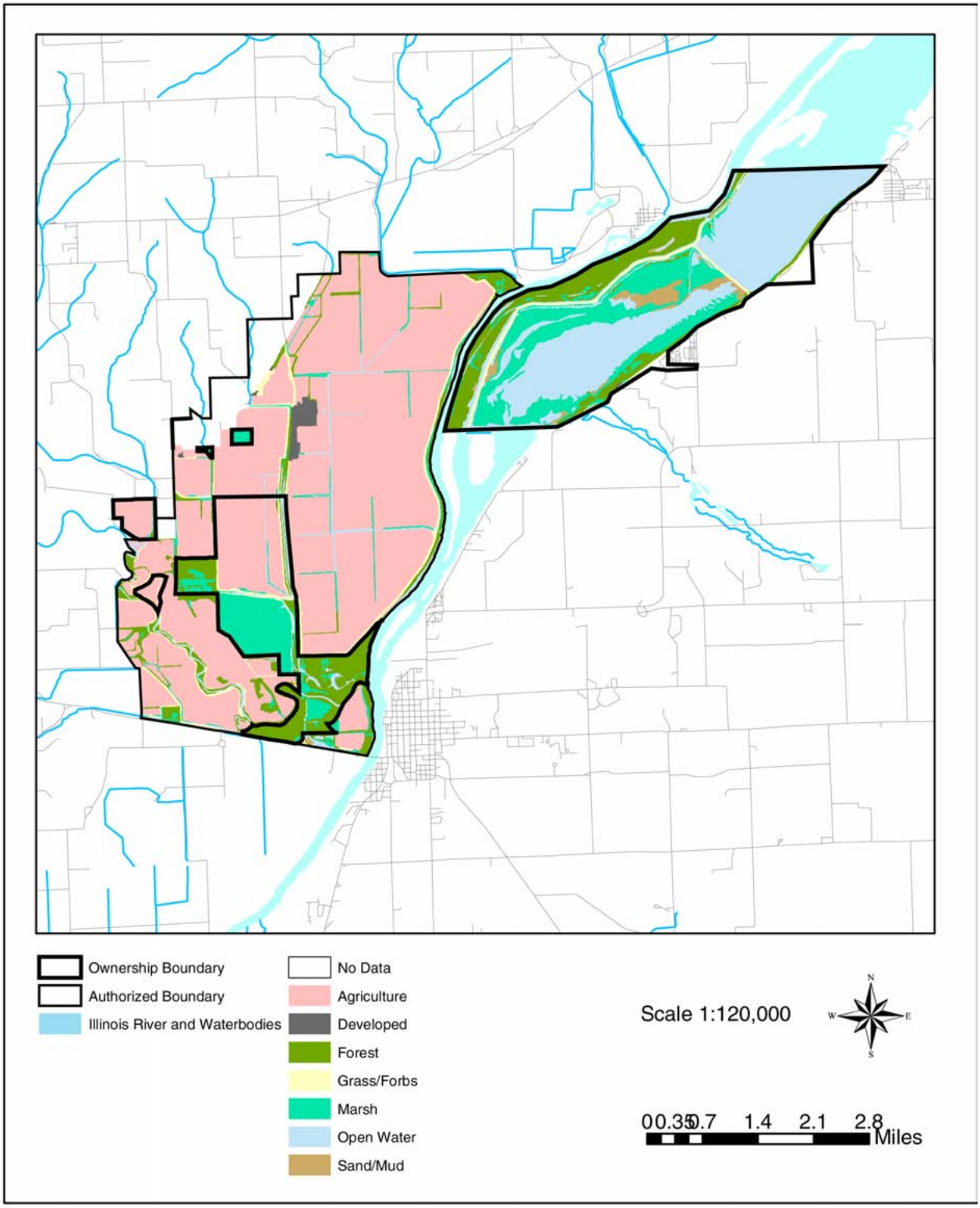


**Figure 8: Ownership and Authorized Boundaries, Cameron-Billsbach Unit of Chautauqua NWR**

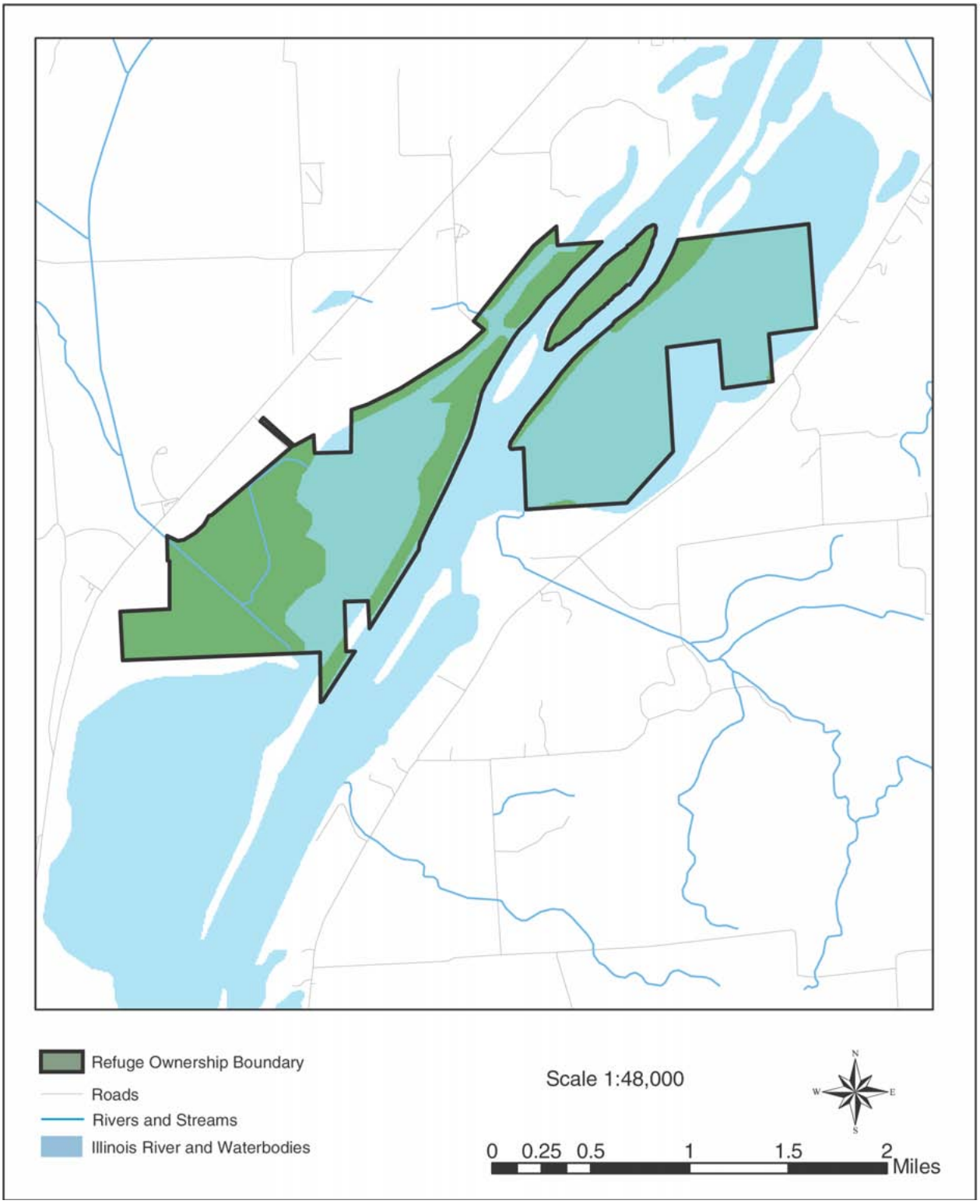


**Figure 9: Land Cover, Cameron-Billsbach Unit of Chautauqua NWR**

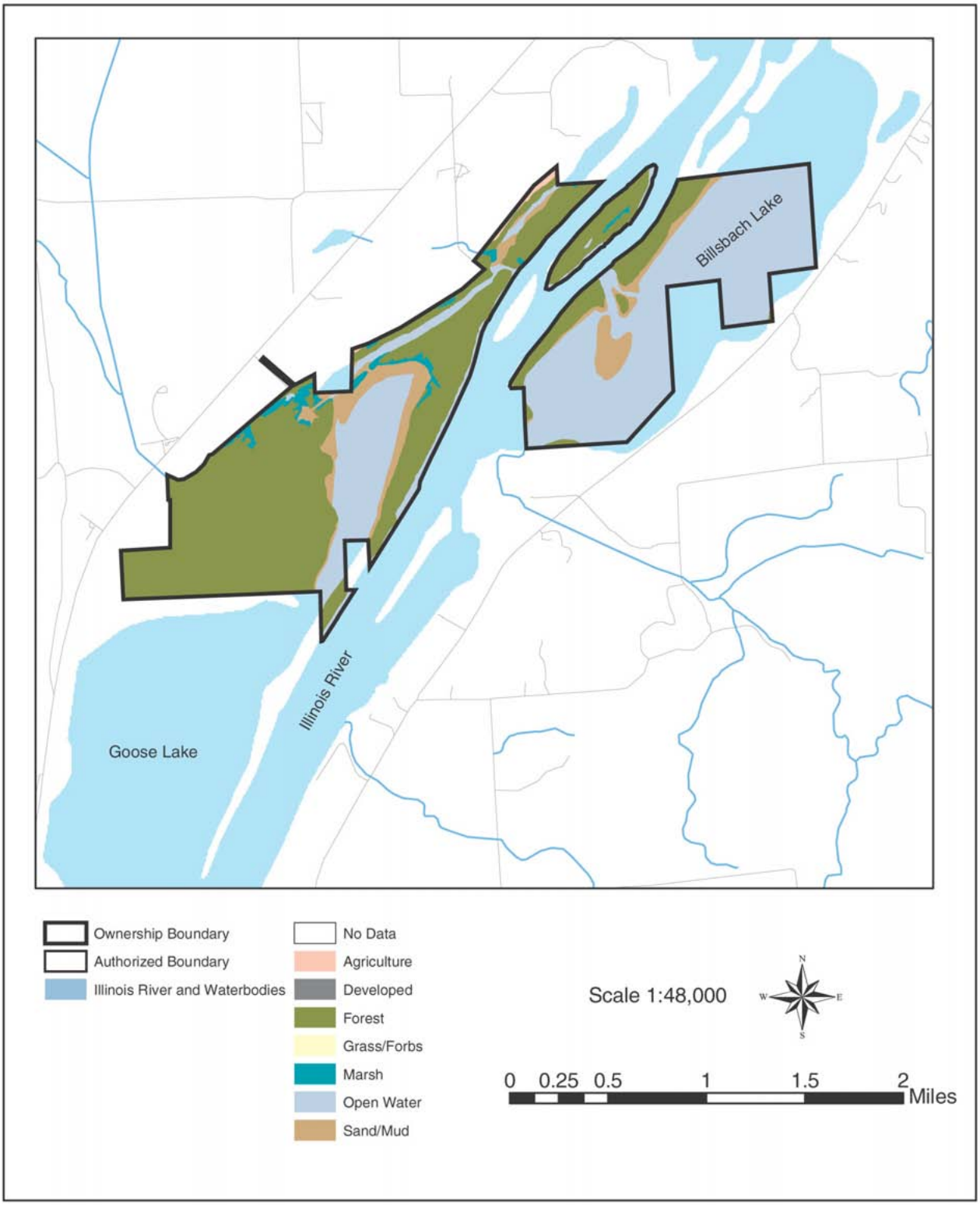


**Figure 10: Ownership and Authorized Boundaries, Meredosia NWR**

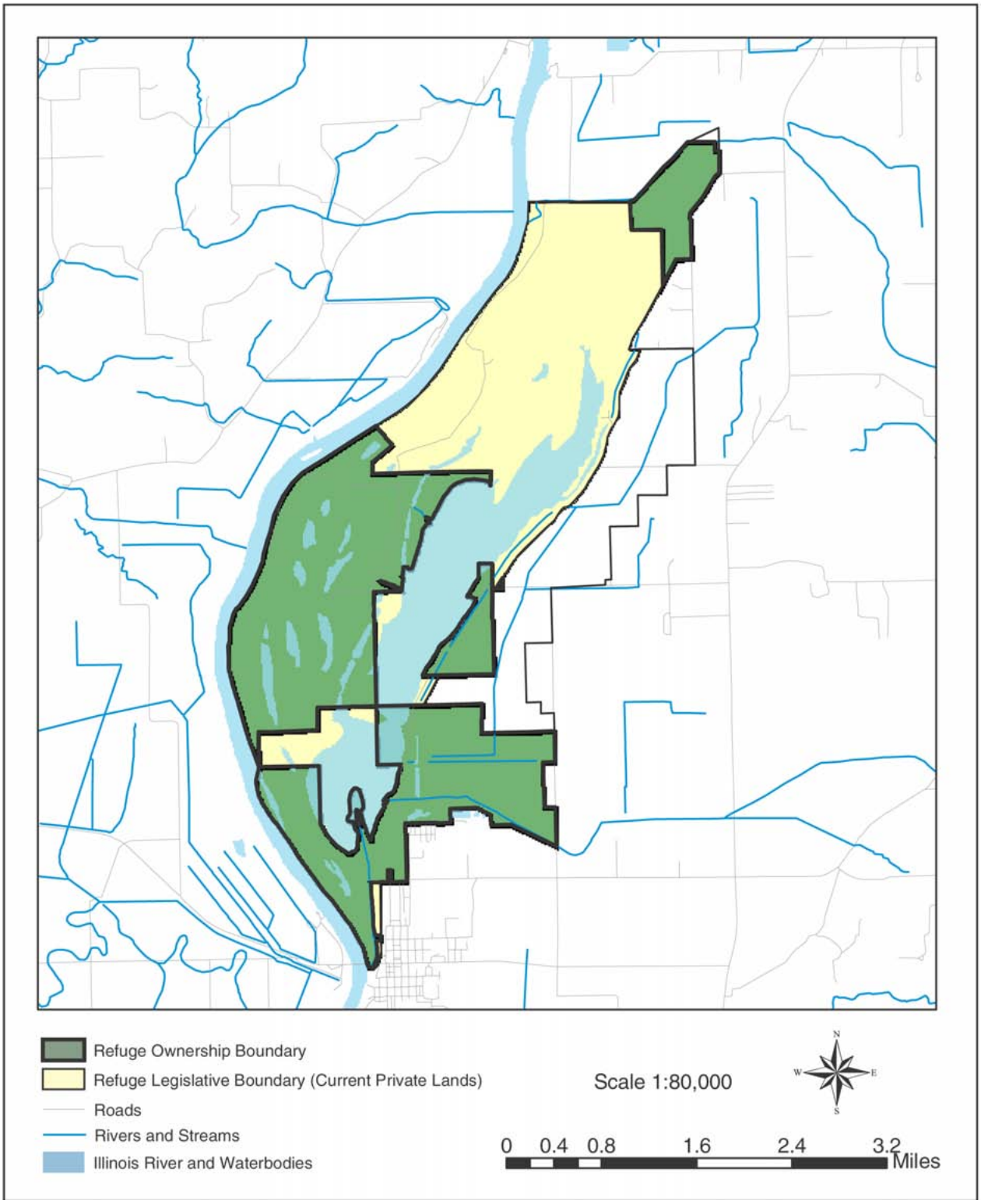
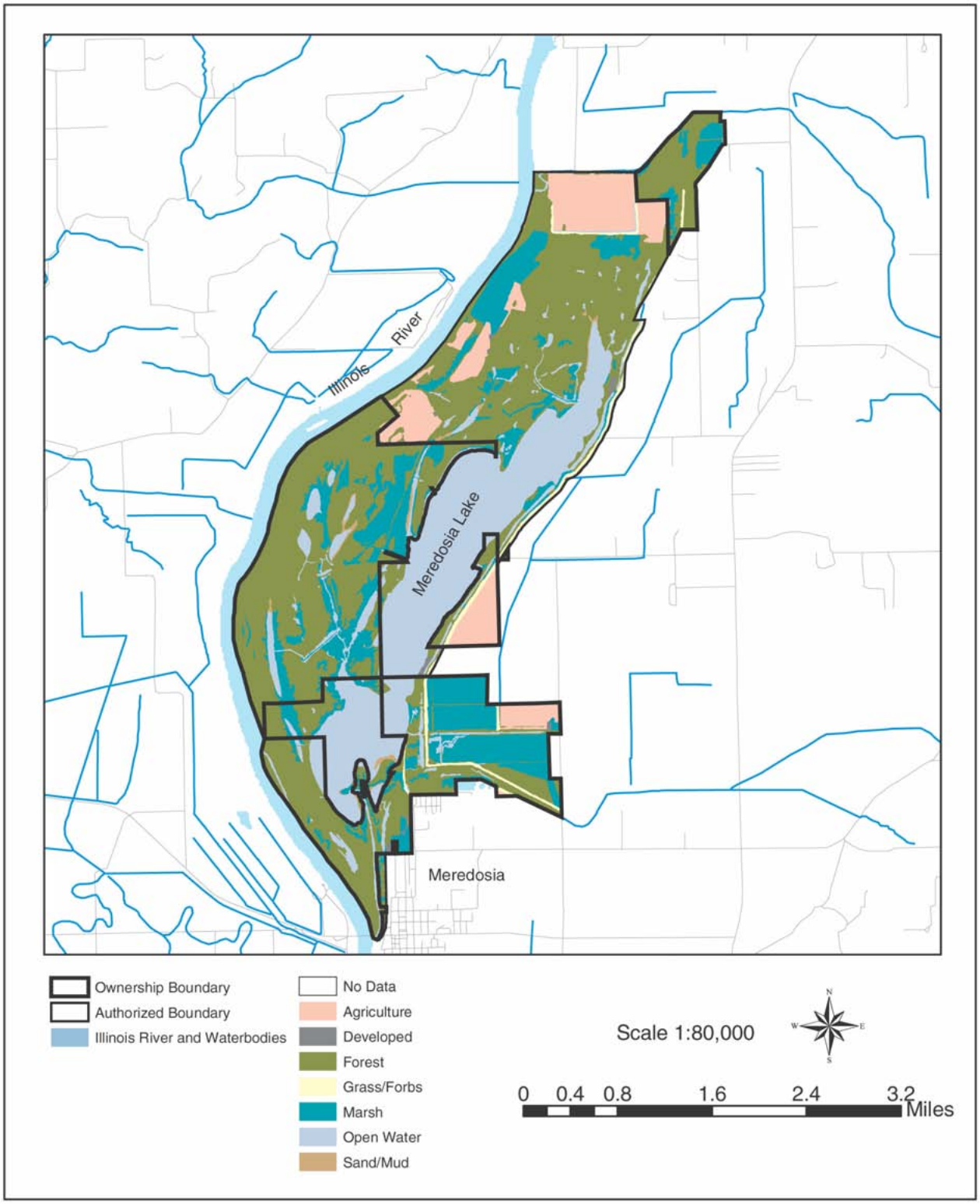


**Figure 11: Land Cover, Meredosia NWR**



#### 3.2.1.3 Emiquon National Wildlife Refuge

As of April 2002, the Service owned and managed 2,114 acres of land within the 11,122-acre authorized boundary for the purpose of benefitting listed species, waterfowl and other migratory birds, native biological diversity, and native fish and mussels.

Historically two backwater lakes (Thompson Lake with 1,800 acres and Flag Lake with 1,000 acres) provided excellent habitat for migratory birds, fish, and resident wildlife. Most of the land within the acquisition boundary was ditched, cleared, leveed, tiled, and pumped in the early 1900s to facilitate row crop agriculture. Because of the levees, Thompson Lake and Flag Lake basins have not been subjected to heavy annual sedimentation and contaminants as most other backwater lakes along the Illinois River.

#### 3.2.1.4 Conservation Focus Areas Within the Illinois River Basin

Several federal agencies have worked with the Service to identify five focus areas for conservation efforts within the Illinois River Basin (Figures 12-17). The focus areas include conservation areas managed by others. Within these focus areas, the agencies will consider the potential for restoration, preservation, and protection of hydrology, water quality, wetlands and aquatic ecosystems. Development of focus areas provides a focus for federal, state, and local conservation efforts.

The cooperating agencies include the Service, the U.S. Department of Agriculture's Natural Resource Conservation Service, the U.S. Army Corps of Engineers, the U.S. Forest Service, the Environmental Protection Agency, the U.S. Geological Survey and the Federal Highway Administration.

### 3.2.2 Fish and Wildlife Resources

#### 3.2.2.1 Listed Species

There are eight federally listed and 80 state-listed threatened and endangered species that historically have been identified on or near the Refuge Complex. These include three threatened plants (decurrent false aster, Mead's milkweed, and Prairie white-fringed orchid); one endangered mollusk (Higgin's eye pearlymussel); one endangered bird (Least Tern), one threatened bird (Bald Eagle); and one endangered mammal (Indiana bat). Only the Bald Eagle and decurrent false aster have been documented on the Refuge Complex. The Indiana bat may occur on habitat associated with Meredosia NWR.

Protecting endangered and threatened species and restoring them to secure status in the wild is a primary purpose of the Service and the Refuge. No creature exists in isolation. All living organisms are part of a complex, delicately balanced network called the biosphere. It is composed of many ecosystems, each with its own complement of plants and animals and their biological, chemical, and geological processes and the interrelationships that characterize them. When a species becomes endangered, it indicates that something is wrong with the ecosystems we all depend on. Like the canaries used in coal mines whose deaths warned miners of bad air, the increasing numbers of endangered species warn us that the health of our environment has declined. The removal of a single species can catalyze a chain reaction affecting many others. The full significance of an extinction of a species is seldom apparent; much remains to be learned, and the long-term impacts are difficult to predict.

**Figure 12: Conservation Focus Areas, Chautauqua NWR and Emiquon NWR**

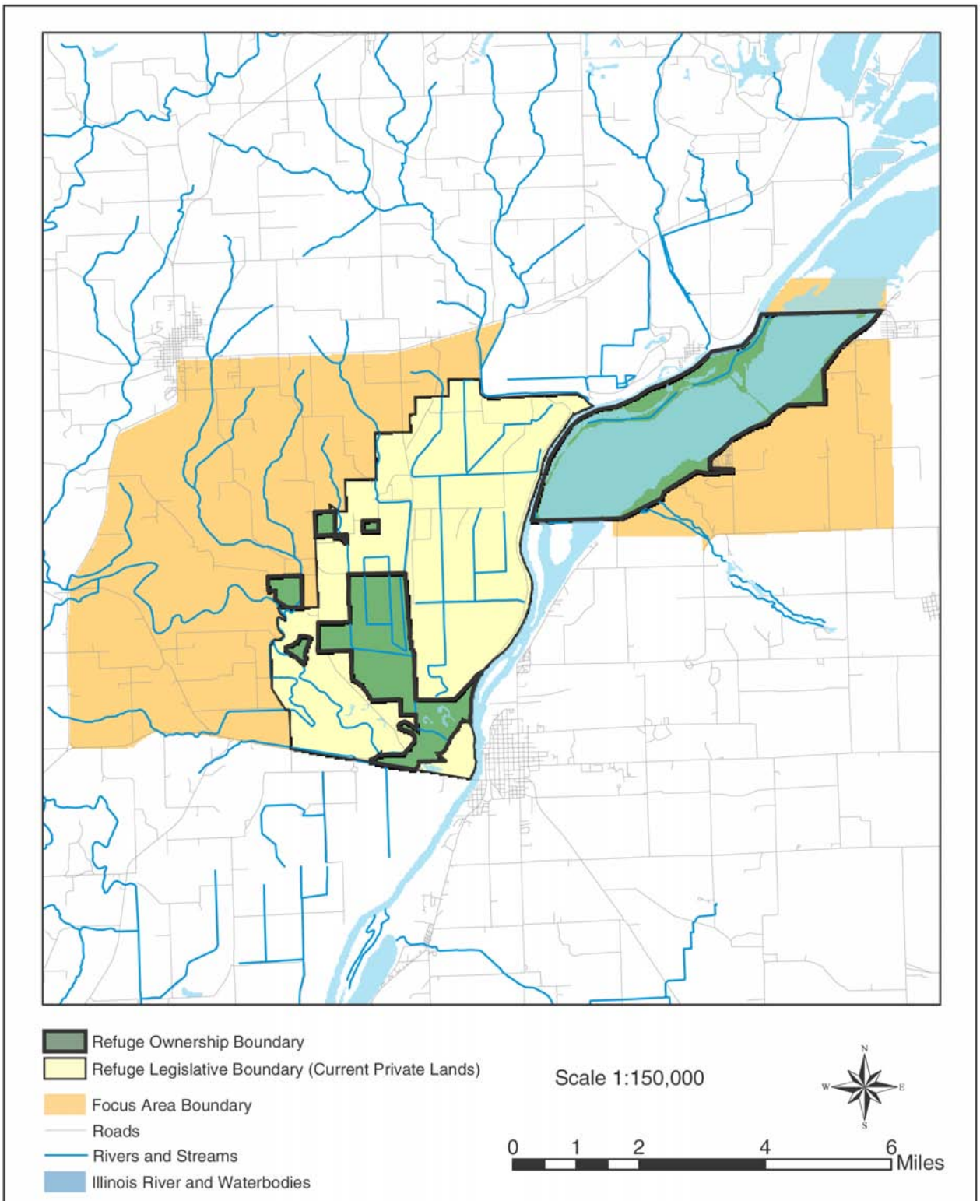


**Figure 13: Conservation Focus Areas, Meredosia NWR**

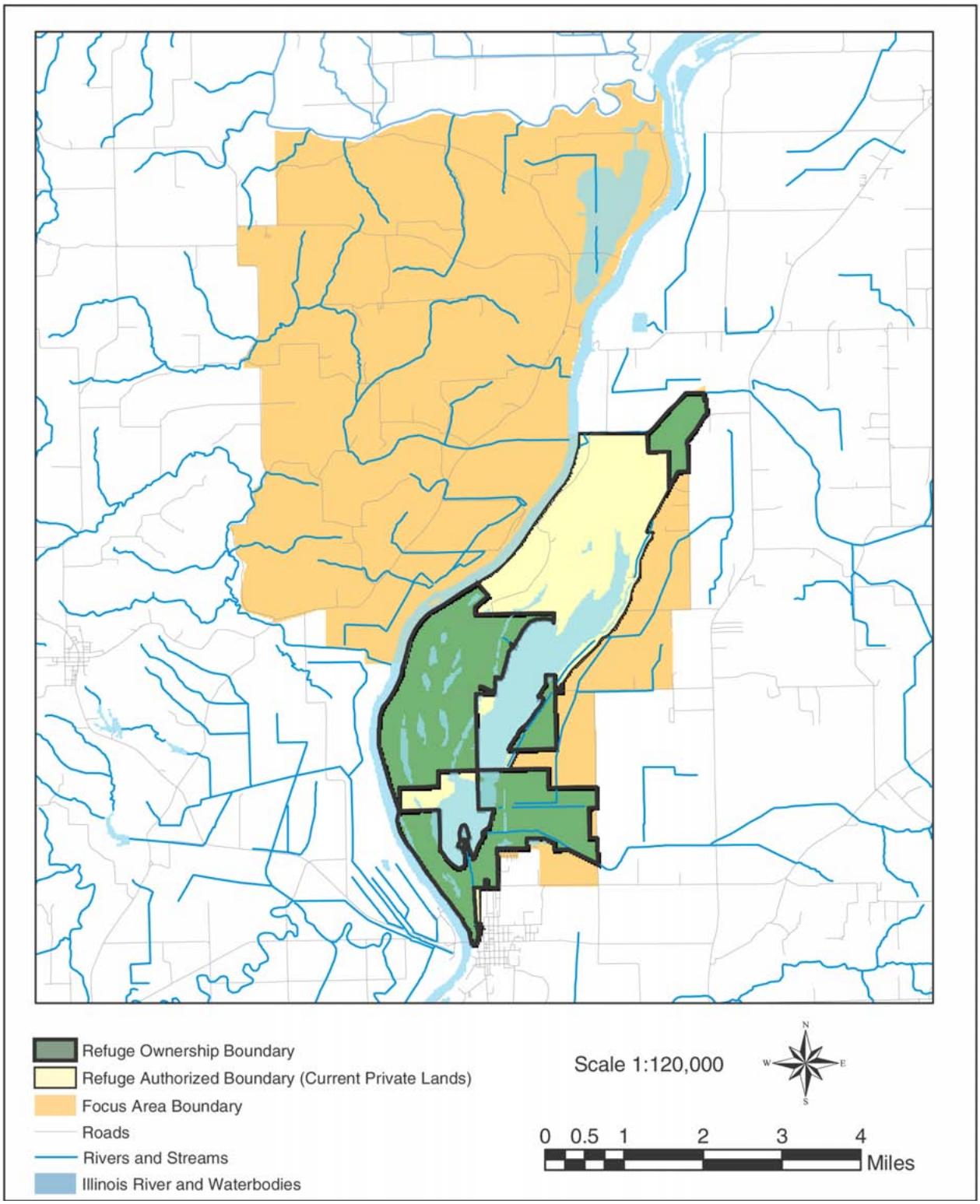


**Figure 14: Focus Area Boundaries, Cameron-Billsbach Unit of Chautauqua NWR**

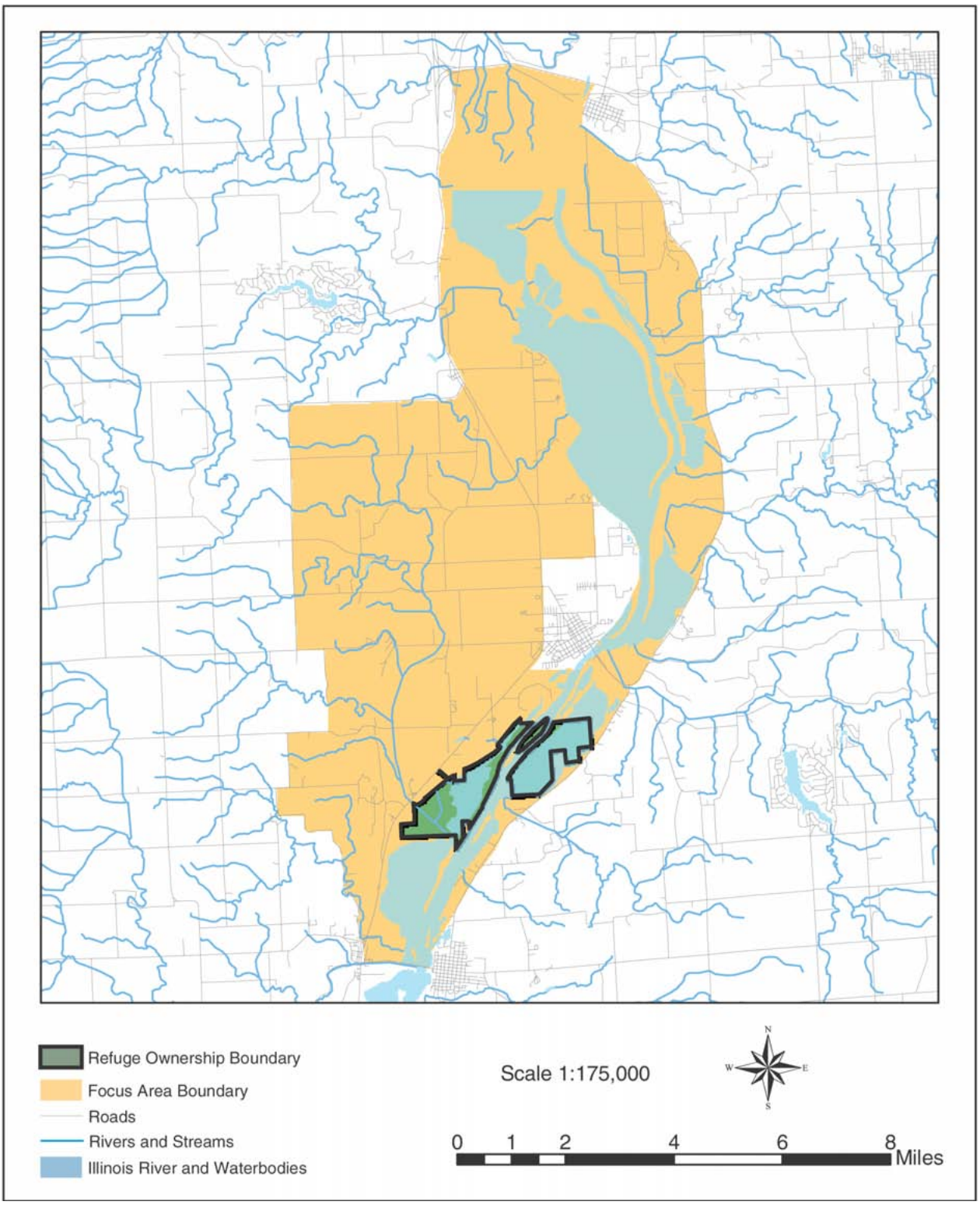


**Figure 15: Focus Area Boundaries, Lower Sangamon**

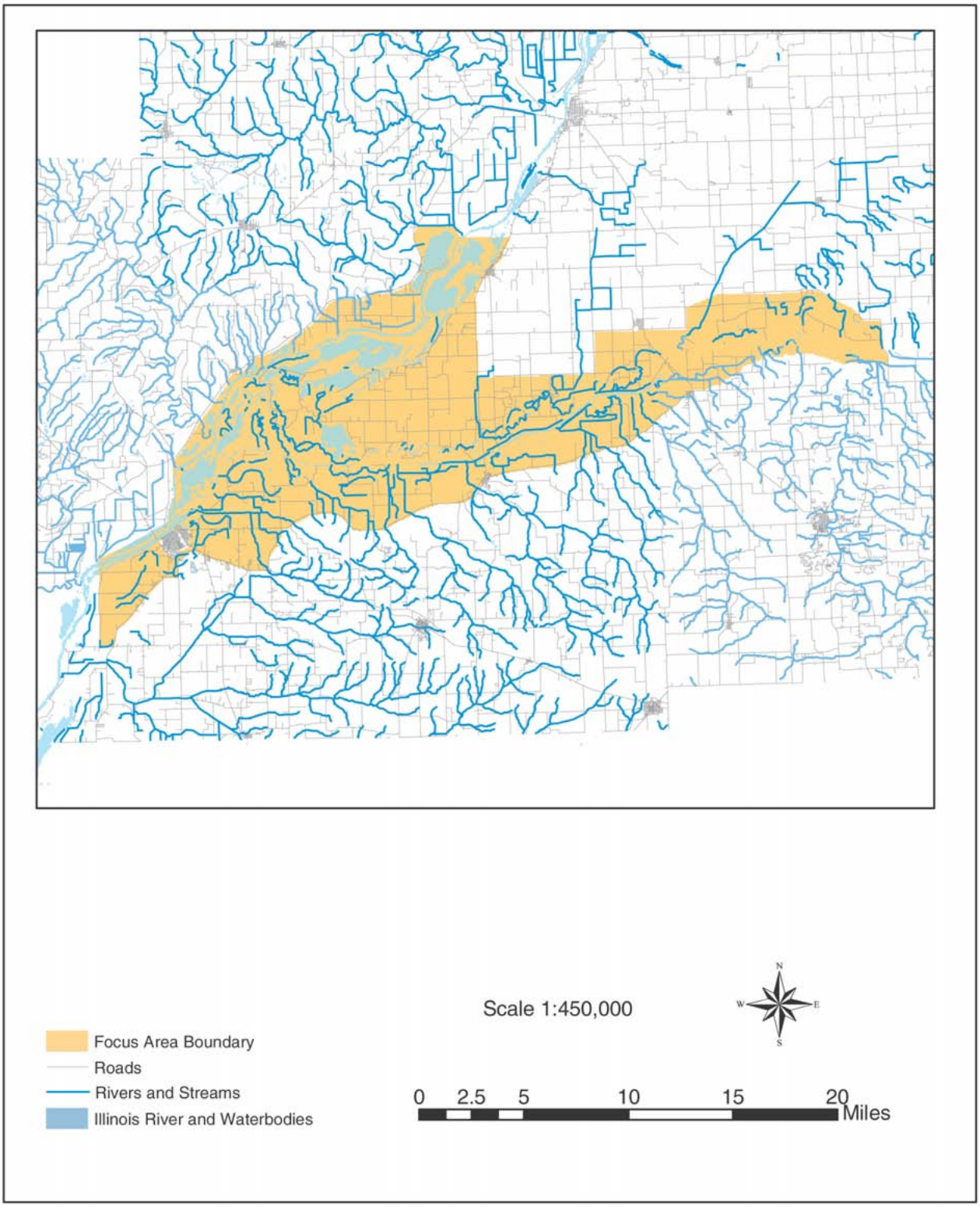


**Figure 16: Conservation Boundaries Within Focus Areas, Chautauqua NWR and Emiquon NWR**

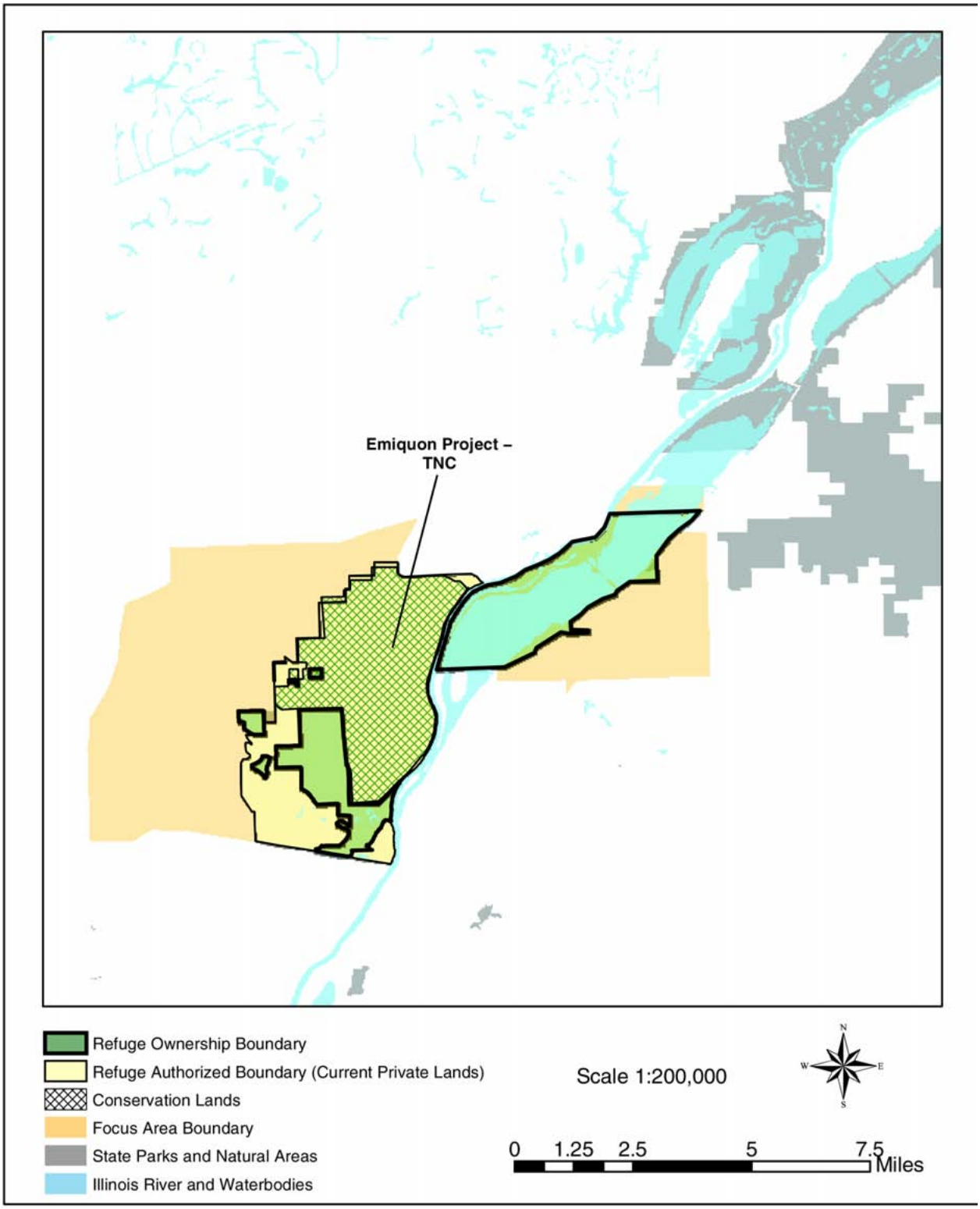
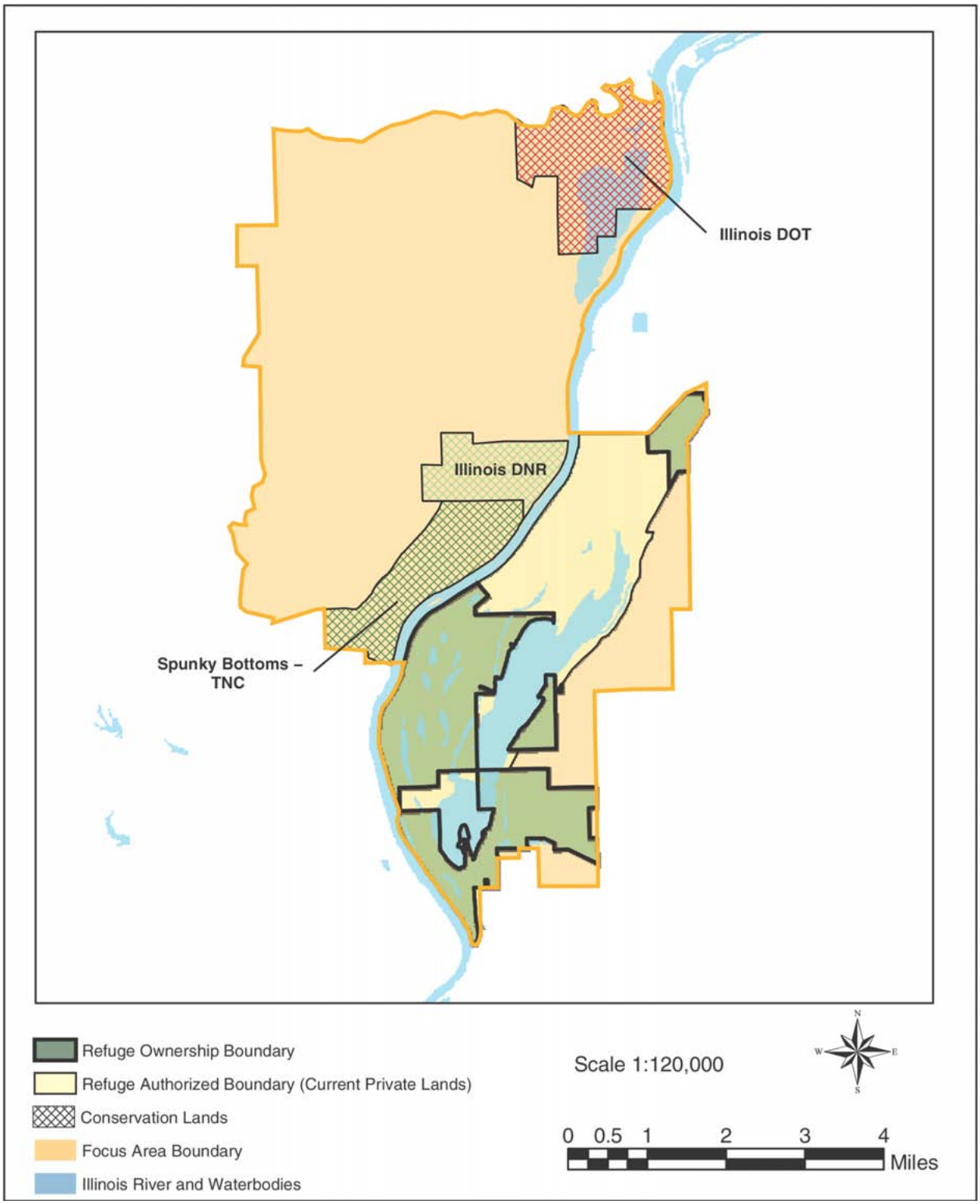


**Figure 17: Conservation Boundaries Within Focus Areas, Meredosia NWR**



Management guidance for listed species within the Refuge Complex is currently limited. In general, management actions are aimed at protecting all federally listed threatened and endangered species on Refuge Complex land. Current management guidance (goal) for listed species includes protecting and enhancing Refuge habitats to maintain or increase use by endangered or threatened species (the Refuge Complex has an objective level of 3,415 use-days for Bald Eagle and Osprey). However, currently the only efforts being made in this regard is to provide maintenance habitat for Bald Eagles on Refuge Complex land. Bald Eagles use the Refuge Complex from October through March, with peak numbers occurring between November and January. A record 176 eagles were observed on Chautauqua NWR on February 4, 1999, when late winter flood waters topped the north spillway in the South Pool. The most important habitat component provided by the Refuge Complex is sanctuary in the form of mature roost trees protected from human disturbance (primarily Melz Slough and, to a lesser extent, Liverpool Lake). The Refuge Complex also contributes food for eagles in the form of fish and waterfowl. Management actions contributing to Bald Eagle maintenance include assuring an abundance of roost trees for migrating eagles, and providing fish and waterfowl as food sources. Mid-winter Bald Eagle surveys are conducted in January and generally cover all refuges within the Complex. Meredosia NWR and Chautauqua NWR have both supported active Bald Eagle nests in the past. Bald Eagle nests are protected during the nesting season by minimizing all activity around them. For these actions, the Refuge Complex currently follows guidance contained in the Northern States Bald Eagle Recovery Plan.

A small population of decurrent false aster (*Boltonia decurrens*), a federally-listed threatened species, has existed on Meredosia NWR since the 1980s. It is a disturbance-dependent species found only at a few sites along the floodplain of the Illinois River. Botanical surveys are currently conducted annually by Dr. Marian Smith of Southern Illinois University-Edwardsville on the Sandy Point population. Small populations are also found on Chautauqua NWR. No protection is currently afforded this plant species on Refuge Complex land.

#### 3.2.2.2 Waterfowl and Other Migratory Birds

The Illinois River Corridor serves as a temporary home to hundreds of thousands of waterfowl that feed and rest on their annual spring and fall migrations. The middle Illinois River valley, stretching from about Hennepin, Illinois, to Beardstown, Illinois, was historically one of the most important areas for migrating waterfowl in all of North America. Although many of the most significant areas have been greatly altered over the years by drainage and cropping of wetlands within the flood plain, shallow bottom land lakes, sloughs, marshes and side channels remain but most are in a degraded state. The Illinois River and associated wetlands provide some of the most significant areas of Wood Duck production and mid-migration mallard habitat in the Mississippi Flyway. The breeding Wood Duck population in the valley is estimated at over 20,000 (North American Waterfowl Management Plan, 1998). Peak Mallard populations have been known to exceed one million ducks.

Twenty-eight species of waterfowl are known to use the Refuge Complex, including Trumpeter and Tundra swans. Two hundred and sixty four species of birds have been documented on Refuge Complex land. The north and south pools of Lake Chautauqua provide a mix of prime habitat for diving ducks and dabbling ducks. Chautauqua NWR in particular provides a haven for more than 40 percent

**Table 1: Annual Waterfowl Use Days 1989-1999**

| Year | Chautauqua NWR | | Emiquon NWR | | Meredosia NWR | | Cameron-Billsbach | |
|---|---|---|---|---|---|---|---|---|
| | *Ducks* | *Geese* | *Ducks* | *Geese* | *Ducks* | *Geese* | *Ducks* | *Geese* |
| 1989 | 1,152,806 | 227,483 | | | 604,682 | 44,755 | 148,225 | 22,670 |
| 1990 | 1,265,049 | 479,525 | | | 1,717,415 | 105,858 | 147,237 | 36,630 |
| 1991 | 1,670,239 | 87,236 | | | 641,214 | 7,013 | 110,571 | 12,198 |
| 1992 | 3,162,339 | 73,325 | | | 669,645 | 4,470 | 152,045 | 6,215 |
| 1993 | 790,817 | 233,365 | N/S | N/S | 467,084 | 21,578 | 103,845 | 10,222 |
| 1994 | 13,411,544 | 1,400,647 | N/S | N/S | 579,113 | 3,000 | 92,625 | 8,610 |
| 1995 | 6,756,325 | 1,948,498 | N/S | N/S | 584,266 | 21,189 | 267,616 | 1,364 |
| 1996* | 1,559,586 | 196,020 | 34,480 | 1,750 | 176,330 | 3,360 | 15,770 | 5,510 |
| 1997 | 2,006,910 | 545,990 | 2,957,100 | 16,850 | 781,000 | 2,360 | 22,095 | 2,970 |
| 1998 | 9,176,961 | 348,704 | 649,602 | 2,600 | 956,370 | 1,675 | 54,787 | 4,010 |
| 1999 | 7,057,289 | 210,230 | 945,720 | 2,100 | 1,752,525 | 1,435 | 164,575 | 3,660 |

* *January 1-September 30 only.*

of the waterfowl that use the Illinois River segment of the Mississippi River Flyway. Table 1 shows monthly duck use days from the period 1989-1999.

In addition to waterfowl, wetlands along the Illinois River provide habitat for over 30 species of shorebirds and 10 species of gulls and terns. The dense wetland vegetation on Chautauqua NWR provides ideal shelter and feeding habitat for marsh birds such as Sora Rail and Yellow Rail, Great Blue Herons, and Great Egrets. Although they are secretive and seldom seen, American Bitterns and Green Herons feed among the more than 70 plant species found in Lake Chautauqua. The low water of summer and the resulting mud flats produce an abundance of shorebirds, especially sandpipers. August is the time to see the many shorebird species found on the Refuges.

Management guidance for waterfowl and other migratory bird management for the Refuge Complex is aimed at providing high quality resting, nesting, and feeding habitat for waterfowl and other migratory birds. Current management actions are directed toward duck maintenance, goose maintenance, and Wood Duck production.

The Mallard is considered to be the most important of several species of dabbling ducks that use the Refuge Complex in the fall (September through December). The Refuge Complex is generally thought to be less important to waterfowl in the spring, when sheet water is common throughout the area and there is no hunting pressure. In the fall, management is directed to provide shallowly flooded moist soil plants for feeding and open water areas for roosting and sanctuary. Submergent and emergent aquatic vegetation would also be desirable, but these vegetation types are practically non-existent at the present time. Most waterfowl and other migratory bird management occurring on the Refuge Com-

plex is accomplished through habitat management. Criteria used to evaluate duck and goose maintenance success include the number of acres available for moist soil management and to a lesser degree, the number of acres of submergent or emergent aquatic vegetation.

In the past, the Refuge Complex had an extensive Wood Duck nest box program. During this time, approximately 50 nest boxes for Wood Ducks are maintained on the Refuge Complex. Success of the nest box program is monitored by Refuge volunteers.

Current management for Wood Ducks consists primarily of attempting to provide both nesting and brood-rearing habitat. Nesting occurs in both natural cavities and artificial nest boxes. Brood habitat consists of relatively shallow open water interspersed with emergent vegetation, which provides both food and cover. Proximity of brood habitat to nesting habitat is also an important consideration. Criteria used to evaluate Wood Duck success include the number of acres of permanent water with emergent vegetation, proximity of emergent vegetation to main nesting habitats, and availability of trees with natural cavities, primarily in Melz Slough and along South Dike. Due to 1993 and 1995 flooding of the Illinois River and the high tree mortality associated with it, there is an abundance of dead trees with natural cavities but these trees are rapidly disappearing.

Floating goose nesting structures that were placed in Lake Chautauqua by the Quiver Creek hunt clubs in the 1990s have fallen apart and have been removed from the lake. There was no known nesting in any of the structures and because of the litter problem and no identified need to produce local Canada Geese, structures will not be placed in the lake in the future.

The Refuge's prescribed burning program is designed to directly benefit nesting grassland birds in open and semi-open landscapes. These programs also help to increase the amount of suitable waterfowl nesting habitat. The Refuge also attempts to attract waterfowl, shorebirds, and other marsh birds by managing water levels on most of its pools. The purpose of water level manipulation on these pools is to grow food plants and to increase the availability of aquatic invertebrates that are favored by migrating water birds. Wetland restoration and prescribed burning activities have been used to restore and maintain sedge meadows on the Refuge Complex. This provides nesting habitat for birds including Sedge Wrens, sparrows, rails, and warblers.

The annual drawdown of the South Pool of Lake Chautauqua provides excellent foraging opportunities for wading birds, shorebirds and other wildlife. During this drawdown period shorebird surveys are performed by Refuge volunteers.

The Refuge Complex also participates in annual Mourning Dove and Woodcock surveys. Mourning Dove surveys are conducted in Fulton and Cass counties and Woodcock surveys are conducted in Fulton and Mason counties. Results of the nationwide surveys are pooled to determine populations trends for the two species. The population trends are then used to set harvest limits for states where these birds are hunted. Surveys are generally conducted in May or June.

### 3.2.2.3 Native Fish and Mussels

The Service's fisheries program focuses on a broad variety of federal trust species and the aquatic habitats on which these species depend. For the fisheries program, the term "federal trust species" refers to organisms targeted through the Endangered Species Act, potentially impacted by federal actions under any federal authority within which the Service has formal review or regulatory responsibility; identified within federal mitigation responsibilities assigned to the Service; inhabiting or migrating through interjurisdictional waters; considered nationally significant, rare or declining in range or population size and lacking protection from non-federal authorities; occurring on federal lands; subject to the interests of Native American governments or otherwise aligned with the Service's tribal trust responsibilities; or covered directly or in potential under any of the approximately 29 public laws, or treaties, interstate compacts, Executive Orders, statutes, and agreements pertaining to the Service's mission and natural resource management responsibilities.

The Illinois River was once among the most biologically productive rivers in the nation. As recently as the 1950s, the waters of the Illinois River and its associated tributaries were counted as among the great inland commercial and sport fisheries. Although no longer the case, the state as a whole remains one of the nation's top producers of freshwater fish. The river is home to more than 100 fish species, and its side channels and backwater lakes serve as important nursery areas. Commercial fish yields experienced abrupt declines in the 1920s and by the 1960s the commercial fishery was only 4 percent (1 million pounds) of what it was prior to the establishment of the drainage and levee districts. Since the 1960s the commercial fishery has further eroded and generally remains at about 700,000 pounds per year, a mere 2 percent of the 1908 harvest. Common carp, bighead carp, and silver carp are among the most abundant species, but other species common to the river include gizzard shad, white bass, large mouth bass, bluegill, and black crappie. Channel catfish, buffalo, bullhead, and sauger also inhabit the river. There are approximately 102 species of fish, 37 species of mollusks, and 10 species of crustaceans found in the vicinity of the Refuge Complex (Appendix C).

Within the upper reaches of the river, fish species diversity is somewhat lower. Because water quality is less than ideal and that stretch includes few backwaters needed for breeding and rearing, only the hardiest species can be found. Thus carp are most plentiful throughout the upper river, except around Starved Rock, which offers more habitat diversity. As habitat conditions improve in this area, other species are appearing in substantial numbers, including largemouth bass, bullhead, walleye and white bass.

The middle river has historically been the most productive area of the river because of the availability of habitat, namely backwaters, that support diverse and productive populations. However, as lakes fill with sediment and aquatic vegetation is killed off, native fish populations decline and other more hardy species, such as carp, predominate.

The lower river from Beardstown, Illinois, to Grafton, Illinois, features roughly the same mix of fish species as the middle river but population numbers are smaller. Even though water quality tends to be better in this reach, fish populations suffer because the lower river is channelized, the floodplain is behind levees, and few backwater areas exist.

#### 3.2.2.4 Mammals

The habitats of the Refuge Complex accommodate 45 species of mammals. Foxes and raccoons are the most abundant predators while cottontails and fox squirrels are the most common rodents. Whitetail deer often are seen along the Refuge roads and dikes. Badgers are rarely seen, but their diggings are obvious along the dike areas. Beavers, muskrats, opossums and woodchucks are common but infrequently seen. The squeaking of southern flying squirrels is commonly heard at night.

Small mammals typical of this area include the eastern mole, deer mouse, white-footed mouse, meadow vole, pine vole, southern bog lemming, and plains pocket gopher. Little brown myotis, big brown bat, and hoary bats use the Refuge Complex.

#### 3.2.2.5 Reptiles/Amphibians

Sixty-seven species of reptiles and amphibians have been reported on the Refuge Complex, but little is known about their populations or their limiting factors. Many of these, such as the snapping and painted turtles, are associated with marsh and open waters while others, such as the common garter snake, occur in grasslands and drier areas of the Refuge Complex.

### 3.2.3 Plant Communities

#### 3.2.3.1 Wetland Resources

In Section 404 of the Clean Water Act, the U.S. Army Corps of Engineers defines wetlands as "areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions." Wetlands are lands transitional between terrestrial and deepwater habitats where the water table is usually at or near the land surface or the land surface is covered by shallow water (Cowardin et al., 1979). Wetlands are diverse systems that provide the biological interface between the aquatic and terrestrial communities, which multiply their function and contribute to their dynamics. Within wetlands, invertebrates, insects, gastropods, and other organisms living among the vegetation provide an important food source for fish and mammals. Waterbirds and other wildlife rely on wetlands for subsistence, nest sites, and cover, while others utilize fish and invertebrates that inhabit the vegetation. Where natural processes are still occurring, zonation and succession in response to environmental conditions are among the important community processes. Water level fluctuations and the resultant plant and animal response are often the most significant driving force in most wetland communities.

The diverse wetlands of Illinois have resulted from geologic events, human activities, and hydrologic conditions. Prior to European settlement, the Illinois River Corridor was composed of shallow marshes, sloughs, meanders, small ponds, and large backwater lakes that allowed dense stands of submergent pondweeds, coontail, waterlilies and emergent duck potato, smartweed, and river bulrush plants to flourish. Vast tracts of naturally flooded wetlands, bottomland hardwoods, and backwater lake habitat provided resting, nesting, and feeding habitat for migrating ducks, geese, and a variety of other migratory birds and resident wildlife. Foods in the form of mast, natural seeds, and invertebrates were available during the September through March migration. Large expanses of open water and marshes also provided a rich source of other wildlife foods.

Today only the most hardy varieties are found, such as river bulrush, marsh smartweed, pondweed, wild celery, coontail, and American lotus. These species appear to tolerate the fluctuating water levels, pollution, and turbidity now characteristic of the modern-day river. River bulrush, the most common emergent aquatic plant found in the Illinois River Corridor, provides nesting habitat for some duck species, as well as food and den material for muskrats. Marsh smartweed, also an emergent variety, provides cover for migrating birds and seeds to feed them. It is a preferred habitat for Wood Ducks and Mallards and provides some food and shelter material for muskrats. Sago pondweed, once considered the most important waterfowl food on the continent, is now relatively rare along the river. It was killed off almost entirely in the 1950s and 1960s, although it has been found in isolated locations along the river. Curlyleaf pondweed, a submerged plant, was abundant in nearly all of the backwater lakes as late as the 1950s. But like other varieties, it is currently found in isolated locations. Wild celery, the preferred food of Canvasback and Ring-neck Ducks, also nearly disappeared from the river valley in the 1950s and 1960's.

Moist-soil vegetation grows on mudflats that occur naturally around the shores of backwater areas. The plants, now the most abundant form of vegetation in the Illinois River Corridor, are an essential food source to 35 different species of waterfowl. The seeds most favored are produced by arrowleaf, several species of millet and smartweed, nutgrasses, rice cutgrass, Spanish needles, teal grass, and water hemp. The health and seed productivity of these plants depend on a year-round cycle of specific water levels. The cycle begins in the spring when waterfowl eat the seeds left on the mudflats around backwater areas. With spring rain, the river overflows and the lakes rise and cover their muddy banks. Light summer rain and low water levels from July to October cause the lakes to recede. As the mudflats dry in the sun, the seeds remaining in the mud germinate and grow. With the coming of the early fall rains, the plants produce seeds once again, the lakes rise, and the mudflats are immersed under a shallow cover of water. This is the environment in which dabbling ducks feed during fall migrations.

Another ecologically important aquatic habitat found along the Illinois River are side channels, which are defined as all departures from the main channel in which there is current during normal river stage. These areas are characterized by low current, soft bottom, and reduced turbidity. They provide important food sources of zooplankton, phytoplankton, and benthic organisms for fish, waterfowl, and migratory birds. Side channels often have a greater production and diversity of benthic organisms, phytoplankton, and aquatic macrophytes than the main channel due to their structural diversity, which ranges from fast flowing chutes with high banks to sluggish streams moving through marshy areas.

#### 3.2.3.2 Forest Resources

Bottomland or floodplain forests within the Illinois River Corridor occupy low-lying areas along the river in relationship to their elevation and distance from water. While once rich in forests, the river's forests today consist of a little more than narrow strips along the edges of the riverbanks. The most densely forested bottomland areas today are located around LaSalle and Starved Rock and in the Alton Pool, the river's southernmost section. Floodplain forests are characterized by poor drainage and slow permeability. In general, flooding regimes, including depth and duration, are major forces in determining species composition

and richness and in determining growth. Floodplain forests in Illinois include wet, wet-mesic, and mesic floodplain forests. Vegetation diversity tends to increase from wet to mesic floodplain forests.

Wet floodplain forests occur in the floodplain bordering the river and include the riverbank. In general, trees and shrubs found in the wet floodplain forest zone are those species most tolerant of flooding. Thus, compared with other floodplain forests, wet floodplain forests contain fewer trees since flood frequency and duration tend to be limiting factors for this community. Wet floodplain forests are often seasonally flooded and/or have perched water tables during a portion of the year, often in late winter and spring. Canopy species in this community include silver maple, hackberry, green ash, honey locus, sycamore, and cottonwood. Sub-canopy species include box elder, Kentucky coffeetree, river birch, and black willow. Shrubs and woody vines include elderberry, bristly catbrier, trumpet creeper, poison ivy, and riverbank grape. Ground cover includes ragweed, panicled aster, a variety of nettles, blue lobelia, honewort, Virginia wild rye, annual bedstraw, and an assortment of others.

Wet-mesic forests typically occur on low terraces along the river and tend to be intermediate in flood duration. Typical canopy species include silver maple, bitternut hickory, hackberry, honey locust, green ash, black walnut, pin oak, and American elm. Sub-canopy species include box elder, sugarberry, red haw, red mulberry, persimmon, Kentucky coffeetree, and slippery elm. Shrubs and vines include paw paw, Missouri gooseberry, common blackberry, elderberry, bristly catbrier, poison ivy, and riverbank grape. Groundcover species include ragweed, false nettle, a variety of sedges, wild chervil, enchanter's nightshade, honeywort, Aunt Lucy, Virginia wild rye, annual bedstraw, white avens, cow parsnip, Virginia waterleaf, wood nettle, Virginia blue bells, woodland phlox, and others. Very few, if any, high quality wet-mesic floodplain forests occur today within the Illinois River Corridor.

Mesic floodplain forests typically occur along high terraces and have relatively brief flooding duration and lower flooding frequency. Common canopy species include sugar maple, black walnut, red oak, bur oak, chinquapin oak, basswood, and American elm. Sub-canopy species include Ohio buckeye, red mulberry, persimmon, and slippery elm. Shrubs and vines include paw paw, redbud, Missouri gooseberry, bladdernut prickly ash, Virginia creeper, bristly greenbrier, poison ivy, and riverbank grape. Ground cover species include many species found in mesic upland forests: doll's eye, wild ginger, Jack-in-the-pulput, spring beauty, enchanter's nightshade, leather flower, hairy and smooth sweet, and a variety of others.

Ecological concerns associated with floodplain forests include flooding, hydrologic cycle maintenance, fire suppression, timber harvest, fragmentation, siltation, and exotic and invasive species. For instance, considerable tree mortality occurred along the Illinois River following the severe flooding in 1993. In general, trees and shrubs found in wet floodplain forests fared much better in 1993 than those found in mesic floodplain forests. Historically, floodplain forests within the Illinois River Corridor were comprised of a diversity of tree species. However, those communities that remain are often dominated by silt and flood-tolerant species (e.g., silver maple).

Farther upland from the river the forest communities are dominated by mixed softwoods, including silver maple, American elm, swamp privet, red mulberry,

box elder, green ash, sycamore, and river birch. Still higher up in elevation, the forest community includes sugarberry, hackberry, hawthorn, honey locust, bur oak, and dogwood. Grading into the blufftops and at some distance from the river, the forest community is characteristic of a diverse mix of softwoods and hardwoods, including oak and hickory, red and sugar maples, and black walnuts.

Upland forest communities can be classified by soil-moisture characteristics as tree species tend to respond in predictable ways along soil-moisture gradients. For the Illinois River Corridor, these would include dry, dry-mesic, mesic, and wet-mesic upland forests.

Dry upland forests are found on ridge crests and slopes with south and south-western exposures. Major canopy species include white oak and black oak. Subcanopy species include shadbush, flowering dogwood, hop hornbeam, redbud, and red cedar. Shrubs include roughleafed dogwood, aromatic sumac, smooth sumac, pasture rose, nannyberry, and hazelnut. Woody vine include Virginia creeper and poison ivy. Garlic mustard, an extremely invasive species, has become locally abundant in many areas and has replaced many native species. Ground cover species include pussy toes, sedges, poverty oats, soft agrimony, hog peanut, tall anemone, shooting star, and a host of others. Several prairie species are often found in forest openings including big bluestem, little bluestem, yellow stargrass, and flowering spurge.

Dry-mesic upland forests, the most prevalent forest community type in Illinois, are found along the upper to middle slopes and ridges of the dissected terrain bordering the Illinois River and on the slopes and sides of ravines. Major canopy species include white oak, black oak, shagbark hickory, and white ash. Subcanopy species include sugar maple, sassafras, shadbush, blue beech, hop hornbeam, redbud, red mulberry, black cherry, and slippery elm. Typical shrubs include rough-leafed dogwood, hazelnut, Iowa crabapple, Missouri gooseberry, black raspberry, aromatic sumac, black haw, and nannyberry. Woody vines include Virginia creeper, poison ivy, bittersweet, bristly greenbrier, riverbank grape, and summer grape. Groundcover includes pussy toes, Virginia snaketoes, whorled milkweed, ebony spleenwort, blue aster, rattlesnake fern, soft agrimony, sicklepod, sedges, and others.

Mesic upland forests occur on sites where available soil moisture is greater than that in dry-mesic sites. These forests are found on the lower-to-middle slopes of the dissected terrain associated with major streams and tributaries. They are characteristic of dense canopies, an understory of shade tolerant woody species, and a variety of woodland wildflowers. Canopy cover includes sugar maple, red oak, bur oak, and basswood. Subcanopy species include Ohio buckeye, shadbush, red mulberry, paw paw, blue beech, and hop hornbeam. Typical shrubs include elderberry, redbud, alternate-leafed dogwood, wahoo, black haw, bladdernut, wild hydrangea, buckbrush, prickly-ash, wafer-ash, common chokeberry, black current, and gooseberry. Woody vines include poison ivy, Virginia creeper, grape honeysuckle, and riverbank grape. Groundcover includes spikenard, yellow bellwort, black snakeroot, bloodroot, blue cohosh, broadleaf goldenrod, fern, and a rich assortment of others.

Wet-mesic upland forest occur where drainage is limited, either by soil characteristics or where depressions occur within the upland forest. While such conditions exist within the Illinois River Corridor, few examples of this community exist.

Typical canopy species would include swamp white oak. Subcanopy is often absent. Groundcover species probably include wetland sedges and shrub species.

Ecological concerns with upland forests include loss and degradation from agricultural development and urban sprawl, timber harvest, grazing, exotic and invasive species, over-browsing by deer, fire suppression, and habitat fragmentation. For instance, over grazing often produces major changes to a forest's structure and composition. As such, many grazing-sensitive species have probably been eliminated from many forest remnants along the Illinois River, while those more tolerant (e.g., thorn-bearing taxa such as red haw, honey locust, gooseberry, blackberry) have probably become more abundant. Non-native species also tend to increase from over-grazing, such as garlic mustard, buckbrush, and poison ivy. Fire suppression typically results in compositional changes in mesic forests (an increase in sugar maples) and primarily structural changes in drier sites (such as an increase in stem density of woody plants and shade). The result is often a reduction in cover and diversity of the ground flora, often the most diverse stratum in Illinois woodlands (Taft et al. 1995).

#### 3.2.3.4 Grassland Resources

The Great Plains, once the continent's largest biome, has become functionally non-existent over the last 150 years. 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. Prior to human-induced alteration, the lower Illinois River floodplain was roughly 40 percent prairie. Today few remain. Loss and fragmentation of prairie landscapes combined with changes in natural processes have had negative consequences for many grassland plants and associated animals

Historically, prairies were an important component of Illinois River ecosystem structure and function. Prairies are plant communities dominated by herbaceous plant species (mainly grasses) and where trees are either absent or widely scattered across the landscape. Illinois lies within an area called the "prairie peninsula," an eastward extension of prairies that borders deciduous forests and woodlands to the north, east, and south. Prairies of this region were maintained under the influence of three major stresses: climate, grazing, and fire. Prairies in this region are subject to extreme temperature fluctuations, with hot summers and cold winters. Rainfall and growing seasons vary from year to year, with prolonged droughts lasting for several years. Prairie fires, started by Native Americans and lightening, were probably common prior to European settlement. As fire moved across the landscape, it killed-off most saplings of woody species, removing thatch that aided in nutrient cycling, and promoting flowering of many species. A portion of the above-ground prairie was consumed each year by grazing animals, such as bison, elk, deer, and rabbits. Grazing was an integral part of the ecosystem performing many functions important for diversity and maintenance.

Three main types of prairie historically occurred in the Illinois River Corridor. They are 1) prairie (black soil, silt-loam prairies, including dry-mesic prairie, mesic prairie, wet mesic prairie, and wet prairie), 2) sand prairie, and 3) hill prairie.

Dry-mesic prairies are typically found on slopes or on soil that is fairly well drained. Common grasses, forbs, and shrubs include little bluestem, big bluestem, prairie dropseed, prairie panic grass, switch grass, Indian grass, side-oats gama, porcupine grass, prairie sedge, Mead's stiff sedge, plains oval sedge, bird's foot violet, black-eyed Susan, compass grass, blazing star, leadplant, New Jersey tea, prairie willow, smooth sumac, and pasture rose (Illinois DNR, 2001). Ecological concerns associated with dry-mesic prairies include the absence of fire and other natural disturbances, wood plant encroachment, and exotic species invasion. Common exotic species include Kentucky bluegrass, Canada bluegrass, sweet clovers, Queen Anne's lace, parsnip, and asparagus (Solecki 1995, 1997).

Mesic prairies are among the most species rich plant communities in North America. Typical remnants contain from 15 to 30 species in a half-meter square sampling quadrat (Illinois DNR, 2001). Most of the plant species found in dry-mesic prairies also occur in mesic prairies. Common grasses and forbs include little bluestem, big bluestem, prairie dropseed, switch grass, Indian grass, compass plant, and prairie dock. Ecological concerns for mesic prairie are similar to those in dry-mesic prairies. No remnant of this prairie type occurs on the Refuge.

Wet-mesic prairies are transitional between mesic and wet prairies and can include plant species from each. Typical grasses, forbs, and shrubs include big bluestem, prairie cordgrass, blue joint grass, awl-fruited oval sedge, brown fox sedge, closed gentian, Culver's root, golden Alexanders, marsh blazing star, swamp rose, prairie willow, and sometimes pussy willows. Ecological concerns for this prairie type are similar to those for dry-mesic and mesic prairie, with the addition of hydrologic cycle maintenance. No remnant of this prairie type occurs on the Refuge.

Wet prairie is a community type where surface water is present during winter and spring and the soil is almost saturated. Typical grasses, forbs, and shrubs include: prairie cord grass, blue joint grass, big bluestem, blue flag, common boneset, panicled aster, prairie Indian plantain, meadow sweet, swamp rose, and sometimes pussy willows. Ecological concerns for this prairie type are similar to those for dry-mesic and mesic prairie, with the addition of hydrologic cycle maintenance. No remnant of this prairie type occurs on the Refuge.

Sand prairies occur where the soil is composed predominantly of sand or sandy loam. White and Madany (1978) recognized five sand prairie community types, based on soil moisture, from dry to wet. Numerous rare and declining plant species occur in sand prairies in this region. These include bog clubmoss, broom-rape, dwarf grape fern, ear-leafed foxglove, false heather, and kitten tails, to name a few. Prairie fameflower, a species that has been considered for listing at the federal level, is also found in sand prairies.

Hill prairies are grassland communities that occur on slopes typically with exposure to the south and/or southwest. Soils moisture conditions are very dry. Substrate, which is also used to differentiate this type of prairie, include loess, glacial drift, gravel, and sand. The floristic composition of hill prairies is a combination of species that also occupy other prairie types (e.g., dry, black soil, sand, and gravel prairies). Because of their inaccessibility, hill prairies have survived as a greater proportion than other prairie types, leaving hill prairies as some of the last remnants of the prairie biome that dominated Illinois for 8,000 years prior to European settlement. Ecological concerns for this prairie type are

similar to those for other prairie types, with the addition of the diminution of grazing, which results in the conversion of hill prairies to forest. For this reason, hill prairies remain severely threatened within the Illinois River Corridor.

*Photograph by Bernie Angus*

Ecological concerns associated with native grasslands include loss, fragmentation, fire suppression, hydrologic cycle maintenance, exotic and invasive species, and development. 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.

Until the 1950s, many remnant prairie tracts were surrounded by agricultural grasslands (haylands/pasture), which helped support their natural structure and function. Today, few of these agricultural grasslands remain, causing many prairie remnants to become islands surrounded by row-crop fields and other development. Further, much of the remaining tallgrass prairie habitat in the area is highly fragmented and dominated by human activity. Habitat fragmentation diminishes habitat suitable for area-sensitive species. Habitat size, shape, and amount and type of edge are important factors in the reproductive success of many grassland birds. Without proper management, many remaining areas will continue to degrade due to their size, isolation, absence of natural processes such as fire and hydrologic cycle maintenance, and inadequate buffers protecting them from surrounding agricultural and urban land uses. Fire absence can lead to woody vegetation encroachment and severe invasion of non-native grasses, which can eliminate many prairie plants. Moisture regimes of many remaining mesic, wet-mesic, and wet prairies have been altered by drainage tile/and or ditches. Many of the ground nesting birds that utilize remaining prairies must concentrate their nesting effort in small scattered parcels of habitat with large amounts of linear edge, where predators such as red fox, striped skunk, and raccoon easily forage. Large native predators (wolves, cougar and bear) which historically preyed on bison, deer, and livestock, have been eliminated from the area and naturally replaced by medium-sized predators (fox, skunk, raccoon) that prey extensively on birds, their eggs, and their young.

### 3.2.3.5 Savanna Resources

Prior to European settlement, oak savanna covered approximately 27-32 million acres of the Midwest (Nuzzo 1986). This same author indicates that in 1985, only 113 sites (2,607 acres) of high-quality oak savanna remained. More than 99 percent of the original savanna has been lost, and Midwestern oak savanna is among the rarest ecosystems in the world. Development has destroyed, fragmented, and disrupted natural processes needed to maintain quality oak savanna ecosystems.

Savanna are characterized by scattered, open-grown trees, with or without shrubs, and a continuous herbaceous ground cover typically dominated by grasses, sedges, and forbs. Density and percent of tree cover varies from little to none, and is intermediate between open prairie and closed woodland and forest.

Savanna is defined as having at least one tree per acre, but less than 50 percent cover. In the dissected terrain of the major river valleys, such as the Illinois River, savannas often occurred associated with a mixture of vegetation types including prairie, woodland-barrens, and forest (Zawacki and Hausfater, 1969; Nelson et al. 1994). Midwestern savanna-like habitats have several unifying characteristics including:

- open canopy structure;
- canopy dominance by a few species of oaks;
- ground cover usually rich in species associated with tallgrass prairie;
- a majority of floristic diversity contained in the ground cover;
- dependence on fire and other disturbances for maintenance of diversity and stability.

Three savanna sub-classes are recognized in Illinois: savanna (generally on fine-textured soils), sand savanna, and barrens (local inclusions of a prairie flora within an otherwise forested landscape) (White and Madany 1978, Madany 1981). However, only the silt-loam savannas are known to occur within the reach of the river occupied by the Illinois River Refuge Complex. Prior to European settlement, savanna was a likely feature of the Illinois River landscape (Nuzzo, 1986). Today, few remain.

Dry-mesic savanna are natural communities where the tree layer is comparable to dry-mesic upland forests and the understory is similar to dry-mesic prairie. Dry-mesic savanna historically occurred within the Illinois River Corridor on the upper slopes and ridge tops of areas dissected by the Illinois River and major tributaries (Illinois DNR, 2001). It is characteristic of a woodland/hill prairie complex and were ecotonal between upland prairies and upland forests. However, in the absence of fire, these areas rapidly developed into closed woodlands. Most of the remaining dry-mesic savannas within the Illinois River Corridor have been degraded and/or undergone substantial vegetational changes. Tree species in these communities primarily include white oak and black oak. Shrubs usually include hazelnut, common blackberry, rough-leafed dogwood, leadplant, and willow. Grasses and forbs include big bluestem, oat grass, white-haired panic grass, little bluestem, Indian grass, bird's foot violet, Canadian milk vetch, common carrion flower, Culver's root, hog peanut, purple coneflower, and shooting star. Within the Illinois River Corridor, less than 10 acres remain (Illinois DNR, 2001).

Mesic savanna typically were associated with prairie groves on level to slightly rolling terrain, at the base of moraine ridges, or as islands surrounded by wetland vegetation (Illinois DNR, 2001). Mesic savannas may also have occurred as ecotonal areas between upland prairies and bottomland forest communities. Vegetational characteristic for mesic savannas is not entirely known, since few remain. Tree species probably included bur oak, black oak, and white oak. Shrubs were probably similar to dry-mesic savannas and include leadplant, New Jersey tea, gray dogwood, and hazelnut. Grasses included big bluestem, little bluestem, and Indian grass. Mesic savannas are among the rarest communities in the Midwest.

Wet-mesic and wet savanna, like mesic savanna, are so rare that little information is available on these natural communities. Nelson et al. (1994) infers their possible occurrence along the lower Illinois River prior to European settlement.

He concluded that since roughly 56 percent of floodplain along the lower Illinois River was forested in the early 1800s and, based on stem-density data calculated from Government Land Office (GLO) records, at least some of this forest could have been wet to wet-mesic savanna. While no detailed descriptions are available, the following is an account compiled by Nelson et al. (1994). Tree species probably included hackberry, pecan, American elm, cottonwood, pin oak, bur oak, black walnut, and willows. Shrub layers probably were not well established, but may have included box elder and elderberry. Groundcover may have included prairie cord grass, Virginia wild rye, stout wood reed, giant ragweed, sawtooth sunflower, Jurusalem artichoke, and goldenglow.

Ecological concerns associated with savanna are similar to that of prairie and include flooding, timber harvest, fragmentation, siltation, exotic and invasive species, and development. Of late, a new round of human-induced change threatens many remaining savanna ecosystems. In a trend called "rurbanization," rural areas are being converted to a more densely developed state. As a result, many remaining and restorable savannas are being fragmented through housing development, roads, etc., which diminishe the value of these areas for area-sensitive wildlife. Habitat size, shape, and amount and type of edge are important factors in the reproductive success of many wildlife species. Without management, most areas will degrade due to their size, isolation, and absence of natural processes (such as fire) and inadequate buffers protecting them from surrounding land uses.

#### 3.2.3.6 Biological Integrity, Diversity, and Environmental Health

The Service defines biological integrity as "biotic composition, structure, and functioning at genetic, organism, and community levels comparable with historic conditions, including the natural biological processes that shape genomes, organisms, and communities." As such, biological integrity can be evaluated by examining the extent to which biological composition, structure, and function has been altered from historic conditions. Biological composition refers to biological components such as genes, populations, species, and communities. Biological structure refers to the organization of biological components, such as gene frequencies, social structures of populations, food webs of species, and niche partitioning within communities. Biological function refers to the processes undergone by biological components, such as genetic recombination, population migration, the evolution of species, and community succession.

Biological integrity lies along a continuum from a biological system extensively altered by significant human impacts to the landscape to a completely natural system. No landscape retains absolute biological integrity, diversity, and environmental health. However, the Service strives to prevent the further loss of natural biological features and processes; i.e., biological integrity.

Currently, there is no written guidance for managing biological integrity, diversity, and environmental health specific to the Refuge Complex. Current management intent is to restore and maintain high quality ecosystems within the approved boundaries of the Refuge Complex primarily for the benefit of waterfowl and other migratory birds. While there has been no direct effort to manage Refuge Complex land for the benefit of biological integrity, diversity, and environment health, management's recent focus on landscape and ecosystem-level processes and functions and the species they serve certainly has contributed in this regard.

**Table 2: Total Number of Visitors to Illinois River NWR Complex in 2002**

| | Chautauqua | Meredosia | Emiquon |
|---|---|---|---|
| Total Number of Visitors | 27,950 | 16,082 | 8,455 |
| Interpretation & Observation | 24,090 | 9,050 | 6,200 |
| Environmental Education | 1,605 | 352 | 120 |
| Hunting | 60 | 0 | 455 |
| Fishing | 2,500 | 5,000 | 1,200 |
| Outreach Audience | 1,200 | 220 | 530 |

## 3.2.4 Visitor Services

Providing recreational opportunities and interpreting the unique natural features of the Refuge Complex for visitors are important elements of the Service's mission and the mission of the Refuge Complex. Six primary wildlife-dependent recreational uses were identified by the National Wildlife Refuge Improvement Act of 1997: hunting, fishing, wildlife observation and photography, environmental education and interpretation. These uses, when compatible with the Refuge purposes, are the focus of the Refuge Complex's visitor services activities. The public use for fiscal year 2002 is displayed in Table 2. Current visitor services facilities are depicted in figures 18-20.

### 3.2.4.1 Potential Refuge Visitors

In order to estimate the potential market for visitors to the Refuge, we looked at 1998 consumer behavior data for an area within an approximate 50-mile radius of the Refuge Complex and focus areas. We used a 50-mile radius because we thought this was an approximation of a reasonable drive to a refuge for an outing. The consumer behavior data that we used in the analysis is derived from Mediamark Research Inc. data. The company collects and analyzes data on consumer demographics, product and brand usage, and exposure to all forms of advertising media. The consumer behavior data were projected by Tetrad Computer Applications Inc. to new populations using Mosaic data. Mosaic is a methodology that classifies neighborhoods into segments based on their demographic and socioeconomic composition. The basic assumption in the analysis is that people in demographically similar neighborhoods will tend to have similar consumption, ownership, and lifestyle preferences. Because of the assumptions made in the analysis, the data should be considered as relative indicators of potential, not actual participation.

We looked at potential participants in birdwatching, freshwater fishing and hunting. In order to estimate the general environmental orientation of the population we also looked at the number of people who potentially might hold a membership in an environmental organization. The consumer behavior data apply to persons greater than 18 years old. For the area that we included in our analysis, the population of persons greater than 18 years old was 1,113,185. The estimated maximum participants in the 50-mile radius for each activity are: 90,090 for birdwatching; 86,994 for hunting and 189,103 for freshwater fishing. The number of persons who might hold a membership in an environmental

**Figure 18: Visitor Services Facilities, 2003, Emiquon NWR**

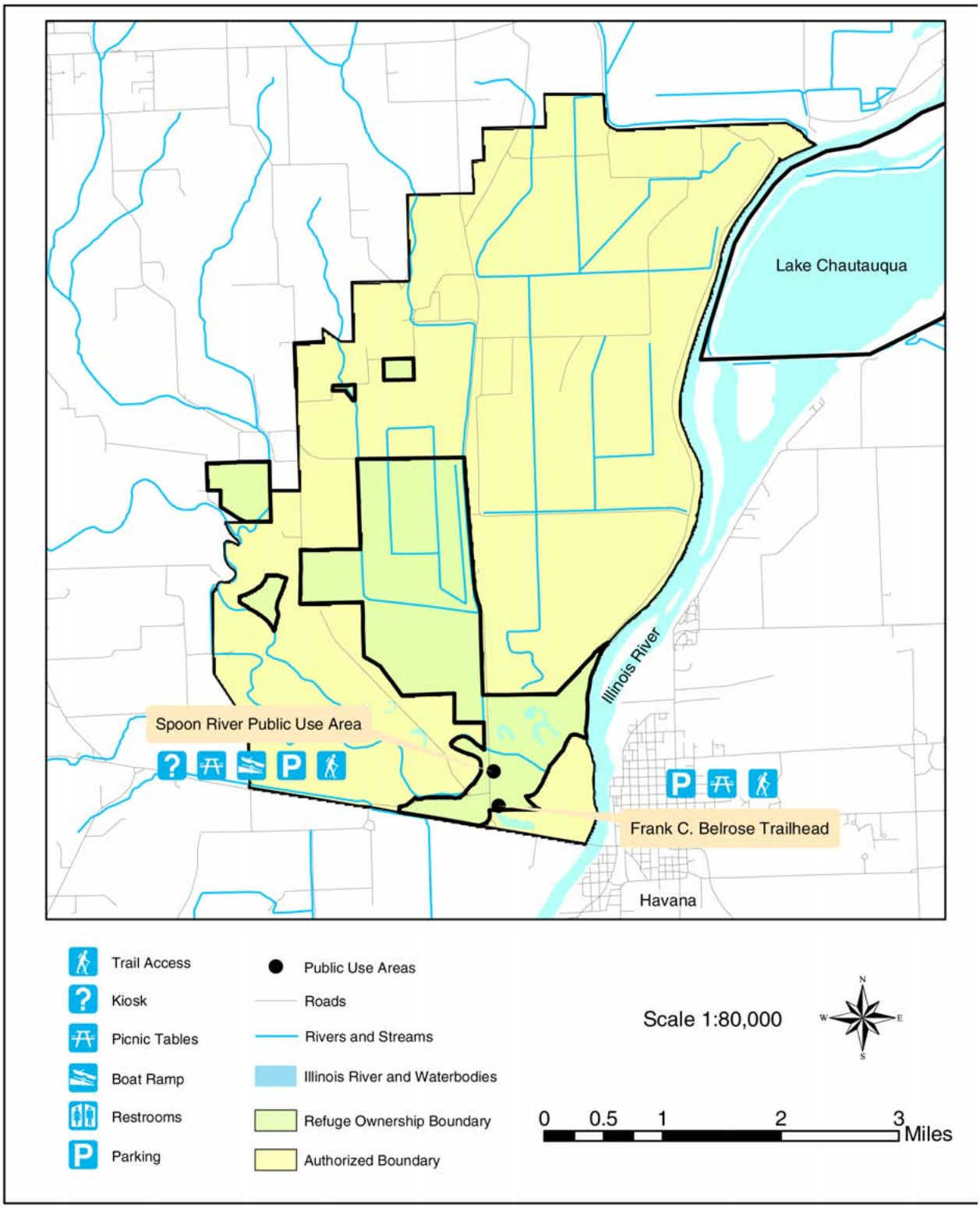


**Figure 19: Visitor Services Facilities, 2003, Chautauqua NWR**

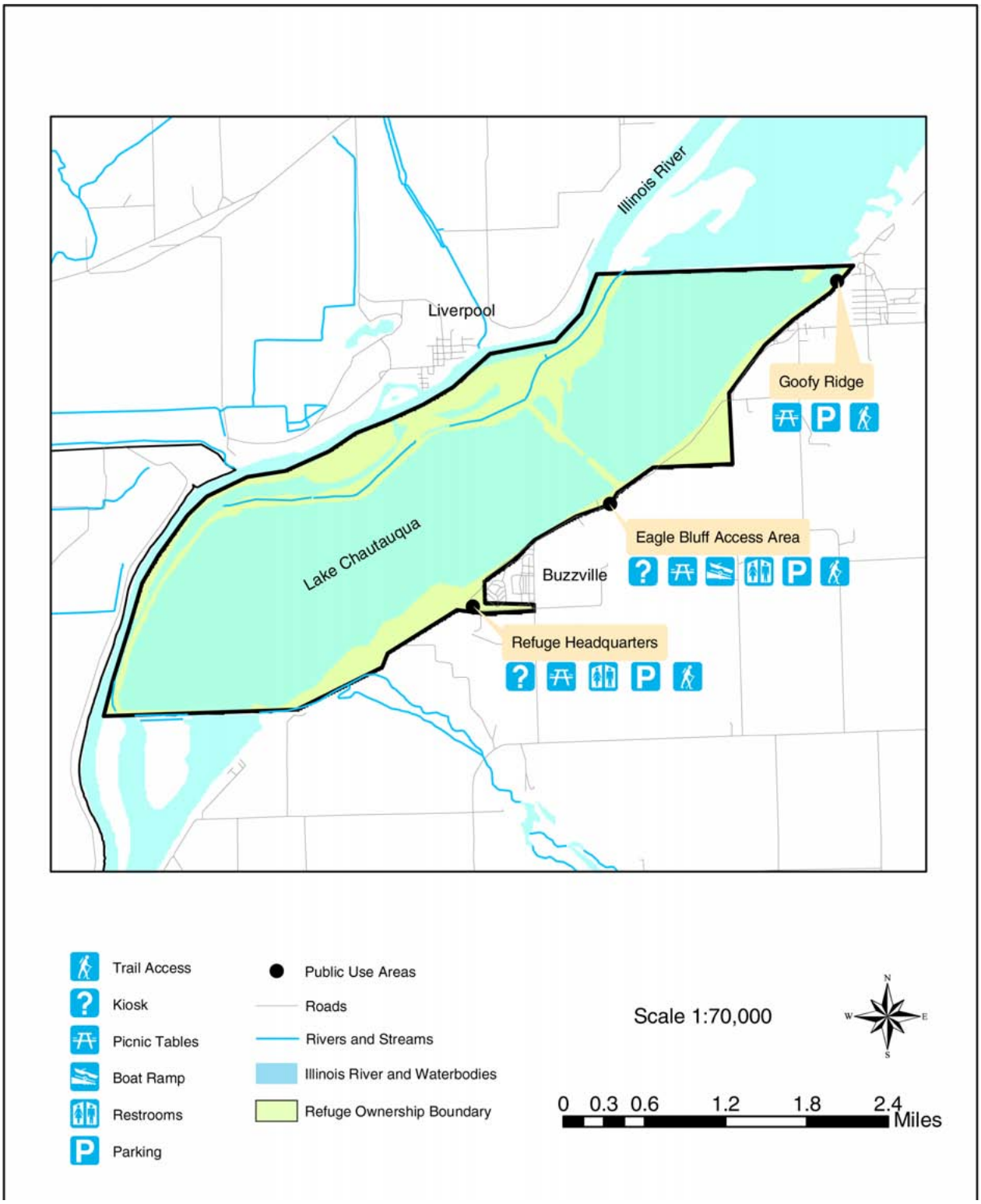
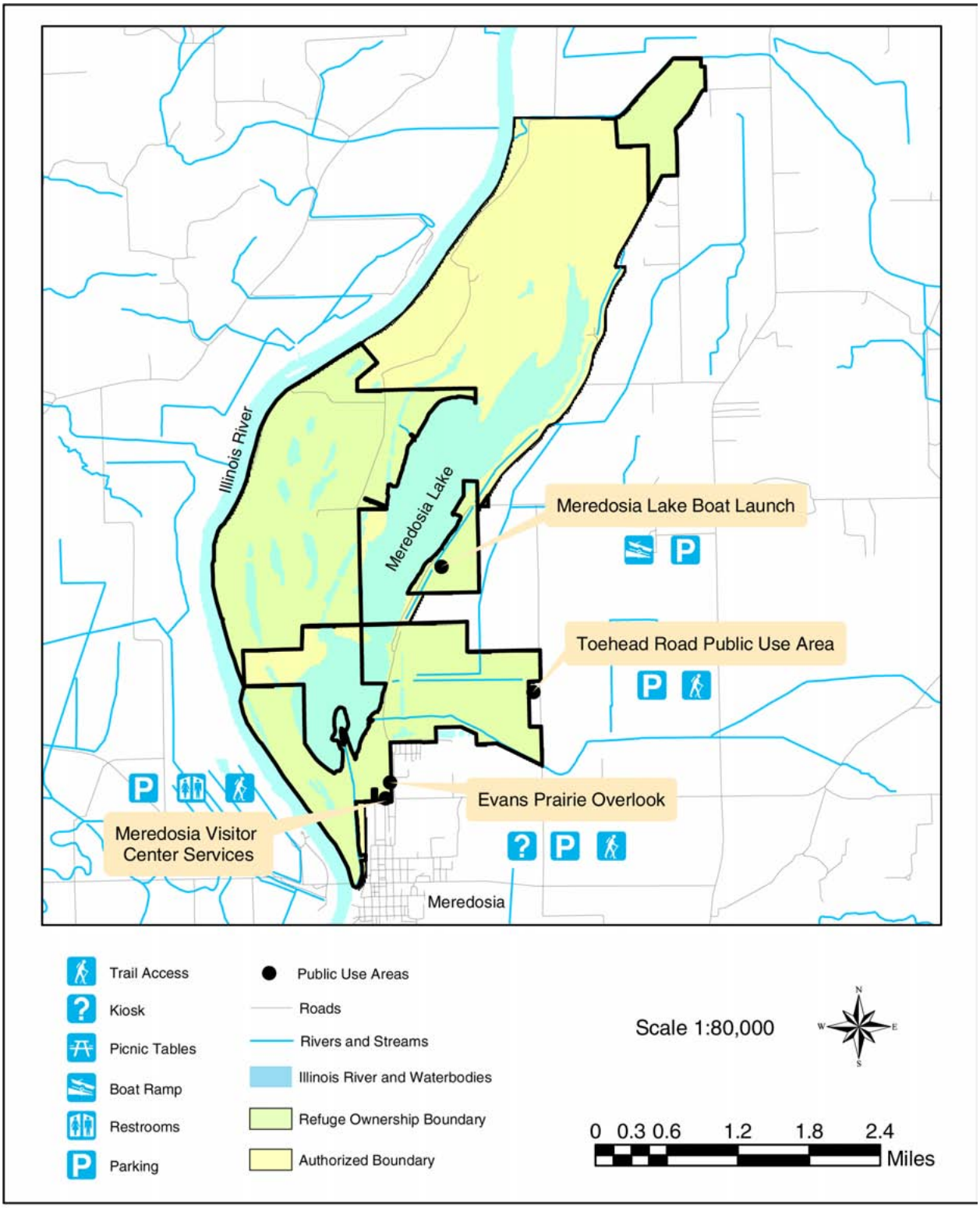


**Figure 20: Visitor Services Facilities, 2003, Meredosia NWR**



organization is 28,908. The projections represent the core audience for repeated trips to the Refuge. On days with special events and when large numbers of birds are at the Refuge, visitors can be expected to travel longer distances.

3.2.4.2 Administrative Facilities

Most administrative facilities for the Refuge Complex are located at Chautauqua NWR. The Refuge Complex office has an attached garage that is used as a shop. Other facilities include a garage, which is used for storage, a flammable storage building, and two pole barns where large equipment is stored. A refuge house is occupied by the Refuge Manager. A pole building at Meredosia NWR includes office, shop and storage areas.

# 3.3 Current Management

Habitat management on the Illinois River Complex entails a combination of active and passive management. Management seeks to mimic natural processes where possible in this greatly modified ecosystem. Drainage, diversion of Great Lakes water, elimination of natural cover, and artificial structures such as locks and dams on the river have all contributed to the challenges to maintain natural functioning processes within the ecosystem. Due to the loss of much of the historical riparian, wetland, and upland habitats, management intensity must be increased to meet the fish and wildlife needs within the areas remaining to support them. This is particularly true in the wetland habitats where dikes, water pumps, and water control structures play an integral role in restoration of wetland habitats. Reconnection of habitats to the river is an integral part of the management but it must be regulated to control unnaturally frequent or severe flood events and excessive siltation. In uplands, habitats may be restored passively by allowing succession to occur or they may require active planting and management, such as with the restoration of native grasslands where planting and controlled burning are key management tools.

*Photograph by Bernie Angus*

## 3.3.1 Wetland Management

Current management of wetlands within the Refuge Complex (e.g., floodplain forests, marsh, fen, sedge meadow) is to provide high quality resting, nesting, and feeding habitat for waterfowl and other migratory birds; spawning, nursery, and overwintering habitat for native fish and mussels; and contribute to the native biological diversity of the Illinois River System. Currently the Refuge Complex manages roughly 6,000 acres of wetland habitat.

In most cases, current wetland management on the Refuge Complex involves the manipulation of water to achieve the desired successional stage of wetland plant communities. Hydrologic cycle maintenance plays an important role in the life cycle of wetlands. As wetland soils go through the drying process, nutrients are released and made available for plant growth. Upon re-flooding, the wetland is rejuvenated and results in an area thriving with insect life and aquatic vegetation. Forested wetlands are managed primarily by limiting human influence to maintain natural levels of hydrologic change. Sedge meadows are managed in this way and are also managed with prescribed fires to help maintain their open character.

Chautauqua NWR, Emiquon NWR, and Meredosia NWR and the Cameron Unit all have water control structures and dikes that require regular maintenance and operation to achieve the desired habitat for fish and wildlife resources. The Billsbach Unit has no structures or facilities. The following summarizes the degree of management required on the refuge units to achieve wildlife and habitat objectives.

**Chautauqua NWR** water management facilities were reconstructed within the last 10 years through the Refuge force account and contracting projects that cost an estimated $5 million and through a Habitat Restoration and Enhancement Project funded and contracted through the Corps of Engineers, which cost about $14 million. The Corps constructed a 40,000-gallon-per-minute pump station capable of pumping from the river into either unit, from either unit out to the river, or from one unit to the other. These projects restored water management capability to the 1,100 acre North Pool and to the 2,100-acre South Pool. The Refuge entered 2003 with the water management infrastructure in prime condition. The pools are managed as follows:

Lake Chautauqua is divided into the North Pool (1,100 acres) and the South Pool (2,000 acres). The North Pool is managed to provide deep stable water habitat (4 to 5 feet) for fish, invertebrate and aquatic plant populations to provide food and cover for Ruddy Ducks and other diving ducks, eagles (the North Pool supports an active eagle nest), pelicans, cormorants, gulls, and other wildlife in need of deep water habitat. The North Pool is protected by a 10-year flood event levee. Refuge staff in cooperation with the Corps of Engineers monitor river levels closely. When the river crest is predicted to top the North Pool levee, Refuge staff open the flood gates in the water control structure to equalize pool water with river water to prevent excessive damage to the levee. The Long Term Resource Monitoring Station in Havana has been monitoring aquatic vegetation, invertebrates, and fish populations since completion of the Habitat Restoration Project. They are presently working with Refuge staff and Americorps volunteers to reestablish wild celery and pond weed in the North Pool. The pool was drawn down for construction in 1998 with a near total fish kill, thus eliminating some carp without using chemicals. The pool will be managed with permanent water for aquatic communities to support migratory birds.

The South Pool of Lake Chautauqua is managed to provide shore bird habitat in their southward migration and to provide moist soil plant seeds, tubers, and invertebrates for waterfowl and other wildlife during fall and spring migration. The South Pool is protected by a 2-year flood event levee that keeps the small summer fluctuations out of the pool to allow the moist soil plants to mature and produce seed. The dewatering is accomplished by removing stop logs from the south water control structure and slowly draining water beginning in about mid June if river levels permit. Water can be pumped off to facilitate dewatering in some circumstances if needed. The South Pool is slowly reflooded by placing stop logs in the Quiver Creek weir and diverting water into the South Pool through a 3X3 foot water control structure or by pumping. Gravity flow is preferred over pumping because of the savings in fuel consumption. The reflooding usually begins in early September to make the food available to waterfowl during their migration. Shallow water is maintained in the South Pool through the spring waterfowl migration.

Approximately 1,500 acres of exposed mudflats for moist soil plant germination is provided by drawing the pool down to 432.0 M.S.L. This provides excellent

foraging habitat for shorebirds and moist soil plant production for migratory birds. Throughout the fall and beginning around October 15, water is slowly added to the pool, which allows gradual flooding of food reserves produced by the moist soil plants. Water levels are increased or decreased according to the annual Water Management Plan. The South Pool of Lake Chautauqua provides excellent spring spawning and nursery habitat for young fish in late winter and spring. It was estimated by the Illinois Natural History Survey that in 1996 over 39 million larval and juvenile fish escaped from the lake to the Illinois River.

Management of Refuge wetlands for moist soil plant production is a major tool used to achieve migratory bird objectives. Moist soil habitats provide shallowly flooded food resources (seeds, invertebrates) for migrating dabbling ducks, shorebirds, other marsh birds, and Canada geese. The greatest use by all waterbirds occurs in the fall, but moist soil units provide a variety of resources for waterbirds and other wildlife species throughout the year. Moist soil units may remain flooded for 2 years and are drawn down during the spring of the third year to make conditions suitable for germination of native moist soil plant species such as smartweed, millet, beggars tick, rice cutgrass and chufa. Drained pools are partially re-flooded in September to a depth of 4 to 18 inches to provide optimum foraging conditions for dabbling ducks. Mud flats and shallow pool edges enhance food availability for shorebirds and other marsh birds. From that point, flooding continues at 6-inch increments making additional food available as the earlier flooded food is consumed. By the end of migration, water levels are brought up to full pool elevation. Other pools may be partially drained in October to concentrate and expose invertebrates, insect larvae, and minnows as an additional food source for shorebirds, ducks, and geese.

The Refuge plans to restore Liverpool Lake on Liverpool Island. This will require restoration of a low level dike at the south end of the island and plugging three or four ditches eroded through the natural berm from flood waters. At least one water control structure will be placed in a ditch to catch and hold flood waters.

Liverpool Side Channel is badly silted in and restoration may be accomplished through Refuge force account, Habitat Restoration and Enhancement Project, or as an Illinois 2020 project.

**The Cameron Unit** now has water control structures constructed in partnership with Ducks Unlimited to facilitate management of habitat on Weis Lake. This lake is badly degraded and waterfowl use declined precipitously in the mid 1970s because of sedimentation and loss of aquatic vegetation. The water control structures will keep out most of the summer fluctuations in river levels and allow moist soil plants to grow and mature. The structures have stop logs with flap gates that can be reversed to allow water in or out depending on the season and water conditions.

The **Billsbach Unit** has no facilities. Most of this unit is open water with full time connection to the Illinois River and therefore management to provide other habitats for migratory birds and other wildlife is not an option.

**Emiquon NWR** requires active management in the form of restoring crop fields to forests, prairie, savanna, or wetland habitat. The 536-acre North Globe will be restored and managed as a hemi-marsh with roughly 40 percent open water and the remainder in aquatic and emergent vegetation. The restoration will require a dike across the north end of the unit to keep water off the state highway. The pump station will be restored to dewater or flood by pumping or by gravity flow to maintain desired water levels. The Oxbow Unit and the Wilder Units will be managed as moist soil units. Until neighboring property within the authorized boundaries is purchased, care will be used to avoid causing wet conditions through subsurface hydraulics in these two units. Higher ground will be planted to mast producing bottomland hardwoods, prairie, or savanna. The Nature Conservancy owns about 7,000 acres of cropland within the approved Emiquon NWR acquisition boundary. The organization plans to restore Thompson and Flag lakes and associated upland habitat beginning in 2005.

Emiquon NWR currently has three areas where moist soil management occurs. They are the Wilder Unit (387 acres), Bellrose Unit (40 acres), and the Spoon River Oxbows (80 acres). Presently the Wilder Unit cannot be pumped in the fall to provide waterfowl habitat due to the lack of a water source. Flooding of this area may be achieved when the Illinois River exceeds flood stage in the spring and occasionally in the fall, as in 2001. This unit receives excellent duck use when food resources are covered with shallow water.

The Bellrose Unit can be pumped from the adjacent Spoon River but will not hold water once pumping has stopped. The water immediately begins to percolate down through the sandy soil and enter the Spoon River. No pumping is performed during the fall for this reason. During the spring it is flooded when Illinois River flood waters backed into the unit. When flood waters begin to recede, stoplogs are placed in the water control structure to try and hold water for the spring migration. Water seeped out quickly, resulting in rapid drying of the soils and extensive germination of cocklebur. During October, stoplogs are inserted in the Spoon River oxbow water control structure to hold water for the fall and spring migration. Water levels rise in this unit from one of two ways: heavy precipitation coming through the oxbow or as the Illinois River rises, water backs into them. All stoplogs are removed in early summer as flood waters recede to allow water levels to drop and moist soil plant development to begin.

The Service purchased the 712-acre South Globe Drainage District from The Nature Conservancy in 2001. This unit is surrounded by an agriculture levee on four sides with no means of bringing water into the unit. The Service will install a water control structure to take in water during river flooding and hold water to encourage development of an open marsh type habitat.

**Meredosia NWR** has two moist soil units inside the Willow Creek and Meredosia Drainage districts. When the river reaches flood stage, Refuge staff open a screw gate on a water control structure allowing river water into the moist soil units. The gate is closed when water reaches the desired level and water is held to provide habitat for migratory birds and other wildlife. There is no dependable source of water to flood the area for fall migration. Refuge staff place a portable pump in the Illinois River each fall to flood seven small wetlands on Meredosia Island. These wetlands all have low level dikes and water control structures which are manipulated to provide brood habitat, to allow production of moist soil

plants, and to provide food for migratory birds and other wildlife in the fall. The Refuge is in the process of converting old fields to bottomland forests on Meredosia Island.

The Shearl and Skinner wetlands on Meredosia NWR are the two primary areas where limited water level management occurs. Moist soil vegetation in these wetlands is flooded during spring migration when the Illinois River water levels rise and back into the units. Spring waterfowl use is excellent in these units, however fall use is minimal because there is typically little if any available water. This spring habitat is important to waterfowl to build up their energy stores to arrive on the nesting grounds in good condition to lay eggs and produce young.

Prior to the fall of 2000, water control structures on Meredosia Island were nonfunctional because of lack of maintenance for many years and, therefore, no water management has been accomplished on Twin Ponds, North Pond, Moss and Briar Pond, Alice's Pond and others. During the fall of 2000, rehabilitation work was completed on the island's water control structures, ditches and levees. In October of 2000, pumping of water from the Illinois River into the island's ditches, sloughs and ponds was restored. This habitat will be maintained and managed to enhance biological diversity on the Refuge.

### 3.3.2 Forest Management

Current management of native upland and bottomland forests within the Refuge Complex is to provide high quality breeding and foraging habitat for migratory birds (e.g. Cerulean Warbler, Red-shouldered Hawk, Yellow-billed Cuckoo), forest nesting waterfowl (e.g. Wood Ducks), an assortment of upland game species (e.g., Wild Turkey), and contributing to the native biological diversity within the Illinois River Corridor. Management focus is to eliminate non-native species and replace them with native hardwood species, to maintain uneven aged stands, to maintain soil productivity, and to reduce fuel loads. No commercial timber harvest currently takes place on Refuge Complex land. The Refuge Complex currently protects and manages roughly 4,500 acres of forest habitat within the Illinois River System.

*Photograph by Bernie Angus*

### 3.3.3 Grassland Management

Currently there is very little written guidance for managing Refuge Complex grasslands. Early guidance included managing "small waste areas to encourage their reversion to sand prairie vegetation rather than to woody type vegetation." Currently the Refuge Complex protects and manages roughly 200 acres of high quality native grassland habitat. The most recent guidance states that Refuge Complex grasslands should provide habitat for grassland bird species, provide nesting habitat for waterfowl and resident game birds, improve habitat diversity on the Refuge, protect water quality and soils from erosion, and provide public use and environmental education opportunities to create an awareness and knowledge of grasslands and their uses by wildlife.

Refuge Complex grassland management actions focus primarily on mowing and prescribed burning. During the summer, the cool season grasses on the setback, north, and south levees on Chautauqua NWR are mowed to prevent woody vegetation from becoming established on the slopes. Approximate levee acreage currently mowed is 72 acres.

The Refuge Complex's Cooperative Farming Program is used as a habitat management tool to address specific management problems. Examples include preventing undesirable woody species from invading an area that will be planted to native grasses, or to control invasive plant species (i.e. reed canary grass, cottonwoods, maples). Several cooperative farmers from the local community currently utilize Refuge Complex land on a two-thirds/one-third crop-share lease, with one-third of the harvest being allocated to the Refuge Complex . The cropland provides food and loafing areas for migrating waterfowl and food, cover and edge for other species. Crops grown include corn, soybeans and winter wheat. Crop fields are restored to native vegetation once control of invasive species is achieved.

### 3.3.4 Savanna Management

Currently the Refuge Complex does not protect or manage any native savanna habitat within the Illinois River System, nor is there any written guidance on management intent. There are limited opportunities to restore and maintain savanna habitat on Chautauqua NWR near the Refuge Complex Headquarters.

### 3.3.5 Fish and Mussel

Current management for native fish and mussels on Refuge Complex land is aimed at restoring, protecting, and managing backwater lake and side channel habitat to create and maintain high quality fisheries habitat capable of supporting a self-sustaining, balanced fish community in support of the Illinois River fisheries resource. Two primary objectives provide guidance for fishery-related actions on the Refuge Complex:

1) maintain and improve the quality of aquatic habitats for a well-balanced community of fish and other water-oriented wildlife species; and

2) provide quality recreational fishing opportunities that are compatible with the primary Refuge objectives (Chautauqua Refuge Fishery Management Plan, 1988).

Active management of Refuge Complex land for fish populations is currently limited due to shallow water and periodic draw-downs in most impoundments. During the 1990s, Chautauqua NWR was rehabilitated to a functioning backwater lake, bottomland forest, and floodplain wetland complex through efforts of the Fish and Wildlife Service and the Environmental Management Program of the Corps of Engineers. The water management system now allows Refuge Complex staff to mitigate the human induced impacts associated with navigation, the diversion of Lake Michigan water down the Illinois River, and conversion of the tallgrass prairie and wetlands to cropland production and other uses. Refuge Complex personnel approximate the historic hydrograph using a series of low level levees, spillways, and water control structures to mimic the historical flood cycle, especially during spring fish migration and the summer dry period.

In 1995, fish were stocked in the North Pool of Lake Chautauqua. The Refuge Complex stocked 200 pounds of fathead minnows and the Illinois DNR stocked 400 pounds of breeder bluegill and 100 pounds of breeder crappie from Spring Lake, and 120,000 fingerling bass from the Jake Wolf Hatchery. Forty breeder bass were stocked during the formal dedication ceremony held in July of 1999. Anglers were beginning to catch crappie, catfish, and largemouth bass just before the flood of 2002 when the river over-topped levees and contaminated the north pool with exotic and invasive fish species (e.g., carp species). Refuge impoundments are periodically sampled to determine which fish species are present.

Invasive species (e.g., carp) are controlled by lowering pool levels in the winter, which freezes the fish out, or pumping the pools down for construction purposes, which greatly reduced invasive species. During summer draw-downs of the south pool, most fish escape to the river. Some fish survive the summer in deep water found in borrow areas. The Illinois Natural History Survey estimated that 39 million fish that hatched and grew in the South Pool of Lake Chautauqua escaped to the river.

Two aspects of wetland management are problematic with respect to managing the Refuge Complex for maximum fisheries benefits. First, managing high quality, open wetland systems is difficult because technology is currently limited to effectively control nuisance exotic and invasive species and encourage desirable fish utilization. Secondly, many controlled high quality wetlands are regulated following water management regimes that tend to limit fish use and production.

### 3.3.6 Wildlife Monitoring

Bird banding has been used for decades by wildlife managers and scientists across North America to understand and track the movements of migratory birds. Illinois River staff cooperate with Illinois Department of Natural Resources by providing assistance with the banding of Canada Geese during the summer. The Refuge also has its own banding program for Wood Ducks and has a yearly quota to band 300 birds.

Aeriel waterfowl surveys are conducted weekly from September through April during the spring and fall migrations by the Illinois Natural History Survey. Ground surveys are performed by Refuge staff and Refuge volunteers throughout the year. These surveys allow Refuge Complex staff to determine migratory bird populations on the Refuge Complex and waterfowl use days, as well as to determine the success of habitat management techniques. Results of the surveys are posted on the Illinois River Refuges and Illinois Natural History web sites.

### 3.3.7 Visitor Services

Management intent for conducting high quality public wildlife-dependent recreation programs on Refuge Complex land is to enhance the public's understanding and appreciation of the natural world. To this end, the Refuge Complex seeks to provide a wide variety of wildlife-dependent recreation opportunities for the public to enjoy.

### 3.3.7.1 Environmental Education and Interpretation

Wildlife observation, including the observation of plants and other natural features, is the single most popular recreational use of the Refuge Complex attracting over 30,000 visits annually. The Refuge Complex has constructed several interpretive trails with wildlife viewing platforms situated along the trail edges. All three of the Complex's refuges have trails. Maintenance of existing trail facilities will require adequate funding to keep the facilities safe for public use. Photography is another popular public use related to wildlife observation. Visitors to the Refuge Complex take advantage of the trails and observation platforms to capture special moments of nature's beauty.

Currently, waterfowl hunting only is allowed on Chautauqua NWR. The Liverpool Lake Public Hunting Area is located on the west side of the Refuge between the west levee and the Illinois River. Regulations require either boat blinds or blinds made from existing dead material. The hunting area is available on a first-come first-served basis. Although duck use on Lake Chautauqua is excellent, duck use of the public hunting area has been poor, resulting in a poor hunting season with very few ducks or geese being taken.

Hunting of migratory game birds, upland game birds, and big game hunting is currently permitted on Emiquon NWR in designated areas. Areas open to hunting are north of the Spoon River to the Wilder Farms levee on the east side of Route 78/97 and north of the Spoon River west of Route 78/97 as posted. Hunters using the area are primarily seeking white-tailed deer and waterfowl. Overall, hunter use of these areas was low, but provided a quality hunt for those taking advantage of the opportunity. Parking on the east side of Route 78/97 is a problem because of the lack of a parking area for hunters. Future plans call for the construction of a parking area east of route 78/97 and north of the Spoon River.

Hunting is not allowed on Meredosia NWR because of deed restrictions that were acquired with the land.

A new boat ramp and parking lot on the North Pool of Chautauqua NWR was opened in July 1999 and receives moderate use by local anglers. The pool was stocked by the Illinois Department of Natural Resources during the spring and summer of 1999 with largemouth bass, crappie, bluegill, and catfish. All Refuge Complex and state regulations must be followed.

Fishing opportunities are limited to the Spoon River and the Oxbow area on Emiquon NWR. The Refuge provides a boat ramp and parking lot to local anglers. The Refuge receives moderate use from anglers. All Refuge and state regulations must be followed.

Fishing opportunities on Meredosia NWR are seasonal due to the Meredosia Lake silting in. The best opportunities for fishing occur in the spring as spring flood waters are receding. Meredosia Lake receives good use from local anglers as well as local commercial fisherman in state waters. State regulations apply.

Environmental education and interpretation are important tools that the Refuge staff use to inform the public about special topics, such as the Illinois River ecosystem, or to call attention to Refuge resources such as prairies or moist soil management.

Environmental education currently takes place both on- and off-Refuge. Refuge Complex staff give slide shows, lead interpretive tours and hikes, create educational exhibits, conduct activities that offer hands-on learning opportunities, provide demonstrations and workshops and write educational articles. Activities are presently geared toward structured educational experiences in which Refuge Complex land and facilities provide a place for students to actively study and learn about ecology and environmental relationships, as presented by their own school teaching staff. Refuge Complex programs follow a style of teaching and a method of learning involving real experiences.

#### 3.3.7.2 Outreach

Outreach activities on the Refuge Complex are consistent with a small-staffed refuge with no one staff person dedicated to visitor services and outreach activities (such as an outreach specialist or outdoor recreation planner). The Refuge Complex headquarters does not have a visitor center or visitor contact station. Outreach activities include staff-conducted talks and tours, on- and off-refuge, with local school groups, local conservation groups and Refuge visitors. The Refuge Complex also participates in staffing of exhibits at sportsmen shows such as Havana Octoberfest, Midwest Waterfowl, Deer and Turkey Expo (Peoria), and Conservation World at the Illinois State Fair. The Refuge Complex participates in local Conservation Day events sponsored by the local Natural Resource Conservation Service.

The Refuge Complex generally holds at least two special events each year for Migratory Bird Week (May) and National Wildlife Refuge Week (October). During these events the auto tour route is open and there are numerous stops along the way for visitors to view wildlife and learn about the National Wildlife Refuge System. On Meredosia NWR there is also an annual Earth Day Event in which all of the Meredosia school district participates in assisting the Refuge with various projects such as planting trees, prairie forbs, and picking up litter. In addition, the Refuge Complex issues roughly 10 to 12 news releases each year and participates in two to three television/radio spots.

#### 3.3.7.3 Law Enforcement

Enforcement of federal wildlife laws, as well as regulations specific to the Refuge System, is an integral part of Refuge Complex operations. Law enforcement plays a crucial role in ensuring that natural and cultural resources are protected and that visitors encounter a safe environment. The Refuge currently has no employees with a law enforcement commission. However, federal law enforcement is a cooperative effort by many agencies in the area. Cooperative relationships and strategies have been developed with state conservation officers and all county sheriff departments in the area. The special agents in Springfield are helpful and supportive in addressing specific law enforcement issues.

## 3.4 Wilderness Review

As part of the CCP process, we reviewed lands within the legislative boundaries of the Refuge Complex for wilderness suitability. No lands were found suitable for designation as Wilderness as defined in the Wilderness Act of 1964. The Refuge does not contain 5,000 contiguous roadless acres nor does it have any units of sufficient size to make their preservation practicable as Wilderness. Lands acquired for the Refuge have been substantially affected by humans, particularly through agriculture and transportation infrastructure.

# Chapter 4: Management Direction

## 4.1. Refuge Management Direction: Goals, Objectives and Strategies

### 4.1.1 Development of Goals, Objectives and Strategies

Driving the development of management direction for the Refuge Complex was the CCP's purpose and need for action, the internal and external issues and concerns identified during the scoping and public involvement process (Chapter 1), the purpose(s) of each individual Refuge within the Refuge Complex, and the vision, mission, goals, core values, and guiding principles of the Refuge Complex. The planning team also paid close attention to relevant federal, state, and local landscape level plans and planning efforts (Chapter 1), and stakeholder expectations for the Service and the Refuge Complex (Chapter 1). Societal trends relevant to wildlife and habitat management and public use of the Illinois River Corridor also were considered.

The planning team made several assumptions that must hold true in order for the Refuge Complex to attain its wildlife, habitat, and people goals and objectives. They include:

- Habitats essential to the life cycle of Refuge Complex resources will not be adversely affected elsewhere, such as the destruction of essential wintering habitat for migratory birds that utilize the Refuge Complex for breeding.
- State laws will support fish and wildlife-dependent recreational activities and environmental health in a manner that conserves natural resources.
- The Refuge's budget will not decline appreciably in the next 10-15 years, and funding for designated projects will be allocated in a timely matter. Staffing levels will be maintained or slightly increase in keeping with government streamlining targets.
- As new land is acquired from willing sellers within the approved Refuge boundaries and land management responsibilities increase, Refuge Complex operations funding will also increase.
- Cooperation and collaboration with the state, local communities, private landowners, non-government organizations, business, and other federal agencies will be increasingly important in achieving Refuge goals.

- In keeping with the "wildlife first" mandate of the National Wildlife Refuge System, the demand for wildlife-dependent recreation will continue to increase on the Refuge.
- The public will be increasingly involved in management decisions on the Refuge.
- Funding and staff will be allocated to support monitoring programs to evaluate progress toward and accomplishment of Refuge goals, objectives, strategies, and projects.

The requirement that an activity or use of the Refuge Complex be compatible with the individual refuge purpose(s) governs whether or not an activity or use can be allowed on the Refuge Complex. "Compatible use" means a proposed or existing wildlife-dependent recreational use or any other use of the Refuge Complex that, in the sound professional judgment of the Refuge Manager, will not materially interfere with or detract from the fulfillment of the National Wildlife Refuge System mission or the purposes of the refuge.

All proposed management actions in this CCP are considered compatible based upon site-specific evaluations of the anticipated impacts with the Refuge purpose and Service policies.

## 4.1.2 Wildlife Management

**Wildlife Management Goal:**
Perpetuate listed species, waterfowl and other migratory birds, and native fish and mussels, within the Illinois River Corridor while restoring and conserving the biological integrity, diversity, and environmental health of the Refuge Complex.

### 4.1.2.1 Listed Species

Management Intent for listed species is to protect and maintain federally-listed species (Bald Eagle, decurrent false aster, and Indiana bat) occurring on Refuge Complex land and to contribute to their recovery. Populations of these species will be protected and maintained (as stable or increasing, if appropriate), in support of federal and state recovery efforts. Refuge Complex staff would continue to consult with the Service's Ecological Services office, the State of Illinois, and others to ensure resource objectives and legal requirements are being met.

**Objective 1.** Protect Bald Eagles occurring on Refuge Complex land from human disturbance.

*Strategy 1.* Minimize human activities within 300 feet of Bald Eagle roosts.

*Strategy 2.* Enforce protective buffer zones around Bald Eagle nests in accordance with the "Northern States Bald Eagle Recovery Plan."

*Strategy 3.* Continue to monitor Bald Eagle nesting success on Refuge Complex land.

**Objective 2.** Protect decurrent false aster populations occurring on Refuge Complex land from human disturbance, including constructing physical barriers to restrict vehicle and foot traffic (minimum 50-foot protective zone).

*Strategy 1.* Monitor decurrent false aster populations on Refuge Complex land to determine if they are self-sustaining.

*Strategy 2.* Evaluate the potential for enhancing existing populations and for establishment of additional decurrent false aster populations on Refuge Complex land. Implement the recommendations from the evaluation. The recommendations may include disturbance of a percentage of the site each year.

*Strategy 3.* Ensure the Refuge and private lands projects support the goals and objectives of the Recovery Plan for decurrent false aster.

**Objective 3.** If Indiana bats occur on the Refuge Complex, protect them from human disturbance

*Strategy 1.* Encourage partners to monitor for the presence of Indiana bats.

**Objective 4.** Encourage colonization of Indiana bats on Refuge Complex land through forest restoration (day roost and nursery habitat) on Emiquon NWR and Meredosia NWR throughout the life of this plan.

*Strategy 1.* Ensure that 20 percent of tree species (big nut and shell bark hickories) used in future forest restoration contribute to meeting the needs of Indiana bats (See Forest Habitat Restoration section 4.1.3.3 for additional strategies and projects).

**Objective 5.** By 2006, in cooperation with state and federal biologists, inventory and assess listed species and their habitats throughout the Illinois River Corridor and determine the extent to which the life cycle needs of listed species are being met within each habitat type. Evaluate the potential reintroduction of species suitable to the habitat of the Refuge Complex (e.g., Higgins eye pearlymussel; Least Tern).

*Strategy 1.* Enlist the support of the Service's Upper Mississippi River/Tallgrass Prairie Ecosystem Team in ascertaining an appropriate lead and in obtaining the funds necessary to complete the effort.

#### 4.1.2.2 Native Fish and Mussels

Service management intent for native fish and mussels within the Illinois River Corridor is to protect the health of aquatic habitats, restore fish and other aquatic

resources, and provide opportunities to enjoy the benefits of healthy aquatic resources. The Service and its partners recognize that management and conservation of fish and other aquatic resources are shared responsibilities, and success is usually contingent on partnerships that cut across jurisdictions and link all stakeholders and partners. The Service will weigh potential actions by the strength of federal authority and responsibility, the extent to which our efforts will complement others in the fisheries and aquatic resource conservation community, the likelihood that our efforts will produce measurable resource results, the likelihood that our efforts will produce significant economic or social benefits, and the extent of partner support.

**Objective 1.** By 2017, restore and maintain native fish and mussel species diversity to 85 percent (fish) and 50 percent (mussel) of those that were historically present in the Illinois River System at the end of the 19th century. Presently there are approximately 102 species of fish, 37 species of mollusks, and 10 species of crustaceans found in the vicinity of the Refuge Complex (Appendix C). This objective would be accomplished in accordance with strategic planning efforts of the State of Illinois.

*Strategy 1.* Work with the Illinois DNR and Service fishery resource staff to develop a comprehensive aquatic resource step-down management plan for the Refuge Complex by 2006. Cooperate and coordinate with Illinois DNR, LTRM, and Service Fishery Biologist in managing the fishery in the north and south pools of Lake Chautauqua.

*Strategy 2.* Enhance aquatic nuisance species control throughout the Illinois River Corridor, including funding additional research on controlling carp in managed wetlands.

*Strategy 3.* Working with state and federal fishery staff, establish and maintain an annual fish and mussel monitoring program on Refuge Complex land by 2006.

*Strategy 4.* Evaluate the need for continued stocking of game fish populations in Lake Chautauqua's North Pool.

#### 4.1.2.3 Biological Integrity, Diversity, and Environmental Health

Service management intent for biological integrity, diversity, and environmental health is to contribute to the protection, restoration and maintenance of high quality ecosystems characteristic of the Illinois River Corridor at the time of European settlement. Under this alternative, management would be focused on landscape-level processes and functions, the ecosystems contained within Refuge Complex Focus Areas, and the species they serve.

**Objective 1.** Safeguard management options and prevent further degradation of landscape processes by promoting diverse and productive plant and animal communities within the Refuge Complex that are appropriate to soil type, climate, and landform.

*Strategy 1.* Maintain and/or restore the ecological processes of nutrient cycling, energy flow, and hydrologic cycles on Refuge Complex land characteristic of the geo-climatic setting. Manage Refuge Complex land to mimic natural ecosystem processes (e.g., fire, flooding, succession) and provide connectivity to the matrix of land in which Refuge Complex land occurs. Use an integrated mix of restoration tools to repattern succession/disturbance regimes and achieve sustainable landscape conditions. Consolidate and coordinate activities where multiple needs can be addressed relative to landscape health (e.g., water quality, riparian processes and functions, forest health, recovery of succession/disturbance regimes, etc.).

*Strategy 2.* By 2010, convert all of the Refuge's non-native habitat to native habitat (i.e., convert cropland to wetland or bottomland).

*Strategy 3.* In cooperation with the State of Illinois, manage the deer population on Refuge Complex land through controlled hunts.

*Strategy 4.* Continue land acquisition within authorized boundaries of the Emiquon NWR and Meredosia NWR as funds become available. Presently, there are 9,009 acres of land within the authorized boundary at Emiquon NWR and 1,747 acres at Meredosia NWR to be acquired.

**Objective 2.** Safeguard management options and prevent further degradation of landscape processes by promoting diverse and productive plant and animal communities within Illinois River Focus Areas that are appropriate to soil type, climate, and landform.

*Strategy 1.* Provide connectivity to the matrix of land in which Refuge Complex land occurs.

*Strategy 2.* Accelerate the current status and trends effort toward restoration and conservation of biological diversity in the Illinois River Corridor through a comprehensive and coordinated system that complements existing authorities. Focus federal, state, and local agencies having related responsibility and/or expertise in this area to increase efficiency and develop consistency in natural resource conservation. Work with partners through the Midwest Natural Resources Group and the Service's Ecosystem Team to expand the focus on landscape management and planning. This would include identifying, protecting, and restoring important landscapes historically occurring within the Illinois River Corridor in a

manner so that their arrangement mimics the natural organization found prior to European settlement.

*Strategy 3.* Ensure private landowners within Refuge Complex Focus Areas have viable options for restoring and maintaining their land for the benefit of biological integrity, diversity, and environmental health. Provide technical assistance and financial incentives to landowners through the Refuge's Partners for Wildlife and Fish Program. Seek to intensify and concentrate other federal, state, and private programs in high priority areas.

**Objective 3.** Manage or eliminate exotic and invasive species on the Refuge Complex below present levels.

*Strategy 1.* Evaluate commercial fishing on Refuge land (on a case-by-case basis) as a tool for exotic species control and research.

*Strategy 2.* Control and eliminate (where feasible) all undesirable non-native species on Refuge Complex land throughout the life of this Plan. Maintain noxious-weed- free plant communities and restore plant communities with noxious weed infestations through the use of broad-scale, integrated management strategies.

*Strategy 3.* Aggressively control invasive shrubs and trees in grasslands.

*Strategy 4.* Minimize the impact exotic species have on Refuge forest land.

*Strategy 5.* Employ an integrated management system to control or contain pest plant species. These integrated management practices include the use of mechanical, chemical, and biological techniques for the control of weeds. Mechanical control involves the use of disking or plowing, chemical control involves the application of U.S. Fish and Wildlife Service approved herbicides, and biological control includes the use of approved biological agents such as rosette weevils on musk thistle. Any introduction of biological control agents will be done in consultation with state biologists.

## 4.1.3 Habitat Management

**Habitat Management Goal:**
Provide the most productive habitat possible within the Illinois River Corridor for the benefit of listed species, waterfowl and other migratory birds, native fish and mussels, and native biological diversity.

4.1.3.1 Native Grasslands

Service management intent for native grasslands within the Illinois River Corridor (e.g., dry-mesic, mesic, wet-mesic prairies, sand prairies and hill prairies) is to restore and conserve grassland habitat within Illinois River Focus Areas that is capable of providing high quality breeding habitat for listed species (e.g., Henslow's Sparrow), waterfowl (Mallard, Blue-winged Teal, Pintail) and other migratory birds (e.g. , Bobolink, Dickcissel, Loggerhead Shrike, Grasshopper Sparrow), and contributing to the native biological diversity of the Illinois River Corridor. The desired future land cover for the Refuge Complex is displayed in Figures 21-23.

**Objective 1.** By 2017, the Refuge Complex will protect and manage 1,000 acres of high quality native grassland habitat for the benefit of listed species, waterfowl and other migratory birds, and native biological diversity (currently the Refuge has roughly 200 acres of high quality native grassland habitat).

*Strategy 1.* Create, restore, or enhance small (40-100 acres) and medium-sized (100-1,000 acres) blocks of grassland habitat comprised of short, medium, and tall height-density patches containing diverse structure (e.g., bare soil, stiff-stemmed forbs, sparse woody vegetation) with a 75 percent grass and 25 percent forbs mix with a minimum of six grass species and a minimum of 30 herb species. 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. Maintain Refuge grasslands through periodic burning and/or mowing / or light grazing with some grasslands (25-50 percent of the total grassland landscape) remaining free from burning, mowing, or grazing between 3 and 6 years to provide habitat for Henslow's Sparrow, Northern Bobwhite, Field Sparrow, and other species that prefer a well-developed duff layer and the presence of some shrubs. Some thicket areas and isolated trees (plum, cherries, sumac, crabs, hawthorns) should be allowed to persist to provide breeding habitat for Loggerhead Shrike, Bell's Vireo, Yellow-breasted Chat, and other species in some prairies and old-fields. Maintain hydrology in wet meadows.

## Figure 21: Future Land Cover Within the Authorized Boundaries, Chautauqua NWR and Emiquon NWR

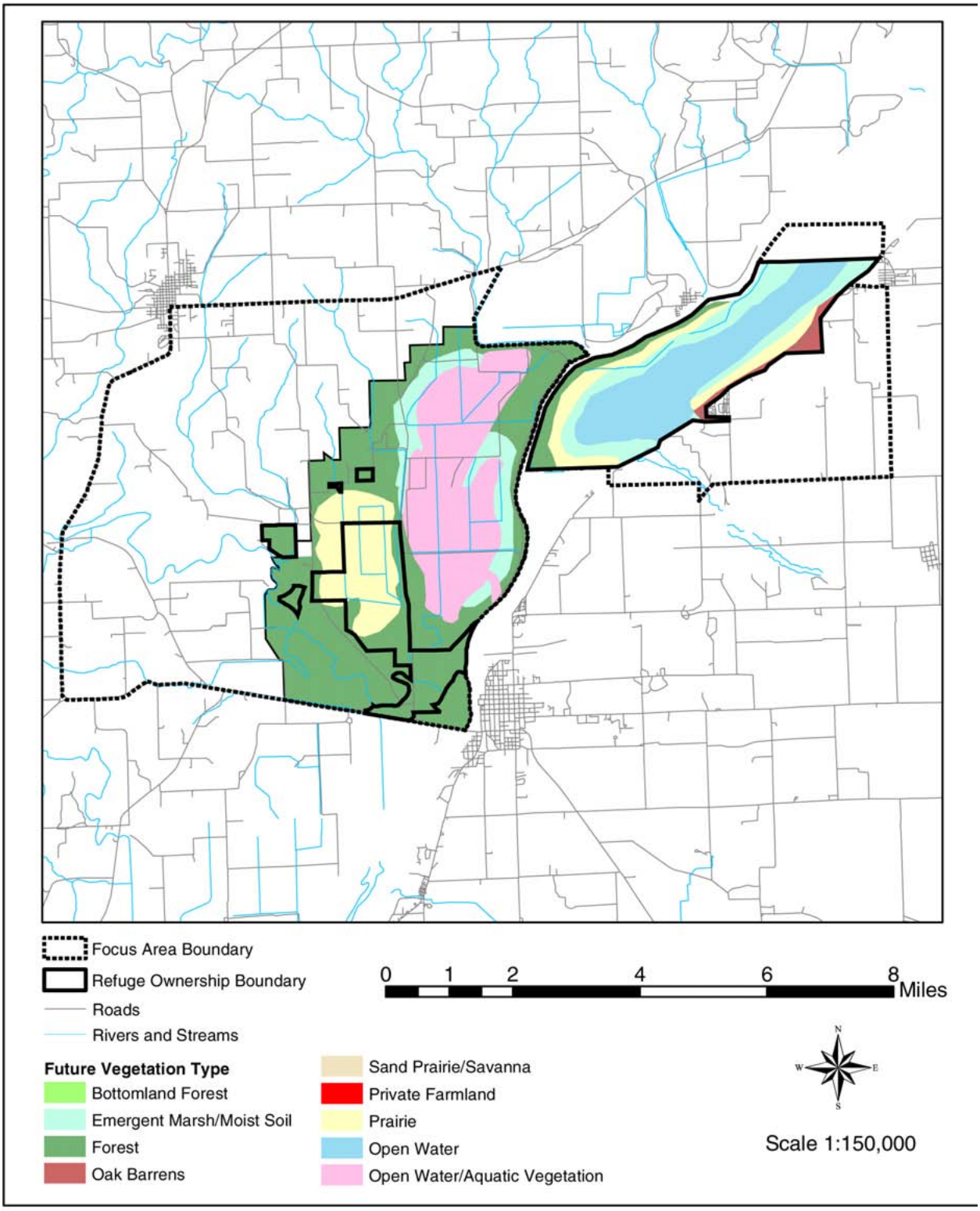
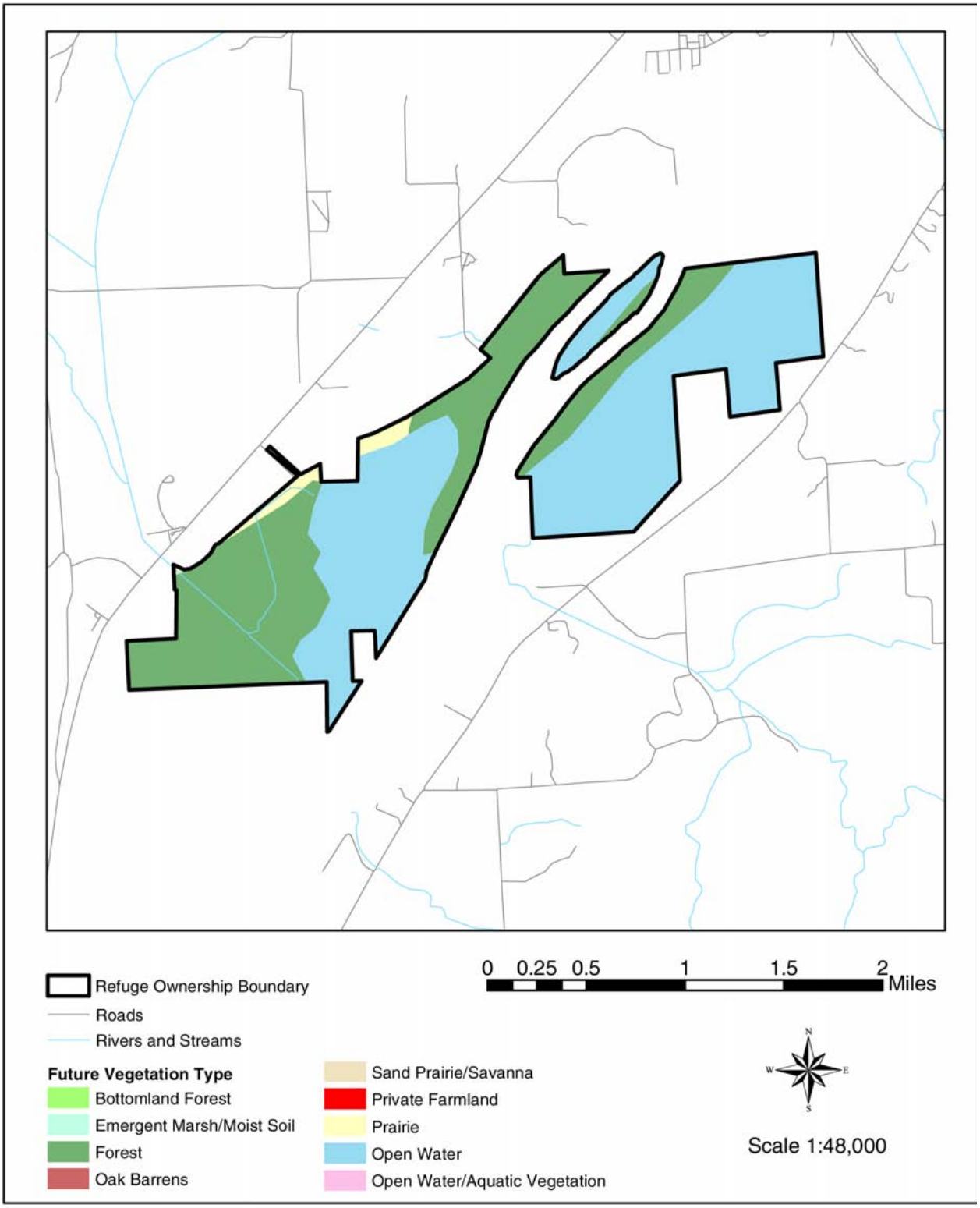
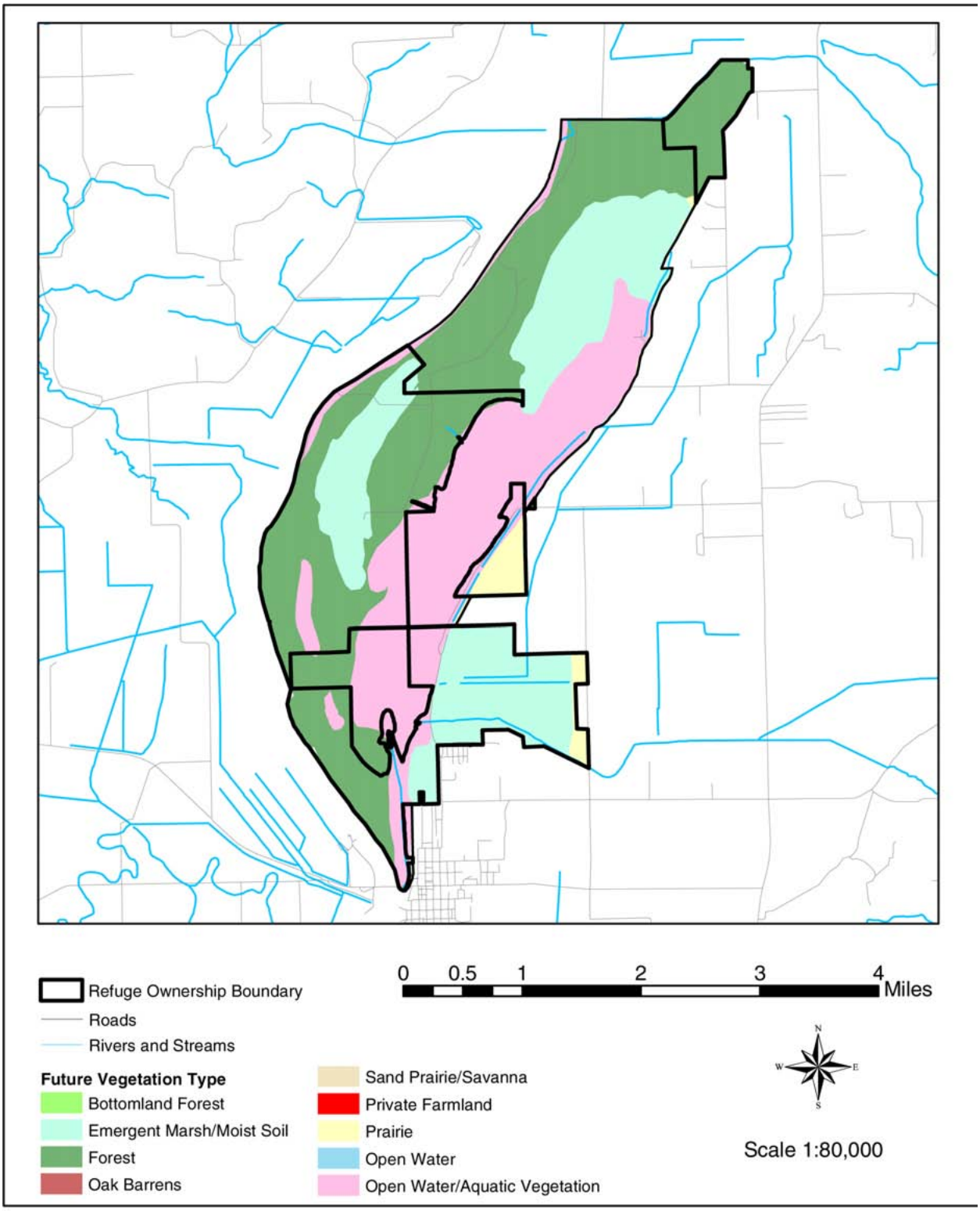


**Figure 22: Future Land Cover Within the Authorized Boundaries, Cameron-Billsbach Unit of Chautauqua NWR**



## Figure 23: Future Land Cover Within the Authorized Boundaries, Meredosia NWR



*Strategy 2.* In cooperation with the state, selectively control medium-sized predators such as coyotes, skunks, fox, and raccoons in Refuge Complex grasslands until sufficiently sized blocks of grassland habitat are restored.

*Strategy 3.* Protect, restore, and manage an additional 300 acres of native grassland habitat on the North Globe Drainage District (within Emiquon NWR's boundary) once an adequate realty interest is acquired.

*Strategy 4.* Restore and manage 50 acres of native grassland habitat on the Wilder Tract (within Emiquon NWR's boundary).

*Strategy 5.* Restore and manage an additional 70 acres of native grassland habitat on the Shearl Tract (within Meredosia NWR's boundary).

*Strategy 6.* Protect, restore, and manage an additional 380 acres of native grassland habitat within Illinois River Refuge Complex Focus Areas through voluntary partnership agreements.

#### 4.1.3.2 Native Savannas

Service management intent for native savanna within the Illinois River Corridor (e.g., oak and scrub savanna) is to restore and conserve high quality native savanna habitat within Illinois River Focus Areas that is capable of providing breeding habitat for migratory birds (e.g. Red-headed Woodpecker, Northern Flicker, Field Sparrow, Baltimore Oriole) and upland game species (e.g., Wild Turkeys) and contributing to the native biological diversity of the Illinois River Corridor.

**Objective 1.** By 2017, the Refuge Complex will protect, restore, and manage 200 acres of high quality native savanna habitat for listed species, waterfowl and other migratory birds, upland game species, and native biological diversity (currently the Refuge Complex protects or manages no savanna habitat).

*Strategy 1.* Create, restore, or enhance contiguous blocks of a savanna landscape dominated by old-growth oaks, black walnut, hickories, or other upland mast-producing trees with a canopy cover between 10 percent and 40 percent and an open understory dominated by native grasses and forbs with a shrub component for Northern Flicker, Red-headed Woodpecker, Black-billed Cuckoo, Yellow-billed Cuckoo, and other species. Plant mast-producing trees and shrubs typical of the historic Central Illinois savanna landscape and/or open up portions of the existing heavily forested landscape, especially on bluffs and areas of rolling topogra-

phy. Maintain an open understory through periodic burning, mowing, or light grazing activities. Maintain a mature oak component in select savanna restoration units to provide nesting cavities for Red-headed Woodpeckers. Enhance and maintain a warm-season grass component in select savanna restoration units to provide nesting cover for Field Sparrows. Maintain a mature oak-hickory-walnut component in savanna restoration units to provide nesting cavities for Red-headed Woodpeckers. Maintain a warm-season grass component in savanna restoration units to provide nesting cover for Field Sparrows.

**Objective 2.** Protect, restore, and maintain 200 acres of existing or restorable native savanna habitat within the Chautauqua-Emiquon Focus Area (approximately 15 acres per year) through voluntary partnership agreements.

*Strategy 1.* Complete restoration and protection through voluntary partnership agreements.

#### 4.1.3.3 Native Forests

Service management intent for native forests within the Illinois River Corridor (e.g., dry-mesic and mesic upland forests) will be capable of providing high quality breeding habitat for listed species (e.g., Indiana bats), migratory birds (e.g. Cerulean Warbler, Red-shouldered Hawk, Yellow-billed Cuckoo), forest nesting waterfowl (e.g. Wood Ducks), an assortment of upland game species (e.g., Wild Turkey), and contributing to the native biological diversity within the Illinois River Corridor. Reforestation will be accomplished primarily by planting native, mast producing trees on newly acquired lands. Some reforestation will occur through natural regeneration.

**Objective 1.** By 2017, the Refuge Complex will protect and manage 6,000 acres of high quality native forest habitat (e.g., upland hardwood, bottomland hardwood) for listed species, waterfowl and other migratory birds, and upland game species (currently the Refuge protects and manages roughly 4,500 acres of forest habitat).

*Strategy 1.* Create, restore, enhance, and manage large contiguous blocks of native bottomland forests (aiming for a minimum of 500 contiguous acres) capable of providing high quality breeding habitat for forest species of concern (e.g. Cerulean Warbler, Wood Thrush, Veery, Yellow-billed Cuckoo, Pileated Woodpecker). Manage native forest land for structural and plant species diversity. Ensure healthy soil and water resources. Maintain large mature stands of oak forest with a diverse, dense understory component, to provide nesting habitat for Yellow-billed Cuckoos, Chestnut-sided Warblers, and Wood Thrush.

*Strategy 2.* Restore and manage an additional 200 acres of bottomland forest habitat within the Emiquon NWR (Wilder Tract).

**Objective 2.** Protect, restore, and manage an additional 1,300 acres of existing or restorable native forest habitat within the Meredosia Focus Area (approximately 100 acres per year).

*Strategy 1.* Complete restoration and protection through voluntary partnership agreements.

#### 4.1.3.4 Wetlands

Service management intent for wetland habitats within the Illinois River Corridor (e.g., floodplain forests, marsh, fen, sedge meadow) is to restore and preserve wetland habitat that is capable of providing high quality resting, nesting, and feeding habitat for waterfowl and other migratory birds; spawning, nursery, and overwintering habitat for native fish and mussels; and contributing to the native biological diversity of the Illinois River Corridor.

**Objective 1.** By 2017, protect and manage 10,000 acres of high quality wetland habitat characteristic of the historic Illinois River Corridor (e.g., hemi-marshes, moist soil habitats, wet prairie, side channels, backwater lakes, tributary streams) (currently the Refuge has roughly 6,000 acres of wetlands).

*Strategy 1.* Maintain a mosaic of hemi-marsh habitat in permanent water bodies for waterfowl, Common Moorhen, Black Tern and shallow water marshes for teal and shorebirds on Emiquon NWR.

*Strategy 2.* Restore and maintain an additional 700 acres of hemi-marsh habitat at the South Globe Drainage District.

*Strategy 3.* Maintain an abundance of moist soil habitat on Refuge Complex land for waterfowl and shore birds.

*Strategy 4.* Restore and maintain 60 acres of moist soil habitat at Emiquon NWR (Proehl Tract).

*Strategy 5.* Restore and maintain 105 acres of moist soil/wet meadow habitat at Emiquon NWR (Wilder Tract).

*Strategy 6.* Restore and maintain 300 acres of moist soil habitat on the North Globe Drainage District (when an adequate interest in the land is purchased).

*Strategy 7.* Maintain wet prairie swales in grassland areas with standing water less than 3 inches deep to provide breeding habitat for King and Black Rail and additional habitat for shorebirds, herons,

egrets, and other rail species on Emiquon and Meredosia national wildlife refuges.

*Strategy 8.* Restore and maintain 53 acres of wet prairie habitat at Meredosia NWR (Klineschmidt Tract).

*Strategy 9.* Restore and maintain side channel and oxbow habitat for fish and mussels, including spawning, nursery, and overwintering habitat through active and passive management (e.g., selective dredging, bank stabilizations, wave control structures). Ensure adequate summer and winter thermal regulation within riparian and aquatic zones. Provide an amount and distribution of woody debris along shorelines and side channels characteristic of natural aquatic and riparian ecosystems for this area.

*Strategy 10.* Restore and maintain 3.5 miles of side channel habitat at the LaGrange Side Channel on Chautauqua NWR.

*Strategy 11.* Restore and maintain 80 acres of oxbow habitat at Emiquon NWR.

*Strategy 12.* Maintain diverse and productive vegetative communities in backwater lakes (e.g., functional litoral zones) for the benefit of waterfowl and native fish populations on the Refuge Complex.

*Strategy 13.* Protect, restore and maintain 100 acres of backwater lake habitat on Liverpool Lake on Chautauqua NWR.

*Strategy 14.* Construct and maintain five islands in the North Pool of Lake Chautauqua to enhance waterfowl nesting and reduce wave erosion (minimum 150 feet from shore). The aim of this project is to reestablish roughly 400 acres of litoral zone in the lake.

*Strategy 15.* Restore and maintain 360 acres of backwater lake habitat at Weis Lake through island construction, construction of sediment control structures, and selective dredging on the Cameron/Billsbach Unit.

*Strategy 16.* Restore and maintain 300 acres of backwater lake habitat at Billsbach Lake through selective dredging and repair of the natural levee.

*Strategy 17.* Protect, restore, and manage 700 acres of backwater lake habitat on Clear Lake through partnerships with the state and local landowners.

*Strategy 18.* In partnership with others, restore 20 miles of tributary stream habitat along Crow Creek and the Spoon River. Ensure private landowners in these areas have viable options to finance and complete the work. Continue to provide technical assistance and financial incentives to landowners through the Partners for Fish and Wildlife Program.

*Strategy 19.* Through the Midwest Natural Resources Group, the Navigation Study, the Ecosystem study, and the Comprehensive Plan for the Upper Mississippi River System and other planning efforts, coordinate interagency water management efforts on the Illinois River to establish a water management strategy in the Illinois River Corridor that enhances wetland functions and values.

*Strategy 20.* Participate in coordinating data acquisition and policy development for addressing impacts of non-point source pollution on the rivers aquatic resources.

*Strategy 21.* Through partnerships, maintain 50 Wood Duck boxes on Refuge land in a manner to achieve a 75 percent occupancy rate.

## 4.1.4 Visitor Services Management

**Visitor Services Management Goal:**
Provide the public with abundant and high-quality wildlife-dependent recreation opportunities on Refuge land including hunting, fishing, wildlife observation and photography, and environmental education and interpretation.

4.1.4.1 Wildlife-dependent Recreation

Management intent for conducting public recreation programs on Refuge Complex land is to enhance the public's understanding and appreciation of the natural world. We believe that the wildlife-dependent recreation activities of hunting, fishing, wildlife observation and photography, and environmental education and interpretation increase understanding and appreciation of the natural world. To this end, the Refuge Complex will provide a wide variety of wildlife-dependent recreation and educational opportunities and participate in local events such as birding festivals. Participants in environmental education and interpretation programs will leave with a better understanding and appreciation of the Refuge, the National Wildlife Refuge System, and the ecosystems of the Illinois River Corridor, as well as learn the skills necessary to actively partcipate in their stewardship.

**Objective 1.** Refuge stakeholders will appreciate the high quality recreational opportunities afforded by the Refuge Complex such that the

Refuge Complex becomes recognized as a premier destination to participate in natural resource based recreation.

U.S. Fish & Wildlife Service

*Strategy 1.* Expand auto-tour route interpretive elements and access times during peak migrations and throughout the summer months.

*Strategy 2.* Create additional viewing opportunities along Chautauqua dike system, including an auto tour route with a minimum of five pull-offs for observation and interpretive/educational opportunities, and a primitive access site off the auto tour route to the Illinois River (Old Levee Access).

*Strategy 3.* Develop a pull-off area at the Globe Drainage District area at Emiquon NWR. Future facility development at Emiquon NWR is depicted in Figure 24.

*Strategy 4.* Amend the hunting plan to include big game hunting on Liverpool Lake and Meredosia Island.

*Strategy 5.* Open and provide access for public hunting and other wildlife dependent recreational uses at Emiquon NWR.

*Strategy 6.* Evaluate new hunting opportunities on existing and newly acquired lands. In 15 years, an estimated 4,000 additional acres could be opened to public hunting for waterfowl, deer and small game.

*Strategy 7.* Open the east side of the North Pool of Lake Chautauqua to accessible bank fishing year-round.

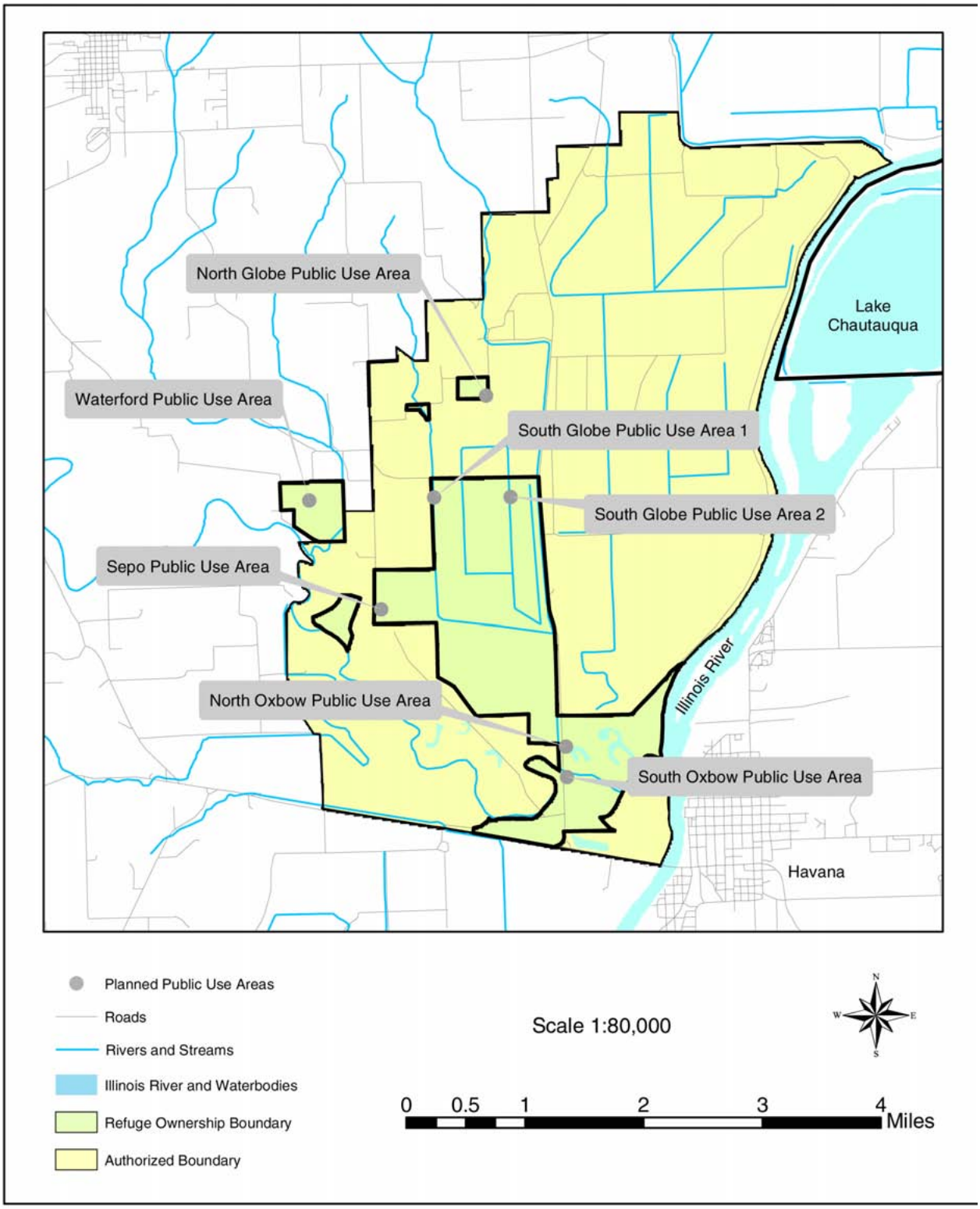
*Strategy 8.* Develop five new parking lots at Emiquon NWR to accommodate deer and waterfowl hunters.

*Strategy 9.* Provide accessible facilities (hunt blinds) for waterfowl and deer hunting on Emiquon NWR.

*Strategy 10.* Promote National Fishing Day events in coordination with Illinois DNR and other partners.

*Strategy 11.* Develop a visitor services step-down management plan by April 2005 that evaluates existing public use facilities, identifies additional facilities needed to provide high quality compatible wildlife-dependent recreation, and sources of funding for development and maintenance of facilities.

## Figure 24: Future Facility Development, Emiquon NWR



*Strategy 12.* Provide two accessible bank fishing facilities for visitors on the Chautauqua NWR North Pool and at Meredosia NWR.

*Strategy 13.* Construct an accessible boat ramp at Goofy Ridge to accommodate access to upper Lake Chautauqua and the Illinois River via Goofy Ridge ditch.

*Strategy 14.* Develop an interpretive loop trail at Meredosia NWR incorporating the existing trail.

**Objective 2.** Provide structured on-site environmental education programs to 2,500 students annually.

*Strategy 1.* Coordinate with existing organizations (i.e. Dickson Mounds, Western Illinois University, Environmental Education Association of Illinois) to develop teacher workshops that orient teachers to the Refuge resources and environmental education materials. Work with local school superintendents to arrange on-site visits. Coordinate with Dickson Mounds, City of Havana, Illinois DNR with relevant/related programs and projects (i.e. link with Illinois River Valley Project). Enhance the Refuge's ability to accommodate large group visits (i.e. tour buses, school groups). Coordinate with resource agency staff (i.e. NRCS, IDNR) to develop a full-day Conservation/Natural Resource day for area grade school students.

*Strategy 2.* Recruit and hire one Park Ranger to coordinate Visitor Services program.

*Strategy 3.* Develop three site-specific learning trunks and resource materials for local educators and youth leaders.

*Strategy 4.* In partnerships with local teachers, county naturalists, and youth organizations, investigate and adapt curriculum and monitoring programs focusing on Refuge water quality and watershed issues.

*Strategy 5.* Update the general brochure to include Refuge management, themes, and natural highlights.

*Strategy 6.* Develop interpretive signage and Refuge orientation message on five kiosks throughout Illinois River Refuges (2 existing at Chautauqua, 1-Meredosia, 1-Emiquon, 1- Cross dike).

*Strategy 7.* Develop a portable interpretive display that highlights Illinois River management, themes, and natural resource highlights (similar to that of Harvesting the River).

*Strategy 8.* Develop permitted/prohibited signage for five kiosks throughout Illinois River National Wildlife and Fish Refuges Complex.

*Strategy 9.* Develop interpretive signage for five stops along Chautauqua Lake auto tour.

*Strategy 10.* Develop a kiosk at the cross dike parking area that interprets messages about wetlands and water management.

*Strategy 11.* Develop restroom facilities at the headquarters to handle groups and individual visitors.

*Strategy 12.* Convert the existing headquarters maintenance shop to a visitor contact station (which includes exhibits/multi-purpose space, and sales outlet) when the new maintenance shop is constructed.

*Strategy 13.* Develop interpretive materials and programs that incorporate Refuge themes, issues, history, and management programs. Utilize area resource professionals and develop a series of public programs highlighting Refuge Complex themes (Bird Migration, Illinois River/Wetland Function/ Hydrology, Heritage/Human-Wildlife Interactions).

*Strategy 14.* Continue to work with the Heartland Water Resource Planning Committee to develop an educational wing at the proposed Illinois River Museum in Peoria.

*Strategy 15.* Conduct a feasibility study/site design for a Illinois River National Wildlife and Fish Refuge Complex Visitor Center near Dickson Mounds Museum.

#### 4.1.4.3 Outreach

Management intent for outreach at the Refuge Complex is to foster improved communication and collaboration between Service programs, the states, non-government organizations, and other federal agencies over the life of this Plan.

**Objective 1.** Refuge stakeholders will feel connected to the Refuge and will actively participate in the stewardship of the Refuge, the National Wildlife Refuge System, and the ecosystems within the Illinois River Corridor.

*Strategy 1.* Develop a comprehensive communication strategy for the Refuge Complex (outreach step-down plan) by 2006.

*Strategy 2.* In partnership with Emiquon Audubon, the Friends of Illinois River, and The Nature Conservancy, promote Chautauqua NWR and Emiquon NWR as international wildlife viewing destinations.

*Strategy 3.* Build cooperative relationship with local media and submit 12 news releases per year to area papers that highlight management activities and wildlife happenings on the Refuge Complex. Advertize special events that promote wildlife viewing opportunities throughout the Refuges (e.g., Migratory Bird Day, Eagle Days, National Wildlife Refuge Week, National Fishing Week).

*Strategy 4.* Maintain the Illinois River NWR Complex website and highlight Refuge Complex activities monthly.

*Strategy 5.* Explore technology to develop real-time video of Lake Chautauqua.

*Strategy 6.* Provide four Refuge tours throughout the year for special guests (city/agency officials).

*Strategy 7.* Promote special public programs through the Chamber of Commerce Calendar of Events.

*Strategy 8.* Promote a "Refuge happenings" show on Radio Station WDUK.

*Strategy 9.* Continue to support stewardship efforts of the Friends of the Illinois River and the Emiquon Audubon Society.

*Strategy 10.* Explore Cooperating Associating Agreement with Emiquon Audubon.

*Strategy 11.* Develop projects that foster community ownership and directly benefit the Illinois River Refuges.

*Strategy 12.* Promote citizen involvement and increase community ownership in the Refuge through stewardship work days.

*Strategy 13.* Coordinate volunteer efforts with The Nature Conservancy and the Illinois DNR EcoWatch program.

*Strategy 14.* Continue the internship program or coordinate with the Western Illinois University Peace Corps Fellowship program.

*Strategy 15.* Coordinate with Illinois DNR in conducting volunteer monitoring of Refuge resources (i.e. frog and toad surveys).

*Strategy 16.* Provide information that orients and informs visitors of recreational opportunities on the Refuge Complex and surrounding areas.

**Objective 2.** Land owners within Refuge Focus Areas will have a greater awareness of conservation and restoration potential on their lands.

*Strategy 1.* Work with Natural Resources Conservation Service and other organizations to disseminate information to land owners.

*Strategy 2.* Initiate Partners for Fish & Wildlife Program efforts in the Focus Areas.

### 4.1.5 Refuge Administration

**Administration Goal:**
Provide leadership and support to federal, state, local and private partners at the Refuge, ecosystem and landscape scales that is proactive in addressing a wide range of conservation opportunities and issues.

4.1.5.1 Law Enforcement

Continue to enforce laws for which the Service is responsible on the Refuge Complex, including the Archeological Resources Protection Act of 1979; the Lacey Act (1981 amendments), the Endangered Species Act, the Migratory Bird Treaty Act, the Migratory Bird Hunting and Conservation Stamp Act, and the National Wildlife Refuge Administration Act, as well as state laws governing hunting, fishing, and motor vehicle use.

**Objective 1.** Increasing compliance of state and federal regulations on Refuge land will be a priority for the Refuge throughout the life of this CCP.

*Strategy 1.* Revise Refuge visitor regulations for consistency and compatibility.

*Strategy 2.* Continually increase the public's knowledge of Refuge visitor regulations and the boundaries of Fish and Wildlife Service lands, throughout the life of this CCP.

*Strategy 3.* Add one full-time law enforcement officer by 2007.

*Strategy 4.* Upgrade radio systems to meet federal narrow-band digital standards by 2005.

*Strategy 5.* Upgrade patrol vehicles to meet state and federal emergency vehicle standards by 2005.

**Objective 2.** Continue to serve as a leader, facilitator, and source of information for natural resources issues along the Illinois River.

*Strategy 1.* Actively participate in partnership activities.

*Strategy 2.* Emphasize partnerships within Refuge Focus Areas.

# Chapter 5: Implementation and Monitoring

## 5.1 Personnel Needs

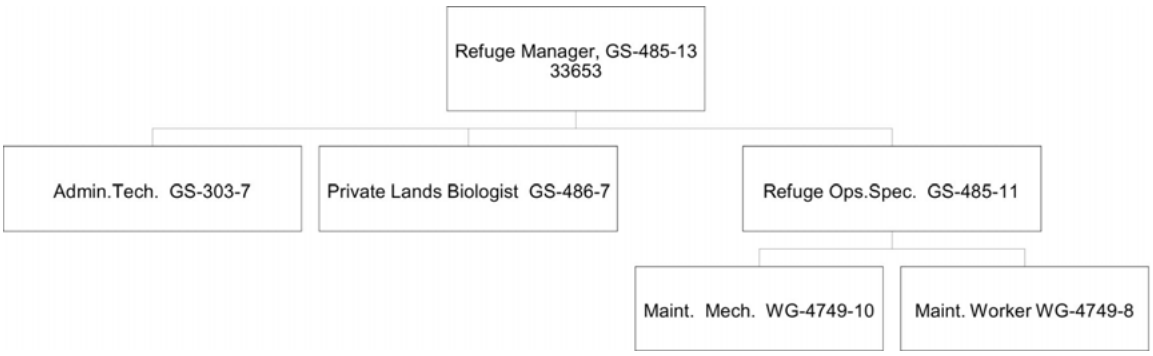
Currently the staff of the Refuge Complex consists of six positions: refuge manager, refuge operations specialist, administrative technician, private lands biologist, maintenance mechanic, and maintenance worker (Figure 25).

As the Refuge Complex activities have expanded and Refuge visitation has increased with a demand for higher quality wildlife-dependent recreation opportunities, it has become difficult to efficiently run the Refuge to meet the demands of the resources and the public. To meet these needs, our plan is to add a full-time park ranger to coordinate the public use program, a full-time law enforcement officer, and a full-time private lands biologist.

## 5.2 New and Existing Projects

The future management of the Refuge Complex will require consistent operational and maintenance funding to implement the strategies in this Plan. The costs to implement the strategies and projects identified in this Plan are captured in Service budget databases, including the Refuge Operating Needs System (RONS), Maintenance Management System (MMS), and Land Acquisition Priority System (LAPS). The following list contains examples of the

### Figure 25: Illinois River NWR Complex Staffing, 2003



highest priority Refuge projects (Tier 1), as chosen by the Refuge staff. A listing of the top priority unfunded Refuge projects can be found in Appendix F.

Tier 1 RONS projects include:

- Improve Refuge public use and outreach by adding an outdoor recreation planner to the staff (RONS No. 97009).
- Improve resources data analysis on the Illinois River Refuges by adding a biologist position (RONS No. 99005).
- Construct an accessible platform at Chautauqua NWR (RONS No. 99011).
- Undertake prairie restoration on the Shearl and Skinner tracts on Meredosia NWR (RONS No. 97003).
- Improve the entrance road to the Refuge Complex headquarters (RONS No. 99004).

## 5.3 Step-down Management Plans

Step-down management plans help meet the goals and objectives of the CCP. Some step-down plans are required by Service policy and others are used to specify strategies and implementation schedules beyond the detail of the CCP. The step-down plans identified in Table 3 will be reviewed and revised as necessary to achieve the objectives of the CCP. Although each plan has value, the Habitat Management Plan, Hunting Plan and Visitor Services detailed planning are essential to describe reforestation, hunt expansion and trail development.

### Table 3: Step-down Management Plan Schedule

| Plan | Completion Date |
|---|---|
| Safety Program | 2004 |
| Hazardous Materials Operations | 2004 |
| Law Enforcement | 2005 |
| Pest Management/Exotic Species | 2005 |
| Hunting | 2006 |
| Habitat Management Plan | 2006 |
| Inventory and Monitoring | 2005 |

## 5.4 Partnership Opportunities

Partnerships with federal, state, and local agencies, private organizations, and individuals will be essential to the successful implementation of this CCP. Refuge staff will seek out partnerships to fulfill the goals and objectives outlined in this plan to attain the desired future wildlife and habitat conditions. Natural resource issues extend beyond social and political boundaries. Stakeholders with a variety of interests and backgrounds need to be included in the day-to-day management of the Refuge Complex and take ownership in its development.

Voluntary participation from private landowners will be an essential part of the Refuge Complex's emphasis on Illinois River Focus Areas. Nearly all the land in the Focus Areas is in private ownership. In fact, nearly 70 percent of all available fish and wildlife habitat in the United States is in private ownership. With increased demographic trends toward urbanization and suburbanization, there is a tendency for people to lose touch with the land and the goods and services it provides. The Refuge Complex's approach to sustainable management of public and private land will be to actively support a network of lands and waters dedicated to fish, wildlife, and plant conservation. This means that partnerships are not only desirable for accomplishing Refuge objectives, they are necessary.

Natural resources do not organize themselves according to political boundaries. Clean air and water, sustainable populations of wildlife and plants, and positive aesthetic and recreational experiences are a community-wide effort involving multiple federal, state, and local jurisdictions. The Refuge Complex will support other governmental agencies, private organizations and industries, and private landowners in managing natural resources in ways that enhance Service Trust Resources for present and future generations. The Refuge Complex will contribute staff expertise, equipment, and monetary resources, where possible, to individuals and groups requesting assistance with activities beneficial to Service trust resources.

The Refuge Complex's volunteer program will be vital to the fulfillment of the Refuge Complex vision. Volunteers currently assist the Refuge Complex staff with fish and wildlife management, habitat management, education and outreach, administration, and maintenance – in other words, in nearly every aspect of the Refuge's operation.

The Refuge has established partnership relationships with following organizations:

- U.S. Department of Agriculture, Conservation Reserve Enhancement Program
- Illinois Department of Natural Resources
- Partners for Fish and Wildlife Program
- U.S. Army Corps of Engineers
- Illinois Natural History Survey
- Forbes Biological Station
- Ducks Unlimited
- Pheasants Forever
- The Nature Conservancy
- The Izaak Walton League of America

- The Natural Resources Conservation Service
- Soil and Water Conservation Districts
- Rural Fire Districts

## 5.5 Monitoring And Evaluation

Monitoring is critical to successful implementation of this plan. Monitoring is necessary to evaluate the progress toward objectives and to determine if conditions are changing.

Accomplishment of the objectives described in this CCP will be monitored annually by the Refuge Manager and his or her supervisor. The public will be informed about the activities of the Refuge Complex staff through periodic mailings to persons on the mailing list and published on the Refuge Complex website. The techniques and details for monitoring related to specific objectives will be specified in the Inventory and Monitoring Step-down Plan.

The direction set forth in this CCP and specifically identified strategies and projects will be monitored throughout the life of this plan. Periodically, the Regional Office will assemble a station review team to visit the Refuge Complex and evaluate current Refuge activities in light of this plan. The team will review all aspects of Refuge management, including direction, accomplishments and funding. The goals and objectives presented in this CCP will provide the baseline from which this field station will be evaluated.

## 5.6 Plan Amendment and Revision

The CCP is meant to provide guidance to Refuge managers and staff over the next 15 years. However, the CCP is also a dynamic and flexible document and several of the strategies contained in the plan are subject to natural, uncontrollable events such as floods and droughts. Likewise, many of the strategies are dependent upon Service funding for staff and projects. Finally, the CCP was developed using the best information available at the time of preparation. As new and better information emerges, the direction and strategies of the CCP may need to be re-evaluated. Because of these factors, the recommendations in the CCP will be reviewed periodically and, if necessary, revised to meet new circumstances. If any revisions are major, the review and revision will include the public.

# Appendices

**Appendix A:** Environmental Assessment

**Appendix B:** Glossary

**Appendix C:** Species Lists

**Appendix D:** Compatibility Determinations

**Appendix E:** Compliance Requirements

**Appendix F:** RONS and MMS Lists

**Appendix G:** Mailing List

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# Appendix A: Environmental Assessment

# Illinois River

National Fish and Wildlife Refuges Complex

# Environmental Assessment

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# FINDING OF NO SIGNIFICANT IMPACT

**Illinois River National Wildlife and Fish Refuge Complex**
**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 Illinois River National Wildlife and Fish Refuge Complex (Meredosia, Chautauqua, and Emiquon NWRs) 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:

- Six of the seven threatened or endangered species occurring or possibly occurring in the affected area will not be negatively impacted and will generally benefit under the CCP implementation. Proposed habitat improvement for the seventh species, decurrent false aster, may take plants, but no loss of reproduction is expected and a net gain is anticipated.
- The CCP provides a clear statement of direction for future management of the Complex.
- The CCP gives refuge neighbors, visitors and the general public an understanding of the Service's management actions on and around Complex refuges.
- The CCP ensures that Complex management actions and programs are consistent with the mandates of the National Wildlife Refuge System.
- The CCP ensures that Complex management is consistent with federal, state and county plans.
- The CCP provides a basis for the development of sound budget requests reflecting Complex refuges' operation, maintenance, and capital improvement needs.
- All issues raised were addressed.

Supporting References:

1. Illinois River National Wildlife and Fish Refuge Complex Final Comprehensive Conservation Plan and Environmental Assessment
2. Statement of Compliance Checklist
3. Environmental Action Statement
4. Compatibility Determinations
5. Intra-Service Section 7 Biological Evaluation Form and Addendum

Marvin Morson

Regional Director, FWS, Region 3

Date: SEP 1 2004

U.S. Fish and Wildlife Service
Department of the Interior

# ENVIRONMENTAL ASSESSMENT FOR IMPLEMENTATION OF THE COMPREHENSIVE CONSERVATION PLAN FOR ILLINOIS RIVER NATIONAL WILDLIFE AND FISH REFUGE COMPLEX

*Abstract*: The U.S. Fish and Wildlife Service is proposing to implement a Comprehensive Conservation Plan (CCP) for the Illinois River National Wildlife and Fish Refuge Complex in Illinois. 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 Refuges 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.

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# Chapter 1: Purpose and Need for Action

## 1.1 Purpose

The purpose of the proposed action is to specify a management direction for the Illinois River National Wildlife and Fish Refuge Complex (Refuge Complex) (Figure 1) in central and western Illinois for the next 15 years. This management direction will be described in detail through a set of goals, objectives, and strategies in a Comprehensive Conservation Plan(CCP).

The action is needed because adequate, long-term management direction does not exist for the Refuge Complex. Management is now guided by several short-term plans and general policies. Also, the action is needed to address current management issues and to satisfy the legislative mandates of the National Wildlife Refuge System Improvement Act of 1997, which requires the preparation of a Comprehensive Conservation Plan for all national wildlife refuges.

The Refuge Complex consists of Chautauqua National Wildlife Refuge (NWR), Meredosia NWR, and Emiquon NWR. Chautauqua National Wildlife Refuge was established by Executive Order 7524 on December 23, 1936. Meredosia NWR was established in 1973 under the authority of the Migratory Bird Conservation Act of 1929. Emiquon NWR was established under the Emergency Wetlands Resources Act of 1986.

The purposes for the Refuges derive from their establishing authority. The purposes are:.

| Refuge | Purpose |
|---|---|
| *Chautauaqua NWR* | "...as a refuge and breeding ground for migratory birds and other wildlife" (Executive Order 7524, dated December 23, 1936) "...for use as an inviolate sanctuary, or for any other management purpose, for migratory birds" (Migratory Bird Conservation Act.) |
| *Meredosia NWR* | "...for use as an inviolate sanctuary, or for any other management purpose, for migratory birds" (Migratory Bird Conservation Act) "...suitable for 1) incidental fish and wildlife-oriented recreational development, 2) the protection of natural resources, 3) the conservation of endangered species or threatened species...the Secretary...may accept and use...real...property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors..." (Refuge Recreation Act) |
| *Emiquon NWR* | "...the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and convention..." (Emergency Wetlands Resources Act) |

We prepared this Environmental Assessment (EA) using guidelines established under the National Environmental Policy Act of 1969. The Act requires us to examine the effects of proposed actions on the natural and human environment. In the following sections we describe three alternatives for future refuge management, the environmental consequences of each alternative, and our preferred management direction. We designed each alternative as a reasonable mix of habitat prescriptions andwildlife-dependent recreational opportunities, and then we selected our preferred alternative based on its environmental consequences and its ability to achieve the Refuges' purposes.

## 1.2 Need for Action

For the Illinois River Refuge Complex, there is a need to provide healthy aquatic habitat for fish, mollusks, and crustaceans in the Illinois River and its tributaries. There is a need to find solutions to sedimentation problems within the Illinois River watershed. There is a need to support populations of declining grassland, savanna, forest and wetland bird species. There is a need to improve the relations between the community and the Refuge. In addition, the Plan is needed to satisfy the legislative mandates of the National Wildlife Refuge system Improvement Act of 1997, which requires the Service to develop and implement a CCP for all national wildlife refuges.

Based on the above needs, the purposes of the Refuges, the mission of the National Wildlife Refuge System and ecosystem considerations, the planning team established the following goals for the Refuge Complex. Each of the three management alternatives described in this EA will be able to at least minimally achieve these goals.

*Wildlife:* Perpetuate listed species, waterfowl and other migratory birds, and native fish and mussels within the Illinois River Corridor, while restoring and preserving the biological integrity, diversity, and environmental health of the Refuge Complex.

*Habitat:* Provide high quality habitat within the Illinois River Corridor for the benefit of listed species, waterfowl and other migratory birds, native fish and mussels, and native biological diversity.

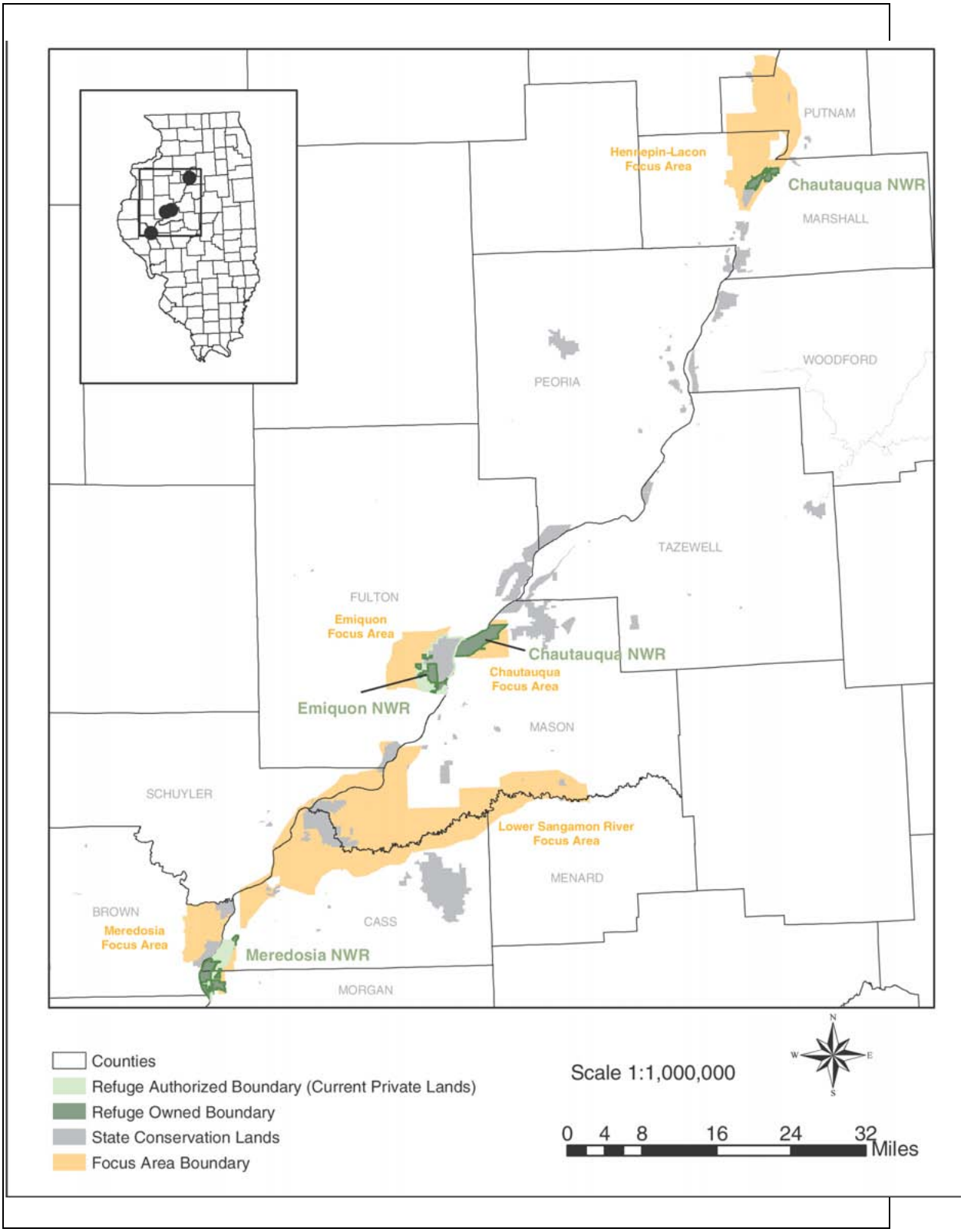
*Visitor Services:* Provide the public with abundant high quality, wildlife-dependent public use opportunities on Refuge Complex land, including hunting, fishing, wildlife observation and photography, environmental education, and interpretation.

*Refuge Administration:* Provide leadership and support at the Refuge, ecosystem, and landscape scales that is pro-active in addressing a wide-range of conservation opportunities and issues.

## 1.3 Decisions to Be Made

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

## Figure 1: Location of Illinois River National Wildlife & Fish Refuge Complex



## 1.4 Authority, Legal Compliance, and Compatibility

The National Wildlife Refuge System includes federal lands managed primarily to provide habitat for a diversity of fish, wildlife and plant species. National wildlife refuges are established under many different authorities and funding sources for a variety of purposes. The purposes of the Refuges are listed in the Section 1.1. Additional authority delegated by Congress, federal regulations, executive orders and several management plans guide the operation of the Refuge Complex. Appendix E contains a list of the key laws, orders and regulation that provide a framework for the proposed action.

## 1.5 Scoping and Public Involvement

The planning process began with scoping in 1998, and public meetings were conducted in the towns of Henry, Meredosia and Lewistown in April 1999. Refuge Complex staff and regional planners conducted more public meetings in May 2000 and February 2002 to provide an update on the planning process. Staff have also met with the Illinois Department of Natural Resources, The Nature Conservancy and several working groups.

The Service used a participatory planning process to develop the CCP and EA for the Refuge Complex. Throughout the planning process the Service has initiated outreach to stakeholders, including representatives from other federal and state agencies, special interest groups, industry and non-profit organizations, landowners living adjacent to Refuge land, Refuge visitors, and Service employees. Information about the CCP was provided to stakeholders and the general public through news releases, presentations, interviews, informational letters, public meetings, briefings, and the Internet. Questionnaires, focus groups, public meetings, and one-on-one discussions were used to gather input.

The draft EA was released for public review and comment with the draft CCP in September 2003. During the review period, which ended on October 20, 2003, three open house meetings were conducted in the communities of Meredosia, Lewistown and Henry, Illinois, for the purpose of hearing public comment on the draft documents.

A summary of the comments we received and our responses to those comments is located in Appendix K.

### 1.5.1 Issues and Concerns

Internal and external scoping and discussion with the public revealed several issues and concerns currently facing the Refuge Complex. One general theme of the issues and concerns was the loss of habitats and the effect on wildlife species that are the Service's responsibility. This includes threatened and endangered species, migratory birds and fish that cross jurisdictions. Another general theme was the need to improve the quality and quantity of wildlife-dependent recreational opportunities on the Refuge Complex. In addition to these general themes, some issues were specific to particular locations on the Refuge Complex. The particular issues and concerns that make up the general themes or relate to specific locations are:

<u>Wildlife Management Issues</u>

- Protect listed species.
- Perpetuate waterfowl and other migratory birds.
- Recover native fish and mussels.
- Safeguard biological integrity, diversity and environmental health.

- Wildlife are creating crop depredation problems on neighboring farm fields.
- Avian botulism has been a serious problem on Lake Chautauqua and continued monitoring is needed.

Habitat Management Issues

- We are losing wetlands.
- We are losing native forest.
- We are losing native grasslands.
- We are losing native savanna.
- Habitat is being degraded.
- An oxbow restoration on Emiquon NWR is affecting drainage on local land, and the Refuge needs to find another means of drainage for the North Globe.
- Sedimentation is resulting in backwater lakes, sloughs and side channels of the Illinois River Corridor filling in.

Visitor Services Management Issues

- The public has identified additional recreational opportunities that the Refuge Complex could provide.
- Refuge Complex infrastructure needs to be upgraded for safety reasons as well as for universal accessibility.
- The Refuge Complex needs to increase its visibility and understanding of its mission.
- Waterfowl hunting quality is being hurt/helped by a structure at the mouth of Quiver Creek.
- Some hunters have suggested that the Refuge Complex serve as sanctuary for waterfowl and not produce food, thus improving hunting on area clubs.

A complete listing and further discussion of these issues and concerns can be found in Chapter 2 of the CCP and Chapter 2 of this EA.

# Chapter 2: Description of the Alternatives

## 2.1 Formulation of Alternatives

Three management alternatives were developed by the planning team based on issues, concerns and opportunities presented during the CCP scoping process. The issues that are discussed came from individuals, cooperating agencies, conservation organizations and Refuge staff. A summary of the three alternatives is provided in Table 2 on page 135.

The three management alternatives were developed to address most of the issues, concerns and opportunities identified during the CCP planning process. Specific impacts of implementing each alternative will be examined in three broad categories:

*Wildlife*: How can the Refuge contribute to the preservation of listed species, provide for waterfowl and other migratory birds, aid in the recovery of native fish and mussels, and safeguard biological integrity and diversity?

*Habitat*: What is the appropriate level and nature of wetland, forest, grassland, and savanna habitat restoration and maintenance projects?

*Visitor Services*: What is the appropriate level of wildlife-dependent recreational activities on the Refuge and how can the quality and universal accessibility be improved? How can the Refuge Complex become better known in local communities?

During the development of the alternatives, the planning team considered: the issues and concerns identified during the scoping, the purpose(s) of each Refuge within the Refuge Complex, and the vision and goals of the Refuge Complex. The planning team also paid close attention to federal, state, and local landscape level plans and planning efforts and stakeholder expectations for the Service and the Refuge Complex. Societal trends relevant to wildlife and habitat management and public use of the Illinois River Corridor were also considered. The planning team developed the three management alternatives assuming that a large budget increase for Refuge operations is unlikely during the life of the plan. The team also limited its considerations to uses that are compatible with the purposes of the Refuge.

Each of the alternatives articulates management direction for the conservation of species, ecosystems, and landscapes across the project area (in varying degrees) for the purpose of providing for the biological needs of listed species, waterfowl and other migratory birds, native fish and mussels, and native biological diversity and to provide the public with high quality wildlife-dependent recreation and education opportunities.

## 2.2 Alternatives Considered But Eliminated From Consideration

### 2.2.1 Floodplain/River Connectivity

Over time, several stakeholders have suggested that the Illinois River would be better served by the Refuge Complex if its floodplain wetlands were linked to the river by way of a hydrologic connection like upper Lake Chautauqua.

Historically, the Illinois River system supported a diverse system of braided channels, riparian lands, side channels, sloughs, islands, sandbars, and backwater lakes. However, during the past 200 years, thousands of acres of these habitats have been lost to development. Many of the watershed's upland prairies and forests have been converted to agricultural use, reducing the land's ability to hold water and increasing the flows and sediment in tributary rivers. Each year it is estimated that more than 14 million tons of sediment are transported through the Illinois River watershed. More than half (7 million tons) is said to be deposited in the Illinois River Valley each year. As a result, many of the backwater lakes, side channels and sloughs associated with the Illinois River Corridor have filled in at an alarming rate, some having lost more than 70 percent of their water storage capacity. The opening of the "Illinois Waterway" from 1919 to 1930 dramatically changed the river's flow pattern. The influx of Chicago's waste water and some 10,000 cubic feet per second of water diverted from Lake Michigan raised the river's average water level by 1.5 to 4 feet, increasing both average flows and the frequency and severity of floods. The construction of dikes, levees, and water control structures have constrained the river's flows to a flowing channel with the principle purpose of supporting commercial navigation. As a result of these activities, many fish, mammal, waterfowl, mussel, and other related life forms have declined drastically.

Due to altered water and sediment regimes, water management is now needed to establish and sustain diverse and productive vegetative communities in backwater areas within the Illinois River floodplain. Unfortunately, the same water control needed to establish and sustain vegetation for some fish and wildlife often negatively impacts other fish and aquatic life that use these areas. Without water control, establishing and maintaining vegetative communities and their attendant functional values for aquatic life would be minimal. The vegetative community, hydrologic cycle maintenance, and biological diversity and production may require periodic "management" to mimic the natural hydrograph that was once present in this system.

Under all Alternatives, Refuge Complex land will be managed for the benefit of aquatic life by providing a managed hydrologic exchange between the river system and the aquatic system that does not jeopardize the health and well-being of the aquatic system as a whole. Such exchange would provide, among other things, important nutrient laden sediment, particulate matter, and invertebrate biomass to the river's aquatic food web. Fish access would be provided for desirable fish spawning, nursery, rearing, summering, and overwintering, while protecting wetland vegetation from large numbers of migrating carp.

### 2.2.2 Quiver Creek Water Control Structure

Several local people suggested that the Refuge should leave the 3X3 structure at the mouth of Quiver Creek open to keep ice from forming on Lake Chautauqua until the end of the waterfowl hunting season. Several comments implied the Service was purposefully closing the structure to force waterfowl to migrate farther south.

All water management activities on Lake Chautauqua and other areas of the Refuge Complex are done for the purpose of promoting diverse and productive vegetative communities. Service policy

is to avoid management practices that will "short stop" waterfowl (i.e., manipulate pools in order to keep ice off longer in the season than would occur "naturally"). In all Alternatives, the Refuge Complex will not manipulate water levels to provide open water on Lake Chautauqua beyond natural freeze-up in an effort to keep waterfowl in the area. We will continue to manage the water on Quiver Creek upstream from the control structure to benefit hunting of waterfowl.

# 2.3 Management Actions Common to All Management Alternatives

## 2.3.1 Archaeological and Cultural Resource Protection

As part of its larger conservation mandate and ethic, the Service through the Refuge Complex Manager applies several historic preservation laws and regulations to ensure historic properties are identified and are protected to the extent possible within its established purposes and Refuge System mission.

Early in project planning for all undertakings, the Refuge Complex Manager informs the RHPO (Regional Historic Preservation Officer) to initiate the Section 106 process. Concurrent with public notification and involvement for environmental compliance and compatibility determinations if applicable, or cultural resources only if no other issues are involved, the Refuge Manager informs and requests comments from the public and local officials through presentations, meetings, and media notices. Results are provided to the RHPO.

When the Service and one or more other federal agencies have Section 106 responsibilities, the Service initiates the procedures in 36 CFR Part 800 independently of other agencies unless a lead federal agency has been determined.

Archeological investigations and collecting are performed only in the public interest by qualified archeologists or by persons recommended by the Governor working under an Archaeological Resources Protection Act permit issued by the Regional Director. The Refuge Manager has found this third-party use of Refuge land to be compatible. The requirements of ARPA apply to Service cultural resources contracts; the contract is the equivalent of a permit. The Refuge Complex Manager issues special permits for archeological investigations. Refuge personnel take steps to prevent unauthorized collecting by the public, contractors, and Refuge personnel; violators are cited or other appropriate action taken. Violations are reported to the Regional Historic Preservation Officer.

The Refuge Complex has an onsite museum collection of five art pieces and off-site archeological collections that are managed under the Region-wide Scope of Collection Statement (10-31-94). Archeological surveys have produced archeological collections totaling more than 20,100 artifacts. These artifacts are curated at the Illinois State Museum under terms of a cooperative agreement. Artifacts are owned by the Federal Government and can be recalled by the Service at any time.

## 2.3.2 Hydrology and Drainage

It is Service policy not to 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. It is the Service policy not to impede the flow of waters from other lands, even if that flow passes through lands acquired by the Service. The following management actions would apply to all alternatives:

- Site-level studies and detailed planning will be performed prior to the Refuge Complex undertaking any management activity directly affecting drainage of any private land.

- If the Refuge Complex 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 Refuge Complex at the Refuge Complex's expense.
- The Refuge Complex will continue to maintain ditches and water control structures that influence water access and use downstream.
- The Refuge Complex will also continue to document water rights and use to protect water resources for the benefit of fish, wildlife, plants and public use of Refuge water-dependent resources.

### 2.3.3 Prescribed Fire

Under each alternative we propose to adopt the Fire Management Plan for the Refuge Complex, which was drafted in 2002 and is available at the Refuge Office for inspection.

Prescribed fire is used regularly on the Refuge Complex as a habitat management tool. Periodic burning of grasslands reduces encroaching vegetation. Fire also encourages the growth of desirable species such as native, warm-season grasses.

Trained and qualified personnel perform all prescribed burns under precise plans. A burn is conducted only if it meets specified criteria for air temperature, fuel moisture, wind direction and velocity, soil moisture, relative humidity, and several other environmental factors. The specified criteria (prescription) minimize the chance that the fire will escape and increase the likelihood that the fire will have the desired effect on the plant community.

How often we burn established grassland and forest units depends on management objectives, historic fire frequency, and funding. The interval between burns may be 2 to 5 years or longer. As part of the prescribed fire program, we will conduct a literature search to determine the effects of fire on various plant and animal species, and we will begin a monitoring program to verify that objectives are being achieved.

We cannot and will not start a prescribed fire without the approval of the Regional Fire Management Coordinator when the area is at an extreme fire danger level or the National Preparedness level is V. In addition, we will not start a prescribed fire without first getting applicable concurrence when local fire protection districts or the State of Illinois have instituted burning bans.

Spot fires and escapes may occur on any prescribed fire. The spot fires and escapes may result from factors that cannot be anticipated during planning. A few small spot fires and escapes on a prescribed burn can usually be controlled by the burn crew. If so, they do not constitute a wildland fire. The burn boss is responsible for evaluating the frequency and severity of spot fires and escapes and, if necessary, slowing down or stopping the burn operation, getting additional help from the Refuge staff, or extinguishing the prescribed burn. If the existing crew cannot control an escaped fire and it is necessary to get help from other entities, the escape will be classified as a wildland fire and controlled accordingly. Once controlled, we will stop the prescribed burning for the burning period.

We may conduct prescribed burns at any time of year. However, the normal prescribed fire season begins November 15 and ends March 31.

We will use existing firebreaks, which we may improve through mowing or tilling. By policy, if we contemplate any new firebreaks or below surface improvements to existing firebreaks, the Regional Historic Preservation Officer will be consulted before the work begins.

Burn plans written by the Refuge staff document the treatment objectives, the prescription, and the plan of action for carrying out a burn. A burn plan includes all the elements specified in the Service's Fire Management Handbook. Details regarding fire resources and procedures can be found in the Refuge's Fire Management Plan.

#### *2.3.3.1 Fire Prevention and Detection*

In any fire management activity, firefighter and public safety will always take precedence over property and resource protection.

Historically, fire influenced the vegetation on the Refuge Complex. Now, fires burning without a prescription are likely to cause unwanted damage. In order to minimize this damage, we will seek to prevent and quickly detect fires by:

- Discussing fire prevention at safety meetings prior to the fire season and during periods of high fire danger and periodically training staff in fire prevention.
- Posting warnings at visitor information stations during periods of extreme fire danger.
- Notifying the public via press releases and personal contacts during periods of extreme fire danger.
- Investigating all fires suspected of having been set illegally and taking appropriate action.
- Depending on neighbors, visitors, cooperators, and staff to detect and report fires.
- Requesting additional resources from the Illinois Interagency Fire Dispatcher in Murphysboro, Illinois, (618-687-1731), if adequate resources are not available locally.

#### *2.3.3.2 Fire Suppression*

We are required by Service Policy to use the Incident Command System (ICS) and firefighters meeting National Wildfire Coordinating Group (NWCG) qualifications for fires occurring on Refuge property. Our suppression efforts will be directed toward safeguarding life while protecting Refuge resources and property from harm. Mutual aid resources responding from Cooperating Agencies will not be required to meet NWCG standards, but must meet the standards of their Agency.

All fires occurring on the Refuge and staffed with Service employees will be supervised by a qualified Incident Commander (IC). The IC will be responsible for all management aspects of the fire. The IC will obtain the general suppression strategy from the Fire Management Plan, but it will be up to the IC to implement the appropriate tactics. Minimum impact suppression tactics will be used whenever possible. As a guide, on low intensity fires (generally flame lengths less than 4 feet) the primary suppression strategy will be direct attack with hand crews and engines. On higher intensity fires (those with flame lengths greater than 4 feet) we may use indirect strategies of back fires or burning out from natural and human-made fire barriers. The barriers will be selected based on their ability to safely suppress the fire, minimize resource degradation, and be cost effective.

During periods of drought we may use severity funding under guidelines of the Service Fire Management Handbook to provide adequate fire protection for the Refuge.

In suppressing a fire, we will:

- Use existing roads and trails, bodies of water, areas of sparse or non-continuous fuels as primary control lines.

- Conduct backfiring operations from existing roads and natural barriers to halt the spread of fire when appropriate.
- Use burnouts to stabilize and strengthen the primary control lines.
- Use either direct or indirect attack methods, depending upon the situation. Using backfire in combination with allowing the wildland fire to burn to a road or natural firebreak would be least damaging to the environment. However, direct attack by constructing control lines as close to the fire as possible may be the preferred method to establish quicker control.
- Use retardants on upland areas when appropriate.
- Not use earth moving equipment (dozers, graders, plows) for suppression activities on the Refuge without the approval of the Refuge Manager or his/her designated representative.
- Evaluate all areas where wildland fires occur on Refuge administered lands prior to the aerial or ground application of foams and/or retardants. Only approved chemical foams and retardants will be used (or not used) in sensitive areas such as those with riparian vegetation.
- Not use wildland fire for resource benefits.
- Keep engines on roads and trails to the fullest extent possible.
- Ensure additional resources are ordered whenever it appears a fire will escape initial attack efforts, leave Service lands, or when the fire complexity exceeds the capabilities of the existing command or operations.
- Monitor Refuge fires until declared out.
- Conduct rehabilitation prior to firefighters leaving the fire. All trash will be removed. Fire lines will be refilled and water bars will be added, if needed. Hazardous trees and snags will be cut and all stumps will be cut flush with the ground. Damage to improvements caused by suppression efforts will be repaired, and a rehabilitation plan will be completed if necessary. If re-seeding is necessary, it will be accomplished according to Service policy and regulations.

### 2.3.4 Wildlife Depredation

Neighboring landowners have complained in recent years about crop losses due to grazing by geese and deer. Early season losses following emergence of crops occur from all species on lands bordering Refuge Complex land. Canada Geese graze on crops for several weeks after emergence. White-tail deer feed on crops throughout the growing season. Crop damage varies by species and location with some neighbors suffering greater losses than others. To help reduce the problem associated with grazing geese, under all alternatives the Refuge Complex will continue to loan propane exploders to farmers to deter geese from grazing on crops, particularly wheat and green beans. Most farmers don't object to waterfowl eating "waste" grain because it reduces volunteer corn problems the next season. The U.S. Department of Agriculture now has animal damage responsibilities. The Refuge Complex will provide landowners with contacts in the Department of Agriculture for assistance with animal damage control that is beyond our capability.

### 2.3.5 Disease Monitoring and Treatment

Avian botulism has been a serious problem on Lake Chautauqua with a loss of 8,000 birds in 1997 and a loss of 2,623 birds in1998. Staff from the Wildlife Health Laboratory in Madison, Wisconsin, provided assistance and confirmed that avian botulism was the agent of death of the birds. Refuge staff advised the Corps of Engineers that the ditching item in the Habitat Restoration and Enhancement Project was not adequate to de-water as needed to prevent significant losses of birds from botulism. Refuge staff monitored the situation closely starting in August of 1999 and began picking up sick and dead birds as soon as a problem appeared to be developing. Losses were limited to 278 birds in 1999 but number of birds lost in 2000 was 933. The Corps of Engineers contracted to have a level ditch constructed from the pump station to the outlet structure in the summer of 2001. Refuge staff were able to de-water the lake at the first sign of sick birds and

losses were negligible. Refuge staff will continue to closely monitor the health of birds on the Refuge and react quickly and decisively to minimize losses to diseases.

The Refuge Complex will continue to monitor the health of birds on Lake Chautauqua beginning in early August through frost. When and if the problem arises, sick and dead birds will be gathered to avoid spread of toxins. If the problem persists, the Refuge Complex will drain the lake and force the birds away from the problem area. Refuge staff will continue to be alert for sick or dead animals on Refuge Complex land and surrounding areas. The Wildlife Health Laboratory in Madison will be contacted for guidance if we find sick or dead birds suspected of cholera, west Nile virus, or other serious diseases.

### 2.3.6 Waterfowl Food and Sanctuary

Two written comments and several oral comments from the public expressed concern about the amount of food for waterfowl presently produced on Chautuaqua NWR and the potential for food production on Emiquon NWR. Some hunters suggested that the Service should provide only sanctuary for waterfowl and not produce any food. This management action was proposed so waterfowl would be more likely to fly off Refuge Complex land to private hunting clubs to find food sources, which would result in better hunting for the hunt clubs. Others orally expressed concern that without food and sanctuary provided by the Refuge Complex, migrating waterfowl would pass over the area without stopping. Several people pointed out that providing waterfowl food and sanctuary at least every 50 miles along the Illinois River has been an unwritten goal of local and regional wildlife managers for years.

It is the position of the U.S. Fish and Wildlife Service to provide food, water, and sanctuary for waterfowl at strategic locations along flyways for the long-term health, sustainability, and distribution of waterfowl populations. The Service will continue to provide food, water and sanctuary on established areas under all alternatives. Any new lands within currently authorized boundaries that are added to the Refuge system along the Illinois River, and where the Service has purchased all of the ownership rights, will be evaluated as to the need for these elements. If it is determined that adequate food, water and sanctuary are available to meet the needs of waterfowl on adjacent lands, the newly acquired/managed areas may be opened for waterfowl hunting and other uses.

### 2.3.7 Listed Species

Chapter 3 describes the threatened and endangered species on the Refuge Complex. Section 7 of the Endangered Species Act outlines a mechanism for ensuring that actions taken by federal agencies do not jeopardize the existence of any listed species. We conducted a “Section 7” review concurrent with the review of the draft CCP. Under all alternatives Bald Eagles would be protected with buffer zones and decurrent false aster would be protected with physical barriers. Indiana bats would be protected if they occur on the Refuge. Under alternatives 2 and 3, additional monitoring and inventory of listed species would occur.

### 2.3.8 Habitat Management

Habitat management on the Illinois River Complex of refuges entails a combination of active and passive management. Management seeks to mimic natural processes where possible in this greatly modified ecosystem. Drainage, diversion of Great Lakes water, elimination of natural cover, and artificial structures such as locks and dams on the river have all contributed to the challenges to maintain natural functioning processes within the ecosystem. Due to the loss of much of the historical riparian, wetland, and upland habitats, management intensity must be increased to meet the fish and wildlife needs within the areas remaining to support them. This is particularly true in the wetland habitats where dikes, water pumps, and water control structures play an integral role in restoration of wetland habitats. Reconnection of habitats to the river is an

integral part of the management but it must be regulated to control unnaturally frequent or severe flood events and excessive siltation. In uplands, habitats may be restored passively by allowing succession to occur or they may require active planting and management such as with the restoration of native grasslands where planting and controlled burning are key management tools.

## 2.4 Description of Management Alternatives

The following paragraphs present a brief summary of each alternative. The goals, objectives, and strategies that describe the details for each alternative are presented in Table 1 on page 123.

### 2.4.1 Alternative 1 (No Action)

The "No Action" alternative considers a future based on recent trends in operation and management of the Refuge Complex and subsequent conservation of the Illinois River Corridor for the benefit of Service trust resources. As such, Alternative 1 represents the "status quo" in the management of the Refuge Complex. Analysis of a "No Action" alternative is a requirement of the NEPA and Service planning procedures.

Under Alternative 1, Refuge management direction would continue under existing guidance contained in Refuge Complex management plans (e.g., Refuge Master Plan, Step-down plans, etc). For Emiquon NWR, existing management direction is contained in the final environmental assessment and decision document (1993) that was prepared when that Refuge was originally planned. In all cases, management under this alternative would be carried out according to written documentation contained in Refuge Complex management plans and within the existing approved boundaries of Chautauqua, Meredosia, and Emiquon national wildlife refuges. Work outside Refuge boundaries would continue through the Partners for Fish and Wildlife Program throughout the 20-county district.

We would manage 200 acres of native grassland within the Refuge Complex. Cooperative farming would be continued to control undesirable species in areas to be planted to native grasses. No savanna habitat would be protected or restored. By 2017, we would manage 4,500 acres of native forest. We would continue to manage 6,000 acres of wetlands.

Under this alternative we would support hunting and fishing at 2003 visitation levels. Additional recreational facilities would include three new interpretive trails at Emiquon NWR. We would provide two photo/hunting blinds and access trails for wildlife observation and hunting. We would construct an accessible fishing platform at Chautauqua NWR. We would continue to provide environmental education to 1,900 students each year. We would continue current outreach efforts to local groups.

### 2.4.2 Alternative 2, Refuge Focus

Under Alternative 2, management direction at the Refuge Complex would proceed under new guidance brought about through the development of a CCP and its step-down management plans. A common feature linking action items in Alternative 2 is the emphasis on completing land acquisition from willing sellers within the authorized boundaries of Emiquon NWR and Meredosia NWR as funding allows. There would be increased restoration of habitats and more wildlife-dependent recreation opportunities. Work outside Refuge boundaries would continue through the Partners for Fish and Wildlife Program throughout the 20-county district.

Under this alternative our objective would be to restore a proportion of the native fish and mussel species on the Refuge Complex. We would also seek to add diversity within the Refuge Complex by converting pine plantations to upland hardwood forests. We would manage the deer population with controlled hunts.

We would manage 1,000 acres of native grassland within the Refuge Complex. Cooperative farming would continue for management purposes. We would seek to manage 200 acres of savanna. By 2017, we would manage 6,000 acres of native forest and 10,000 acres of wetlands.

Under this alternative we would seek to expand hunting opportunities by evaluating and opening additional existing Refuge lands and newly acquired lands within currently authorized boundaries and providing accessible blinds. We estimate that in 15 years an additional 4,000 acres could be opened to hunting. We would expand fishing opportunities beyond the current planned program by opening additional areas to bank fishing, providing two accessible fishing facilities, and constructing a boat ramp. In addition to currently planned facilities, we would increase the opportunities for wildlife observation by expanding the hours of the auto-tour and developing additional pull-off areas. We would provide environmental education to 2,500 students each year. Additional support to environmental education and interpretation would be offered through an additional staff person, programs, materials, and facilities that would include signs and restrooms. We would expand our outreach activities in partnership with others through special programs, tours, website, and other media beyond what is currently done.

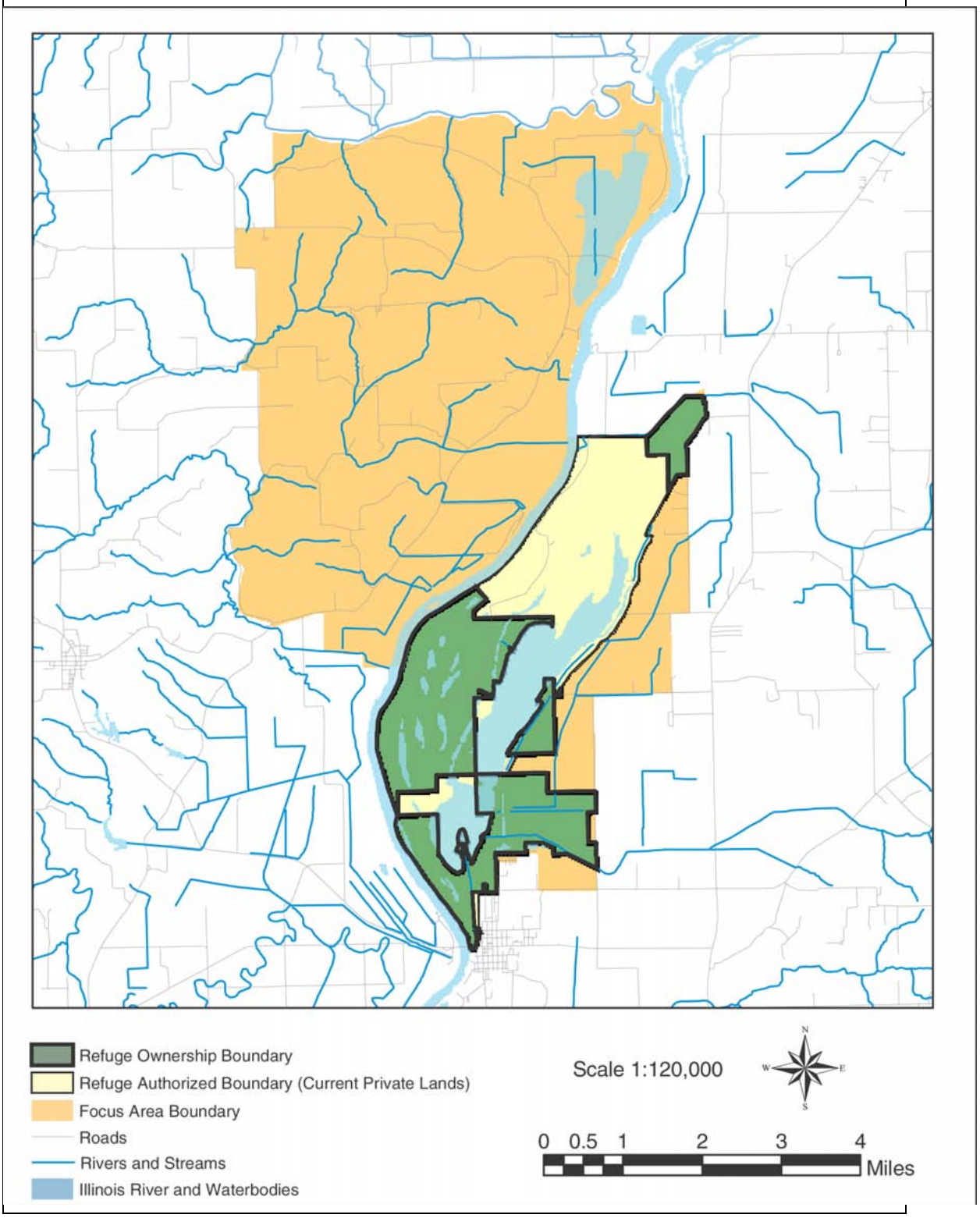
### 2.4.3 Alternative 3, Refuge Resource Area Focus (Preferred Alternative)

Under Alternative 3, management direction at the Refuge Complex would proceed under new guidance brought about through the development of a CCP and associated step-down management plans. We would complete land acquisition from willing sellers within the authorized boundaries of Emiquon NWR and Meredosia NWR as funding allows. There would be increased restoration of habitats and more wildlife-dependent recreation opportunities. The Service would concentrate efforts of the Partners for Wildlife Program within five focus areas: Meredosia, Lower Sangamon River, Emiquon, Chautauqua, and Hennepin-Lacon that encompass 236,160 acres (see Figures 2, 3, 4 and 5).

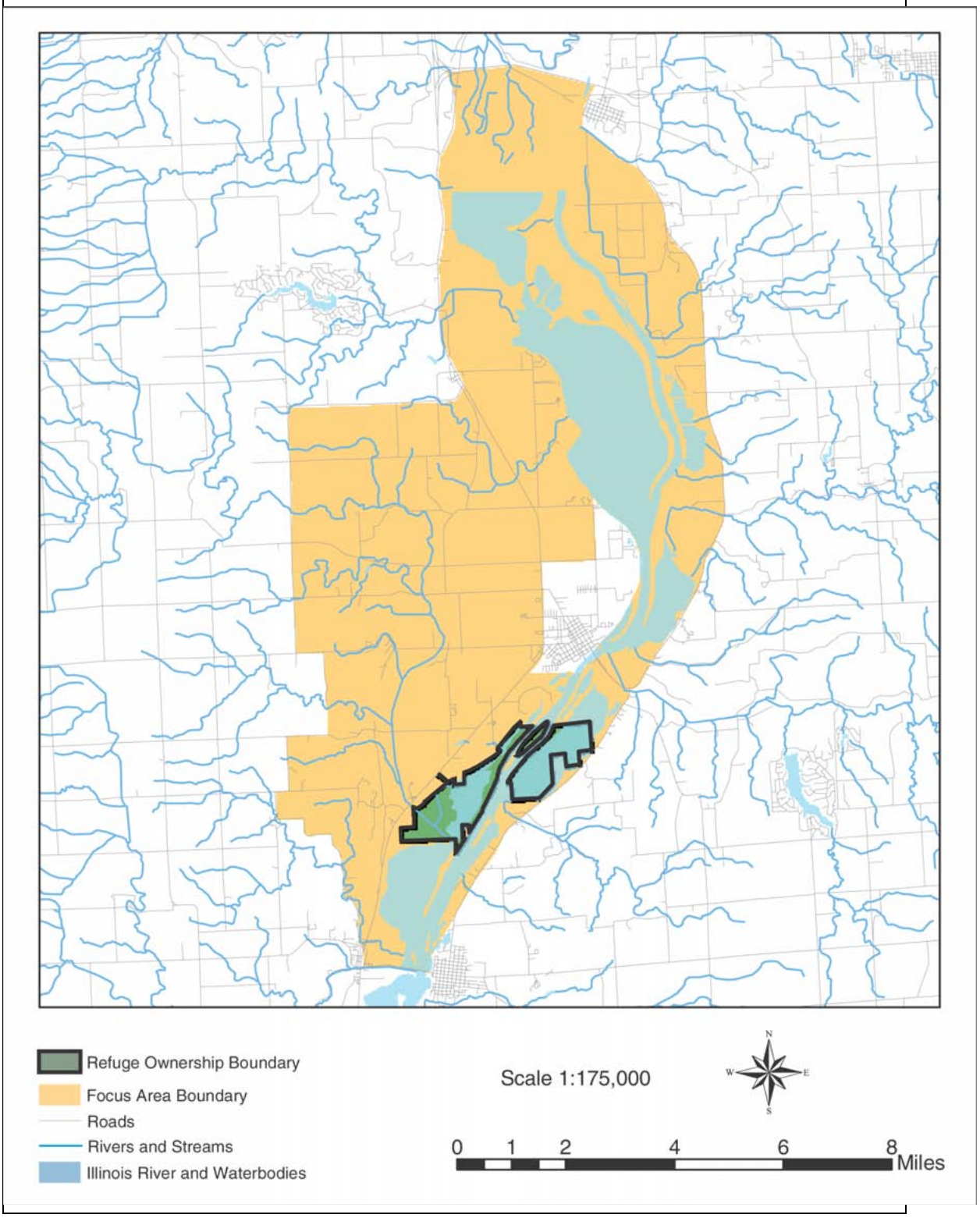
The major difference between this alternative and Alternative 2 is in the conservation efforts made in Illinois River Focus Areas. Under this alternative, like in Alternatives 1 and 2, the Refuge Complex would enhance fish and wildlife habitat protection, restoration, and management within the boundaries of the Illinois River Refuges. There would be no expansion of existing authorized land acquisition boundaries. The acres managed, recreational opportunities offered, and facilities that would be developed are the same as in Alternative 2.

Unlike Alternative 2, conservation efforts would be actively encouraged within the five focus areas over the next 15 years. The Refuge Complex would refocus its Partners for Wildlife Program across the five focus areas in the hope of developing additional voluntary partnership agreements in these areas. We would work toward protecting 380 acres of native grassland, 200 acres of savanna, and 1,300 acres of native forest within the focus areas through voluntary partnerships.

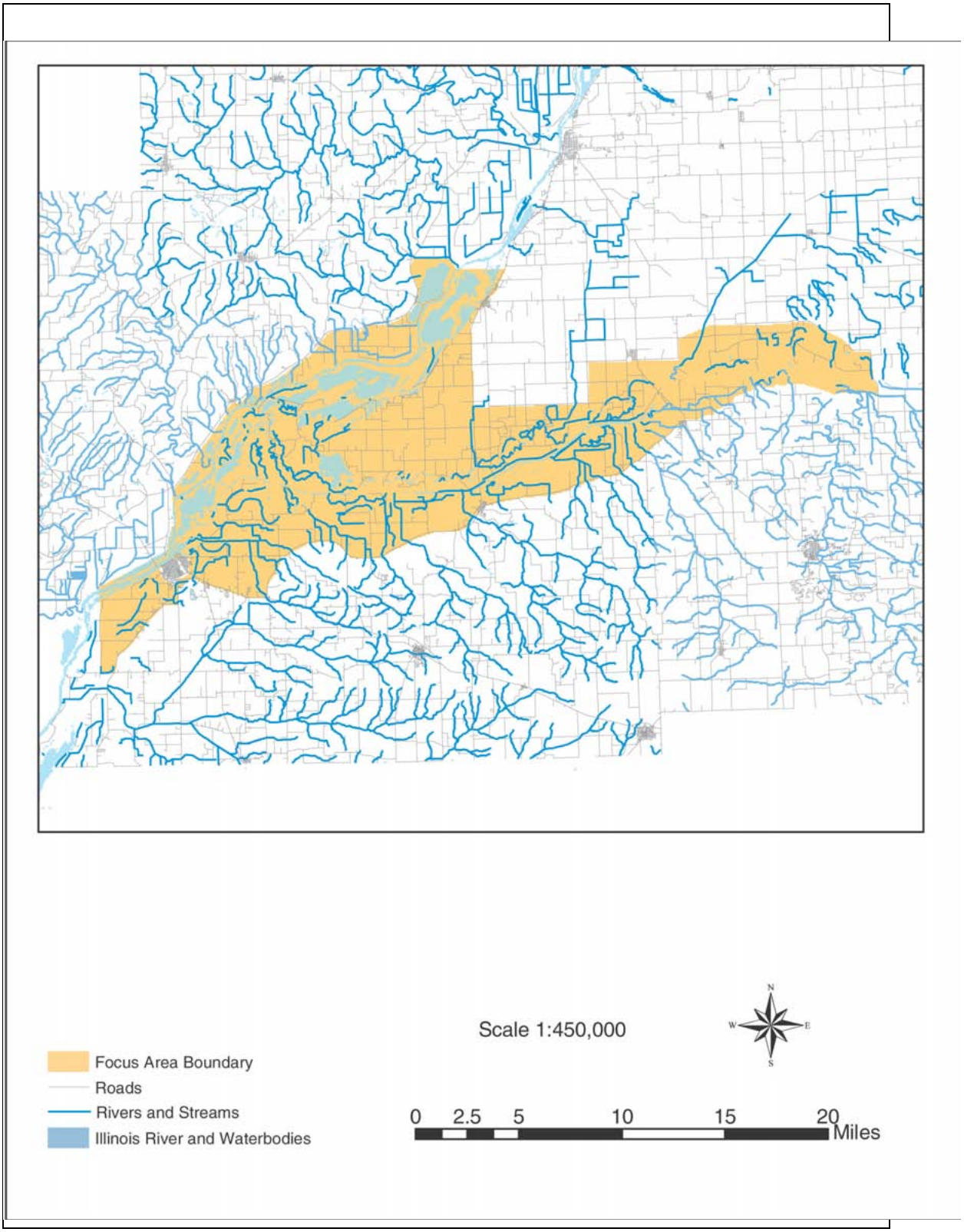
## Figure 2: Meredosia Focus Area



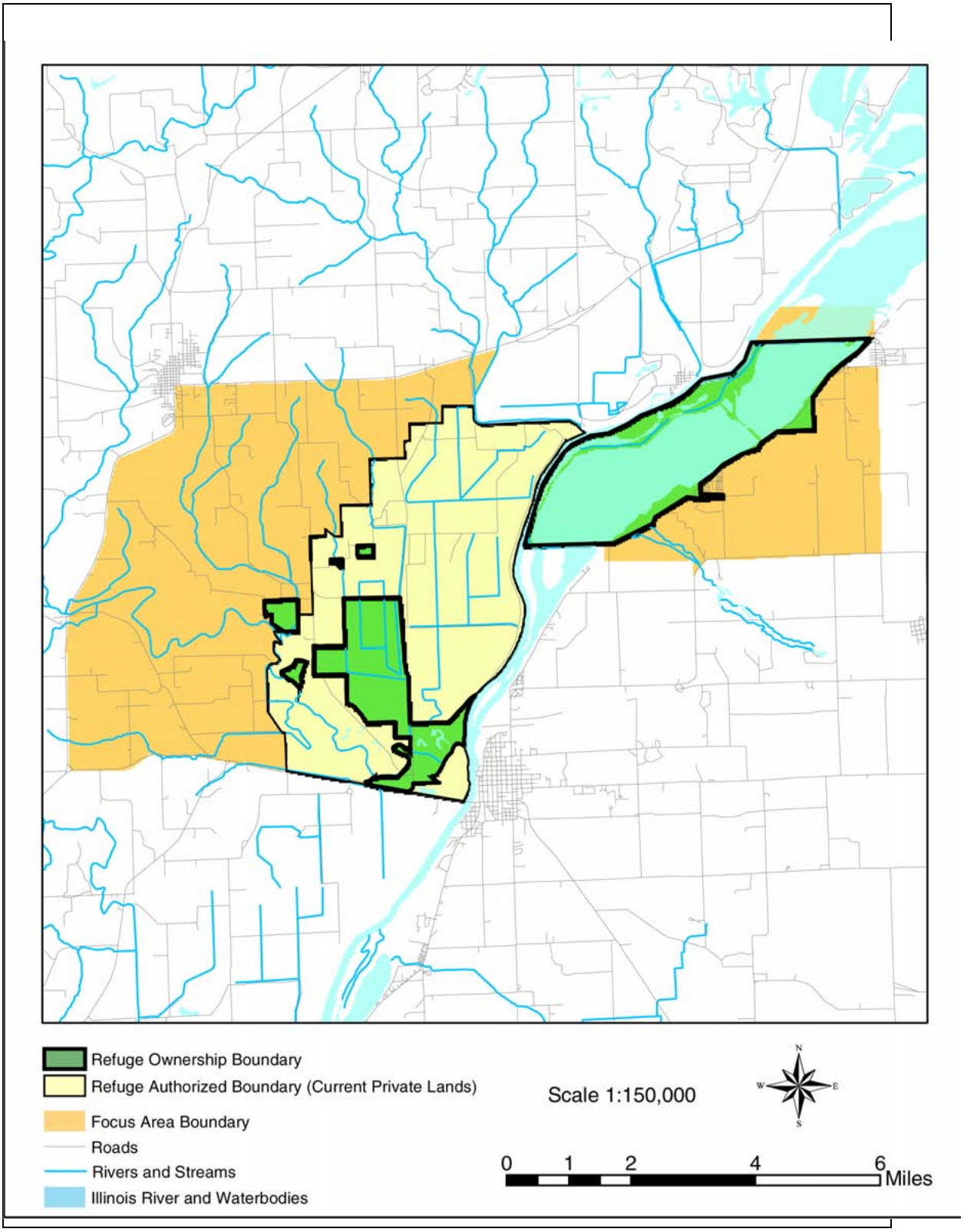
## Figure 3: Hennepin-Lacon Focus Area



## Figure 4: Lower Sangamon Focus Area



## Figure 5: Chautauqua and Emiquon Focus Areas



## Table 1: Alternatives Described by Goals, Objectives and Strategies

| Description | Alternative | | |
|---|---|---|---|
| | 1 | 2 | 3 |
| **WILDLIFE MANAGEMENT GOAL** | | | |
| Perpetuate listed species, waterfowl and other migratory birds, and native fish and mussels within the Illinois River Corridor, while restoring and preserving the biological integrity, diversity, and environmental health of the Refuge Complex | | | |
| **LISTED SPECIES** | | | |
| Objective: Protect Bald Eagles occurring on Refuge Complex land from human disturbance. | U | U | U |
| Strategy: Minimize human activities within 300 feet of bald eagle roosts. | U | U | U |
| Strategy: Enforce protective buffer zones around bald eagle nests in accordance with the *Northern States Bald Eagle Recovery Plan*. | U | U | U |
| Strategy: Continue to monitor Bald Eagle nesting success on the Refuge Complex land. | U | U | U |
| Objective: Protect Decurrent False Aster populations occurring on Refuge Complex land from human disturbance, including constructing physical barriers to restrict vehicle and foot traffic (minimum 50-foot protective zone). | U | U | U |
| Strategy: Monitor Decurrent False Aster populations on Refuge Complex land to determine if they are self-sustaining. | U | U | U |
| Strategy: Evaluate the potential for enhancing existing populations and for establishment of additional Decurrent False Aster populations on Refuge Complex land. Implement the recommendations from the evaluation. | U | U | U |
| Strategy: Ensure that Refuge and private lands projects support the goals and objectives of the Recovery Plan for Decurrent False Aster. | U | U | U |
| Objective: If Indiana bats occur on the Refuge Complex, protect them from human disturbance. | U | U | U |
| Strategy: Encourage partners to monitor for the presence of Indiana bats | | U | U |
| Objective: Encourage colonization of Indiana Bats on Refuge Complex land through forest restoration (day roost and nursery habitat) on Emiquon and Meredosia Refuges throughout the life of this plan. | | U | U |
| Strategy: Ensure that 20 percent of tree species (big nut and shell bark hickories) used in future forest restoration contribute to meeting the needs of Indiana bats (See Forest Habitat Restoration section 2.2.3 for habitat strategies and projects). | | U | U |

## Table 1: Alternatives Described by Goals, Objectives and Strategies (Continued)

| Description | Alternative | | |
|---|---|---|---|
| | 1 | 2 | 3 |
| Objective: By 2006, in cooperation with state and federal biologists, inventory and assess listed species and their habitats throughout the Illinois River Corridor and determine the extent to which the life cycle needs of listed species are being met within each habitat type. Evaluate the potential reintroduction of species suitable to the habitat of the Refuge Complex (e.g., Higgin's eye pearly mussel). | | U | U |
| Strategy: Enlist the support of the Service's Upper Mississippi River/Tallgrass Prairie Ecosystem Team and the Midwest Natural Resource Group in ascertaining an appropriate lead and in obtaining the funds necessary to complete the effort. | | U | U |
| **NATIVE FISH AND MUSSELS** | | | |
| Objective: By 2019, restore and maintain native fish and mussel species diversity to 85 percent (fish) and 50 percent (mussel) of those that were historically present in the Illinois River System at the end of the 19th century. Presently there are approximately 102 species of fish, 37 species of mollusks, and 10 species of crustaceans found in the vicinity of the Refuge Complex (Appendix 5). This objective would be accomplished in accordance with strategic planning efforts of the state of Illinois. | | U | U |
| Strategy: Work with the Illinois DNR and Service fishery resource staff to develop a comprehensive aquatic resource step-down management plan for the Refuge Complex by 2006. Cooperate and coordinate with Illinois DNR, LTRM, and Service Fishery Biologist in managing the fishery in the north and south pools of Lake Chautauqua. | | U | U |
| Strategy: Enhance aquatic nuisance species control throughout the Illinois River Corridor, including funding additional research on controlling carp in managed wetlands. | | U | U |
| Strategy: Working with state and federal fishery staff, establish and maintain an annual fish and mussel monitoring program on Refuge Complex land by 2006. | | U | U |
| Strategy: Evaluate the need for continued stocking of game fish populations in Lake Chautauqua's North Pool. | | U | U |
| **BIOLOGICAL INTEGRITY, DIVERSITY, AND ENVIRONMENTAL HEALTH** | | | |
| Objective: Safeguard management options and prevent further degradation of landscape processes by promoting diverse and productive plant and animal communities within the Refuge Complex that are appropriate to soil type, climate, and landform. | | U | U |
| Strategy: Maintain and/or restore the ecological processes of nutrient cycling, energy flow, and hydrologic cycles on Refuge Complex land characteristic of the geo-climatic setting. Manage Refuge Complex land to mimic natural ecosystem processes (e.g., fire, flooding, succession). Use an integrated mix of restoration tools to repattern succession/disturbance regimes and achieve sustainable landscape conditions. Consolidate and coordinate activities where multiple needs can be addressed relative to landscape health (e.g., water quality, riparian processes and functions, forest health, recovery of succession/disturbance regimes, etc). | | U | U |
| Strategy: By 2010, convert all of the Refuges non-native habitat to native habitat (i.e., convert cropland to wetland or bottomland forests). | | U | U |

## Table 1: Alternatives Described by Goals, Objectives and Strategies (Continued)

| Description | Alternative | | |
|---|---|---|---|
| | 1 | 2 | 3 |
| Strategy: In cooperation with the State of Illinois, manage the deer population on Refuge Complex land through controlled hunts. | | U | U |
| Strategy: Continue land acquisition within the authorized boundaries of the Emiquon and Meredosia Refuges as funds become available. Presently there are 9,009 acres of land within the authorized boundary at Emiquon NWR and 1,747 acres at Meredosia NWR to be acquired. | U | U | U |
| Objective: Safeguard management options and prevent further degradation of landscape processes by promoting diverse and productive plant and animal communities within Illinois River Focus Areas that are appropriate to soil type, climate, and landform. | | | U |
| Strategy: Provide connectivity to the matrix of land in which Refuge Complex land occurs. | | | U |
| Strategy: Accelerate the current status and trends effort toward restoration and conservation of biological diversity in the Illinois River Corridor through a comprehensive and coordinated system that complements existing authorities. Focus Federal, state, and local agencies having related responsibility and/or expertise in this area to increase efficiency and develop consistency in natural resource conservation. Work with partners through the Midwest Natural Resources Group and the Service's Ecosystem Team to expand the focus on landscape management and planning. This would include identifying, protecting, and restoring important landscapes historically occurring within the Illinois River Corridor in a manner so that their arrangement mimics the natural organization found prior to European settlement. | | | U |
| Strategy: Ensure private landowners within Refuge Complex Focus Areas have viable options for restoring and maintaining their land for the benefit of biological integrity, diversity, and environmental health. Provide technical assistance and financial incentives to landowners through the Refuge's Partners for Wildlife Program. Seek to intensify and concentrate other federal, state, and private programs in high priority areas. | | | U |
| Objective: Manage or eliminate exotic and invasive species on the Refuge Complex below present levels. | U | U | U |
| Strategy: Evaluate commercial fishing on Refuge land (on a case-by-case basis) as a tool for exotic species control and research. | | U | U |
| Strategy: Control and eliminate (where feasible) all undesirable non-native species on Refuge Complex land throughout the life of this Plan. Maintain noxious-weed- free plant communities and restore plant communities with noxious weed infestations through the use of broad-scale, integrated management strategies. | U | U | U |
| Strategy: Aggressively control invasive shrubs and trees in grasslands. | U | U | U |
| Strategy: Minimize the impact exotic species have on Refuge forest land. | U | U | U |

## Table 1: Alternatives Described by Goals, Objectives and Strategies (Continued)

| Description | Alternative | | |
|---|---|---|---|
| | 1 | 2 | 3 |
| Strategy: Employ an integrated management system to control or contain pest plant species. These integrated management practices include the use of mechanical, chemical and biological techniques for the control of weeds. Mechanical control involves the use of disking or plowing, chemical control involves the application of U.S. Fish and Wildlife Service approved herbicides, and biological control includes the use of approved biological agents such as rosette weevils on musk thistle. | U | U | U |
| **HABITAT MANAGEMENT GOAL** | | | |
| Provide high quality habitat within the Illinois River Corridor for the benefit of listed species, waterfowl and other migratory birds, native fish and mussels, and native biological diversity | | | |
| **NATIVE GRASSLANDS** | | | |
| Objective: By 2019, the Refuge Complex will protect and manage 200 acres of high quality native grassland habitat for the benefit of listed species, waterfowl and other migratory birds, and native biological diversity. | U | | |
| Objective: Continue the use of the Refuge Complex's Cooperative Farming Program as a habitat management tool to address specific management problems. Several cooperative farmers from the local community currently farm Refuge Complex land on a two-thirds/ one-third crop-share lease, with one-third of the harvest being allocated to the Refuge Complex . The program assists in preventing undesirable woody species from invading an area that will be planted to native grasses and controlling invasive plant species (i.e. reed canary grass, cottonwoods, maples). | U | U | U |
| Objective: By 2019, the Refuge Complex will protect and manage 1,000 acres of high quality native grassland habitat for the benefit of listed species, waterfowl and other migratory birds, and native biological diversity. | | U | U |
| Strategy: Create, restore, or enhance small (40-100 acres) and medium-sized (100-1,000 acres) blocks of grassland habitat comprised of short, medium, and tall height-density patches containing diverse structure (e.g., bare soil, stiff-stemmed forbs, sparse woody vegetation) with a 75 percent grass and 25 percent forbs mix with a minimum of 6 grass species and a minimum of 30 herb species. The Refuge will focus on creating blocks of grassland habitat that is structurally open and free of major linear woody edges. In most cases, woody cover will represent less than 5 percent of the grasslands habitat. Maintain Refuge grasslands through periodic burning and / or mowing / or light grazing with some grasslands (25-50 percent of the total grassland landscape) remaining free from burning, mowing, or grazing between 3 and 6 years to provide habitat for Henslow's Sparrow, Northern Bobwhite, Field Sparrow, and other species which prefer a well-developed duff layer and the presence of some shrubs. Some thicket areas and isolated trees (plum, cherries, sumac, crabs, hawthorns) should be allowed to persist to provide breeding habitat for Loggerhead Shrike, Bell's Vireo, Yellow-breasted Chat, and other species in some prairies and old-fields. Maintain hydrology in wet meadows. | | U | U |
| Strategy: In cooperation with the state, selectively control medium-sized predators such as coyotes, skunks, fox, and raccoons in Refuge Complex grasslands until sufficiently sized blocks of grassland habitat are restored. | | U | U |

## Table 1: Alternatives Described by Goals, Objectives and Strategies (Continued)

| Description | Alternative | | |
|---|---|---|---|
| | 1 | 2 | 3 |
| Strategy: Protect, restore, and manage an additional 300 acres of native grassland habitat on the North Globe Drainage District (within Emiquon Refuge boundary) once an adequate realty interest is acquired. | | U | U |
| Strategy: Restore and manage 50 acres of native grassland habitat on the Wilder Tract (within Emiquon Refuge boundary). | | U | U |
| Strategy: Restore and manage an additional 70 acres of native grassland habitat on the Shearl tract (within Meredosia Refuge boundary). | | U | U |
| Strategy: Protect, restore, and manage an additional 380 acres of native grassland habitat within Illinois River Refuge Complex Focus Areas through voluntary partnership agreements. | | | U |
| **NATIVE SAVANNAS** | | | |
| Objective: By 2019, the Refuge Complex will protect, restore, and manage 200 acres of high quality native savanna habitat for listed species, waterfowl and other migratory birds, upland game species, and native biological diversity (currently the Refuge Complex protects or manages no savanna habitat). | | U | U |
| Strategy: Create, restore, or enhance contiguous blocks of a savanna landscape dominated by old-growth oaks, black walnut, hickories, or other upland mast-producing trees with a canopy cover between 10% and 40% and an open understory dominated by native grasses and forbs with a shrub component for Northern Flicker, Red-headed Woodpecker, Black-billed Cuckoo, Yellow-billed Cuckoo, and other species. Plant mast-producing trees and shrubs typical of the historic Central Illinois savanna landscape and / or open up portions of the existing heavily forested landscape, especially on bluffs and areas of rolling topography. Maintain an open understory through periodic burning, mowing, or light grazing activities. Maintain a mature oak component in select savanna restoration units to provide nesting cavities for Red-headed Woodpeckers. Enhance and maintain a warm-season grass component in select savanna restoration units to provide nesting cover for Field Sparrows. Maintain a mature oak-hickory-walnut component in savanna restoration units to provide nesting cavities for Red-headed Woodpeckers. Maintain a warm-season grass component in savanna restoration units to provide nesting cover for Field Sparrows. | | U | U |
| Objective: Protect, restore, and maintain 200 acres of existing or restorable native savanna habitat within the Chautauqua-Emiquon Focus Area (approximately 15 acres per year). | | | U |
| Strategy: Complete restoration and protection through voluntary partnership agreements. | | | U |
| **NATIVE FORESTS** | | | |
| Objective: By 2019, the Refuge Complex will protect and manage 4,500 acres of high quality native forest habitat (e.g., upland hardwood, bottomland hardwood) for listed species, waterfowl and other migratory birds, and upland game species. | U | | |
| Objective: By 2019, the Refuge Complex will protect and manage 6,000 acres of high quality native forest habitat (e.g., upland hardwood, bottomland hardwood) for listed species, waterfowl and other migratory birds, and upland game species. | | U | U |

## Table 1: Alternatives Described by Goals, Objectives and Strategies (Continued)

| Description | Alternative | | |
|---|---|---|---|
| | 1 | 2 | 3 |
| Strategy: Create, restore, enhance, and manage large contiguous blocks of native bottomland forests (aiming for a minimum of 500 contiguous acres) capable of providing high quality breeding habitat for forest species of concern (e.g. Cerulean Warbler, Wood Thrush, Veery, Yellow-billed Cuckoo, Pileated Woodpecker). Manage native forest land for structural and plant species diversity. Ensure healthy soil and water resources. Maintain large mature stands of oak forest with a diverse, dense understory component, to provide nesting habitat for Yellow-billed Cuckoos, Chestnut-sided Warblers, and Wood Thrush. | | U | U |
| Strategy: Restore and manage an additional 200 acres of bottomland forest habitat within the Emiquon Refuge (Wilder Tract). | | U | U |
| Objective: Protect, restore, and manage an additional 1,300 acres of existing or restorable native forest habitat within the Meredosia Focus Area (approximately 100 acres per year). | | | U |
| Strategy: Complete restoration and protection through voluntary partnership agreements. | | | U |
| **WETLANDS** | | | |
| Objective: Continue to protect and manage 6,000 acres of high quality wetland habitat characteristic of the historic Illinois River Corridor (e.g., hemi-marshes, moist soil habitats, wet prairie, side channels, backwater lakes, tributary streams). | U | | |
| Objective: By 2017, protect and manage 10,000 acres of high quality wetland habitat characteristic of the historic Illinois River Corridor (e.g., hemi-marshes, moist soil habitats, wet prairie, side channels, backwater lakes, tributary streams). | | U | U |
| Strategy: Maintain a mosaic of hemi-marsh habitat in permanent water bodies for waterfowl, Common Moorhen, Black Tern; shallow water marshes for teal and shorebirds. | | U | U |
| Strategy: Restore and maintain an additional 700 acres of hemi-marsh habitat at the South Globe Drainage District. | | U | U |
| Strategy: Maintain an abundance of moist soil habitat on Refuge Complex land for waterfowl and shore birds. | | U | U |
| Strategy: Restore and maintain 60 acres of moist soil habitat at Emiquon NWR (Proehl Tract). | | U | U |
| Strategy: Restore and maintain 105 acres of moist soil/wet meadow habitat at Emiquon NWR (Wilder Tract). | | U | U |
| Strategy: Restore and maintain 300 acres of moist soil habitat on the North Globe Drainage District (when an adequate interest in the land is purchased) on Emiquon NWR. | | U | U |
| Strategy: Maintain wet prairie swales in grassland areas with standing water less than 3 inches deep to provide breeding habitat for King and Black Rail and additional habitat for shorebirds, herons, egrets, and other rail species on the Refuge Complex. | | U | U |

## Table 1: Alternatives Described by Goals, Objectives and Strategies (Continued)

| Description | Alternative | | |
|---|---|---|---|
| | 1 | 2 | 3 |
| Strategy: Restore and maintain 53 acres of wet prairie habitat at Meredosia NWR (Klineschmidt Tract). | | U | U |
| Strategy: Restore and maintain side channel and oxbow habitat for fish and mussels, including spawning, nursery, and overwintering habitat through active and passive management (e.g., selective dredging, bank stabilizations, wave control structures). Ensure adequate summer and winter thermal regulation within riparian and aquatic zones. Provide an amount and distribution of woody debris along shorelines and side channels characteristic of natural aquatic and riparian ecosystems for this area. | | U | U |
| Strategy: Restore and maintain 3.5 miles of side channel habitat at the LaGrange Side Channel on Chautauqua NWR. | | U | U |
| Strategy: Restore and maintain 80 acres of oxbow habitat at Emiquon NWR. | | U | U |
| Strategy: Maintain diverse and productive vegetative communities in backwater lakes (e.g., functional litoral zones) for the benefit of waterfowl and native fish populations. | | U | U |
| Strategy: Protect, restore and maintain 100 acres of backwater lake habitat on Liverpool Lake on Chautauqua NWR. | | U | U |
| Strategy: Construct and maintain five islands in the North Pool of Lake Chautauqua to enhance waterfowl nesting and reduce wave erosion (minimum 150 feet from shore). The aim of this project is to re-establish roughly 400 acres of litoral zone in the lake. | | U | U |
| Strategy: Restore and maintain 360 acres of backwater lake habitat at Weis Lake through island construction, construction of sediment control structures, and selective dredging. | | U | U |
| Strategy: Restore and maintain 300 acres of backwater lake habitat at Billsbach Lake through selective dredging and repair of the natural levee. | | U | U |
| Strategy: Protect, restore, and manage 700 acres of backwater lake habitat on Clear Lake through partnerships with the State and local landowners. | | U | U |
| Strategy: In partnership with others, restore 20 miles of tributary stream habitat along Crow Creek and the Spoon River. Ensure private landowners in these areas have viable options to finance and complete the work. Continue to provide technical assistance and financial incentives to landowners through the Partners for Fish and Wildlife Program. | | U | U |
| Strategy: Through the Midwest Natural Resources Group, the Navigation Study, the Ecosystem study, and the Comprehensive Plan for the Upper Mississippi River System and other planning efforts coordinate interagency water management efforts on the Illinois River to establish a water management strategy in the Illinois River Corridor that enhances wetland functions and values. | | | U |
| Strategy: Participate in coordinating data acquisition and policy development for addressing impacts of non-point source pollution on the rivers aquatic resources. | | U | U |

## Table 1: Alternatives Described by Goals, Objectives and Strategies (Continued)

| Description | Alternative | | |
|---|---|---|---|
| | 1 | 2 | 3 |
| Strategy: Through partnerships, maintain 50 wood duck boxes on Refuge land in a manner to achieve a 75 percent occupancy rate. | | U | U |
| **VISITOR SERVICES MANAGEMENT GOAL** | | | |
| Provide the public abundant high quality wildlife-dependent public use opportunities on Refuge Complex land, including hunting, fishing, wildlife observation and photography, environmental education, and interpretation | | | |
| **WILDLIFE-DEPENDENT RECREATION** | | | |
| Objective: Enhance the public's understanding and appreciation of the natural world by supporting wildlife observation and photography. | U | | |
| Strategy: Construct three new interpretive trails in three different plant communities found or restored at Emiquon NWR. | U | U | U |
| Objective: Provide hunting opportunities, at 2003 visit levels, that are compatible with the Refuge Complex purpose. | U | | |
| Strategy: Construct two photo and hunting blinds and access trails for wildlife observation and hunting opportunities. | U | U | U |
| Objective: Provide quality recreational fishing opportunities, at 2003 visit levels, that are compatible with the primary Refuge Complex purpose. | U | | |
| Strategy: Construct accessible fishing platform at Chautauqua NWR. | U | U | U |
| Objective: Refuge stakeholders will appreciate the high quality recreational opportunities afforded by the Refuge Complex such that the Refuge Complex becomes recognized as a premier destination to participate in natural resource based recreation. | | U | U |
| Strategy: Expand auto-tour route access times during peak migrations and throughout the summer months. | | U | U |
| Strategy: Create additional viewing opportunities along Chautauqua dike system, including an auto tour route, five pull-offs, and a primitive access site off the auto tour route to the Illinois River (Old Levee Access). | | U | U |
| Strategy: Develop a pull-off area at the Globe Drainage District area at Emiquon NWR. | | U | U |
| Strategy: Amend hunting plan to include big game hunting on Liverpool Lake and Meredosia Island. | | U | U |
| Strategy: Open and provide access for public hunting and other wildlife dependent recreational uses at Emiquon NWR. | | U | U |
| Strategy: Evaluate new hunting opportunities on existing and newly acquired lands. In 15 years, an estimated 4,000 additional acres could be opened to public hunting. | | U | U |

## Table 1: Alternatives Described by Goals, Objectives and Strategies (Continued)

| Description | Alternative | | |
|---|---|---|---|
| | 1 | 2 | 3 |
| Strategy: Open the east side of upper Lake Chautauqua to bank fishing year-round. | | U | U |
| Strategy: Develop five new parking lots at Emiquon NWR to accommodate deer and waterfowl hunters | | U | U |
| Strategy: Provide accessible facilities (blind) for waterfowl and deer hunting on Emiquon NWR | | U | U |
| Strategy: Promote National Fishing Day events in coordination with Illinois DNR and other partners | | U | U |
| Strategy: As land acquisition progresses, review and revise the sport fishing plan for all units in the Refuge Complex. | | U | U |
| Strategy: Develop a visitor services step-down management plan by April 2005 that evaluates existing public use facilities, identifies additional facilities neded to provide high quality compatible public use, and sources of funding for development and maintenance of facilities. | | U | U |
| Strategy: Provide 2 accessible bank fishing facilities for visitors on the Chautauqua NWR North Pool and at Meredosia NWR. | | U | U |
| Strategy: Construct a boat ramp at Goofy Ridge to accomodate access to the North Pool of Lake Chautauqua and the Illinois River via Goofy Ridge ditch. | | U | U |
| Strategy: Develop a loop trail at Meredosia NWR incorporating the existing trail. | | U | U |
| **ENVIRONMENTAL EDUCATION AND INTERPRETATION** | | | |
| Objective: Provide structured on-site environmental education programs to 2,077 students annually. | U | | |
| Objective: Provide structured on-site environmental education programs to 2,500 students annually. | | U | U |
| Strategy: Coordinate with existing organizations (i.e. Dickson Mounds, Western Illinois university, Environmental Education Association of Illinois) to develop teacher workshops that orient teachers to the Refuge resources and environmental education materials. Work with local school superintendents to arrange on-site visits. Coordinate with Dickson Mounds, City of Havana, Illinois DNR with relevant/related programs and projects (i.e. link with Illinois River Valley Project). Enhance the Refuges ability to accommodate large group visits (i.e. tour buses, school groups). Coordinate with resource agency staff (i.e. NRCS, IDNR) to develop a full-day Conservation/Natural Resource day for area grade school students. | | U | U |
| Strategy: Recruit and hire one Park Ranger to coordinate Public Use program. | | U | U |
| Strategy: Develop 3 site-specific learning trunks and resource materials for local educators and youth leaders. | | U | U |

## Table 1: Alternatives Described by Goals, Objectives and Strategies (Continued)

| Description | Alternative | | |
|---|---|---|---|
| | 1 | 2 | 3 |
| Strategy: In partnerships with local teachers, county naturalists, and youth organizations, develop curriculum and monitoring programs focusing on Refuge water quality and watershed issues. | | U | U |
| Strategy: Update general brochure to include Refuge management, themes, and natural highlights. | | U | U |
| Strategy: Develop interpretive signage and Refuge orientation message on 5 kiosks throughout Illinois River Refuges (2 existing at Chautauqua, 1-Meredosia, 1-Emiquon, 1 - Cross dike) | | U | U |
| Strategy: Develop a portable interpretive display that highlights Illinois River management, themes, and natural resource highlights (similar to that of Harvesting the River). | | U | U |
| Strategy: Develop permitted/prohibited signage for 5 kiosks throughout Illinois River National Wildlife Refuge and Fish Complex | | U | U |
| Strategy: Develop interpretive signage for 5 stops along Chautauqua Lake auto tour | | U | U |
| Strategy: Develop a kiosk at the cross dike parking area that interprets messages about wetlands and water management. | | U | U |
| Strategy: Develop bathroom facilities at the headquarters to handle groups and individual visitors. | | U | U |
| Strategy: Convert the existing headquarters maintenance shop to visitor contact station (which includes exhibits/multi-purpose space, and sales outlet) when new maintenance shop is constructed. | | U | U |
| Strategy: Develop interpretive materials and programs that incorporate refuge themes, issues, history, and management programs. Utilize area resource professionals and develop a series of public programs highlighting Refuge Complex themes (Bird Migration, Illinois River/Wetland Function/Hydrology, Heritage/Human-Wildlife Interactions). | | U | U |
| Strategy: Continue to work with the Heartland Water Resource Planning Committee to develop an educational wing at the proposed Illinois River Museum in Peoria. | | U | U |
| Strategy: Conduct a feasibility study/site design for a Illinois River National Wildlife and Fish Refuge Complex Visitor Center near Dickson Mounds Museum. | | U | U |
| **OUTREACH** | | | |
| Objective: Maintain the Complex's ability to welcome visitors and relate the mission of the Refuges, the U.S. Fish & Wildlife Service, and the National Wildlife Refuge System. | U | | |
| Strategy: Continue existing outreach activities, including presentations to local school groups and local conservation groups both on and off the refuges and to refuge visitors, and provide tours of the refuges. | U | | |

## Table 1: Alternatives Described by Goals, Objectives and Strategies (Continued)

| Description | Alternative | | |
|---|---|---|---|
| | 1 | 2 | 3 |
| Objective: Refuge stakeholders will feel connected to the Refuge, and will actively participate in the stewardship of the Refuge, the National Wildlife Refuge System, and the ecosystems within the Illinois River Corridor. | | U | U |
| Strategy: Develop a comprehensive communication strategy for the Refuge Complex (communication step-down plan) by 2005. | | U | U |
| Strategy: In partnership with Emiquon Audubon, the Friend's of Illinois River, and The Natural Conservancy, promote Chautauqua NWR and Emiquon NWR as international wildlife viewing destinations. | | U | U |
| Strategy: Build cooperative relationship with local media and submit 12 news releases per year to area papers that highlight management activities and wildlife happenings on the Refuge Complex. Advertize special events that promote wildlife viewing opportunities throughout the Refuges (e.g., Migratory Bird Day, Eagle days, National Wildlife Refuge Week, National Fishing Week) | | U | U |
| Strategy: Maintain Illinois River Refuge website and highlight Refuge Complex activities monthly. | | 'U | U |
| Strategy: Explore technology to develop real-time video of Lake Chautauqua. | | U | U |
| Strategy: Provide 4 Refuge tours throughout the year for special quests (city/agency officials) | | U | U |
| Strategy: Promote special public programs through the Chamber of Commerce Calendar of Events. | | U | U |
| Strategy: Promote a "Refuge happenings" show on Radio Station WDUK | | U | U |
| Strategy: Continue to support stewardship efforts of the Friends of the Illinois River and the Emiquon Audubon Society | | U | U |
| Strategy: Explore Cooperating Associating Agreement with Emiquon Audubon | | U | U |
| Strategy: Develop projects that fosters community ownership and directly benefits the Illinois River Refuges. | | U | U |
| Strategy: Promote citizen involvement and increase community ownership in the Refuge through stewardship work days. | | U | U |
| Strategy: Coordinate volunteer efforts with The Nature Conservancy and the IDNR EcoWatch program. | | U | U |
| Strategy: Continue internship program or coordinate with Western Illinois University Peace Corps Fellowship program | | U | U |
| Strategy: Coordinate with IDNR in conducting volunteer monitoring of Refuge resources (i.e. frog and toad surveys). | | U | U |
| Strategy: Provide information that orients and informs visitors of recreational opportunities on Illinois National Wildlife Refuges and surrounding areas. | | U | U |

## Table 1: Alternatives Described by Goals, Objectives and Strategies (Continued)

| Description | Alternative | | |
|---|---|---|---|
| | 1 | 2 | 3 |
| Objective: Land owners within Refuge Focus Areas will have a greater awareness of conservation and restoration potential on their lands. | | | U |
| Strategy: Work with Natural Resources Conservation Service and other organizations to disseminate information to land owners. | | | U |
| **ADMINISTRATION GOAL** | | | |
| Provide leadership and support at the Refuge, ecosystem, and landscape scales that is pro-active in addressing a wide-range of conservation opportunities and issues | | | |
| **LAW ENFORCEMENT** | | | |
| Objective: Continue to enforce laws for which the Service is responsible on the Refuge Complex, including the Archeological Resources Protection Act of 1979; the Lacey Act (1981 amendments); the Endangered Species Act; the Migratory Bird Treaty Act; the Migratory Bird Hunting and Conservation Stamp Act; and the National Wildlife Refuge Administration Act, including state laws governing hunting, fishing, and motor vehicle use. | U | U | U |
| Objective: Increasing compliance of state and Federal regulations on Refuge land will be a priority for the Refuge throughout the life of this CCP. | | U | U |
| Strategy: Revise Refuge visitor regulations for consistency and compatibility. | | U | U |
| Strategy: Continually increase the public's knowledge of Refuge visitor regulations and the boundaries of Fish and Wildlife Service lands, throughout the life of this CCP. | | U | U |
| Strategy: Add one full-time law enforcement officer by 2007. | | U | U |
| Strategy: Upgrade radio systems to meet Federal narrow-band digital standards by 2005. | | U | U |
| Strategy: Upgrade patrol vehicles to meet State and Federal emergency vehicle standards by 2004. | | U | U |
| Objective: Continue to serve as leader, facilitator, and source of information for natural resource issues along the Illinois River. | U | U | U |
| Strategy: Actively participate in partnership activities. | U | U | U |
| Strategy: Emphasize partnerships within Refuge Focus Areas | | | U |

**Table 2: Summary of Alternatives**

| Goal | Alternative 1 | Alternative 2 | Alternative 3 |
|---|---|---|---|
| **WILDLIFE MANAGEMENT**<br>Perpetuate listed species, waterfowl and other migratory birds, and native fish and mussels within the Illinois River Corridor while restoring and preserving the biological integrity, diversity, and environmental health of the Refuge Complex. | ■ Protect Bald Eagle and Decurrent False Aster occurring on Refuge Complex land. | ■ Protect Bald Eagle and Decurrent False Aster occurring on Refuge Complex land.<br>■ Encourage colonization of Indiana bats.<br>■ Restore and maintain native fish and mussel species diversity on Refuge Complex land.<br>■ Increased wildlife monitoring<br>■ Convert pine plantations to upland hardwood forest | ■ Protect Bald Eagle and Decurrent False Aster occurring on Refuge Complex land.<br>■ Encourage colonization of Indiana bats.<br>■ Inventory listed species and their habitats throughout the Illinois River Corridor<br>■ Restore and maintain native fish and mussel species diversity on Refuge Complex land.<br>■ Enhance aquatic nuisance species control throughout the Illinois River Corridor.<br>■ Maximum wildlife monitoring<br>■ Convert pine plantations to upland hardwood forest<br>■ Working with partners and private land owners within Refuge Focus Areas to promote biological integrity |

**Table 2: Summary of Alternatives (Continued)**

| Goal | Alternative 1 | Alternative 2 | Alternative 3 |
|---|---|---|---|
| **HABITAT MANAGEMENT**<br>Provide the most productive habitat possible within the Illinois River Corridor for the benefit of listed species, waterfowl and other migratory birds, native fish and mussels, and native biological diversity. | ■ Manage 200 acres of native grassland.<br>■ No savanna habitat.<br>■ Manage 4,500 acres of native forest.<br>■ Manage 6,000 acres of wetland habitat. | ■ Manage 1000 acres of native grassland.<br>■ Manage 200 acres of savanna habitat on the Refuge Complex.<br>■ Manage 6,000 acres of native forest.<br>■ Manage 10,000 acres of wetland habitat. | ■ Manage 1000 acres of native grassland.<br>■ Manage 200 acres of savanna habitat on the Refuge Complex and 200 acres within Refuge Focus Areas.<br>■ Manage 6,000 acres of native forest.<br>■ Restore 1,300 acres of native forest habitat with Refuge Focus Area.<br>■ Manage 10,000 acres of wetland habitat. |
| **VISITOR SERVICES AND MANAGEMENT**<br>Provide the public with abundant and high-quality prublic use opportunities on Refuge land, including hunting, fishing, wildlife observation and photography, and environmental education and interpretation. | ■ Provide opportunities for wildlife dependent recreation at current levels.<br>■ Continue existing outreach activities with presentations on and off the Refuge and tours on the Refuge. | ■ Enhance opportunities for wildlife dependent recreation through increased facilities and areas open to hunting and fishing.<br>■ Expand outreach activities with media, new technology, volunteer, and partnership efforts. | ■ Enhance opportunities for wildlife dependent recreation through increased facilities and areas open to hunting and fishing<br>■ Work with others to disseminate information to the land owners in the Refuge Focus Area.<br>■ Expand outreach activities with media, new technology, volunteer, and partnership efforts. |
| **REFUGE ADMINISTRATION**<br>Provide leadership and support to federal, state, local, and private partners at the Refuge, ecosystem, and landscape scales that is proactive in addressing a wide range of conservation opportunities and issues. | ■ Continue to enforce applicable federal laws on the Refuge Complex at present levels.<br>■ Continue partnerships at levels present in 2003. | ■ Increase capability to allow greater enforcement and visitor education.<br>■ Continue partnerships at levels present in 2003. | ■ Increase capability to allow greater enforcement and visitor education.<br>■ Emphasize partnerships that apply to the Refuge Complex and Focus Areas. |

# Chapter 3: Affected Environment

The Refuge Complex is located along 124 miles of the Illinois River. The Refuges that make up the Complex have a current approved boundary that includes about 19,900 acres. The Service owns about 12,000 acres within the approved boundary. The following section briefly describes the Illinois River Corridor in the area of the Refuge Complex. More detail is included in Chapter 3 of the CCP.

The Illinois River Basin drains about 30,000 square miles in three states –Wisconsin, Indiana, and Illinois. Historically, the Illinois River system supported a diverse system of braided channels, riparian lands, side channels, sloughs, islands, sandbars, and backwater lakes. Development and agricultural use have increased the flows and sediment deposition in the Illinois River Valley. Many of the backwater lakes, side channels and sloughs associated with the Illinois River Corridor have filled in.

The "Illinois Waterway," which connected Lake Michigan to the Illinois River, raised the river's average water level, average flows and the frequency and severity of floods. Today the river is largely constrained by dams, locks and levees. The U.S. Army Corps of Engineers maintains locks and dams on the Illinois River Waterway, which allow the transport of nearly 60 percent of the Illinois' annual commodity tonnage, including grain, coal, and petroeum products by barge. Recreation is an important economic activity associated with the Illinois River Corridor. Popular activities include boating, camping, fishing, hunting, wildlife observation and photography. There are seven state parks, nine conservation areas, four waterfowl management areas, and three national wildlife refuges located along the river that provide the public recreation opportunities.

Twenty eight species of waterfowl are known to use the Refuge Complex, including Trumpeter Swans and Tundra Swans. In addition to waterfowl, wetlands along the Illinois River provide habitat for over 30 species of shorebirds and 10 species of gulls and terns. Two hundred and sixty four species of birds have been documented on Refuge Complex land.

The Illinois River Corridor serves as a temporary home to hundreds of thousands of waterfowl who feed and rest on their annual spring and fall migrations. The middle Illinois River valley, stretching from about Hennepin, Illinois, to Beardstown, Illinois, was historically one of the most important areas for migrating waterfowl in all of North America. Although many of the most significant areas have been greatly altered over the years by drainage and cropping of wetlands within the floodplain, shallow bottom land lakes, sloughs, marshes and side channels remain, but most are in a degraded state. The Illinois River and associated wetlands provide some of the most significant areas of Wood Duck production and mid-migration mallard habitat in the Mississippi Flyway. The breeding Wood Duck population in the valley is estimated at over 20,000. Peak Mallard populations have exceeded one million ducks.

Within the upper reaches of the Illinois River, fish species diversity is rather low. The middle river has historically been the most productive area of the river because of the availability of backwaters that support diverse and productive populations. However, as lakes fill with sediment and aquatic vegetation is killed off, native fish populations decline and other more hardy species, such as carp, predominate. The lower river from Beardstown, Illinois, to Grafton, Illinois, features roughly the same mix of fish species as the middle river, but population numbers are smaller. There are approximately 102 species of fish, 37 species of mollusks, and 10 species of crustaceans found in the vicinity of the Refuge Complex.

Bottomland or floodplain forests within the Illinois River Corridor occupy low-lying areas along the river in relationship to their elevation and distance from water. While once rich in forests, the river's forests today consist, for the most part, of narrow strips along the edges of the riverbanks.

Three main types of prairie historically occurred in the Illinois River Corridor. They are 1) prairie (black soil, silt-loam prairies, including dry-mesic prairie, mesic prairie, wet mesic prairie, and wet prairie), 2) sand prairie, and 3) hill prairie. Concerns associated with native grasslands include loss, fragmentation, fire suppression, hydrologic cycle maintenance, exotic and invasive species, and development. Today, many prairie remnants are islands surrounded by row-crop fields and other development. Further, much of the remaining tallgrass prairie habitat in the area is highly fragmented and dominated by human activity.

Prior to European settlement, oak savanna covered approximately 27-32 million acres of the Midwest. Over 99 percent of the original savanna has been lost, and mid-western oak savanna ranks among the rarest ecosystems in the world. Prior to European settlement, savanna was a likely feature of the Illinois River landscape. Today, few savannas remain.

Threatened and Endangered Species: There are eight federally listed and 80 state-listed threatened and endangered species that historically have been identified on or near the Refuge Complex. These include three threatened plants (decurrent false aster, Mead's milkweed, and prairie white-fringed orchid); one endangered mollusk (Higgin's eye pearlymussel); one endangered bird (Least Tern), one threatened bird (Bald Eagle); and one endangered mammal (Indiana bat). Only the Bald Eagle and decurrent false aster have been documented on the Refuge Complex. The Indiana bat may occur on habitat associated with Meredosia NWR.

Archaeological and Cultural Values: Archaeological studies have identified sites and potential sites on and near the Refuge Complex. The Cameron-Billsbach unit has high potential for containing prehistoric sites. Chautauqua NWR has many known prehistoric sites. Emiquon NWR is in an area of many known important archeological sites. There is archeological evidence within the Refuge Complex of each major period for the past 12,500 years. The recognized tribal interests in the areas of the Refuge Complex are confined to the historic period. No National Register properties are located within the Refuge Complex.

# Chapter 4: Environmental Consequences

This chapter evaluates three alternatives on the basis of environmental consequences or impacts relative to the significant issues identified in Chapter 1. The chapter is organized by alternative.

## 4.1 Impacts Common to All Alternatives

### 4.1.1 Unavoidable Adverse Impacts

Under Alternatives 1, 2, and 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. Greater public use of the Refuge Complex 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 all alternatives include habitat restoration and enhancement activities for the benefit of Service trust resources. All alternatives could 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 all alternatives 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.

### 4.1.4 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.

### 4.1.5 Flood Control

Under all of the alternatives, flooding frequency and duration would be expected to remain the same. Population growth, sedimentation, runoff, and urban development are all expected to increase in the Illinois River Basin. Over time, these processes could increase flood peaks and subject more property (including Refuge Complex land) to damage at higher monetary costs.

### 4.1.6 Crop Depredation

Under all of the alternatives the Service will continue to reduce crop depredation on neighboring private land from wandering geese. This will be accomplished by working with adjacent landowners (who make a request) by loaning propane cannon, developing and maintaining natural vegetative barriers and/or fencing between Refuge Complex wetlands and adjacent farm fields to control field depredation by geese in coordination with the U.S. Department of Agriculture Animal and Plant Health Inspection Services program of Wildlife Services.

### 4.1.7 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 Complex 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.

### 4.1.8 Agricultural Land

All alternatives would likely result in some reduced acreage of agricultural land when existing cropland is converted to wetland, grassland, forest, or savanna. Under all alternatives, we estimate that approximately 5,000 additional acres of row crop agricultural land could be acquired by the Service and restored to native cover over the next 15-20 years. In the long term, the habitat restored over this land would serve to protect and rebuild soils. Moreover, restoration would not be irreversible if it is determined that it is in the best public interest, at some future date, to again cycle these lands back to agricultural use. Commercial or residential development, however, represents destruction of the topsoil and a much longer term impact on the agricultural land base.

Several landowners adjacent the Refuge Complex have expressed sincere concern for the impact that the restoration of wetlands could have on their neighboring farms. The Service is committed to limiting the impact of its restoration activities to Service-owned or managed lands. Regional studies may provide some guidance, but it is likely that site-specific hydrological evaluations will be necessary prior to acquisition for many properties. We will also draw from our own experience and the experience of other organizations and individuals conducting wetland restoration in the Illinois River Basin.

The Service is also aware of concerns expressed by some agri-business people over the potential for reducing agricultural land in a county below some sustainable threshold. Since land acquisition for the Refuge Complex will occur over a long period of time (15-20 years or more), communities will have a reasonable time period to adapt to the proposed land use changes. As previously stated, current development in the Illinois River Basin is increasing, and its impact on farmland will likely be much greater than that of the Refuge Complex in the coming decades.

The Service shares the concern of the agricultural community about the loss of prime farmland soils. It is important to note that the definition of prime farmland is a soil-based definition. Therefore, land defined as prime farmland can have many different land uses, e.g., forest, wetland, pasture, or row crop. We feel the Refuge Complex contributes to the maintenance of prime farmland soils because, as stated previously, Refuge land protects, preserves, and builds soil. The most serious and irreversible threat to prime farmland soils is development and urban sprawl.

## 4.1.9 Use of Prescribed Fire as a Habitat Management Tool

The Refuge Complex's Fire Management Plan provides addtional detail beyond what is described in this section and will be adopted through this Environmental Assessment.

### *4.1.9.1 Social Implications*

A prescribed burn on the Refuge will be a direct benefit to the public in creating recreational opportunities through increased wildlife populations for hunting and observation. If a wildland fire occurs on or near the Refuge, the areas that were prescribed burned and the firebreaks intended for prescribed burning will help in controlling the fire.

Smoke from a Refuge fire could impair visibility on roads and become a hazard. All efforts will be taken to assure that smoke does not impact smoke-sensitive areas such as roads and local residences. The impact of smoke can be lessened through management actions, which include: use of road guards and a pilot car, signing, altering ignition techniques and sequence, halting ignition, suppressing the fire, and use of local law enforcement officers to control traffic. Burning will be done only when the smoke will not be blown across the community or when the wind is sufficient enough not to cause heavy concentrations.

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

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

### *4.1.9.2 Cultural and Archaeological Resources*

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

### *4.1.9.3 Flora*

The prescribed burning program will have a visible impact on vegetation and the land. Immediately after a fire much of the land will be blackened. There will be few grasses or ground forbs remaining and most of the higher brush, such as oak sprouts, will be bare of leaves. Trees may be scorched up to 10 feet above the ground. Because of wet ground conditions or discontinuous fuel, there may be areas up to 1 acre in size in the burn that are untouched by the fire.

In late spring, grasses and forbs will begin to grow within a few days of the burn. The enriched soil will promote rapid growth such that after 2 or 3 weeks the ground will be completely covered. In some cases, young trees will re sprout. The bases of the trees as well as the burned slash and stumps will be partially or completely covered by the new growth. Some of the less fire resistant trees will show signs of wilting and may succumb within a month or two. After one season of regrowth, most signs of the prescribed burn will be difficult to detect without close examination. After 2 or 3 years it will be virtually impossible to detect signs of the fire.

Other signs of the burn will remain for longer periods. The firebreaks will be maintained and remain visible to realize their benefit in a wildland fire situation and in future prescribed burns. Vehicle tracks through the burn are visible on the freshly burned ash and may be longer lived if the vehicle became stuck or created ruts in the ground. Travel across the burn area will be kept to a minimum. Vehicle travel is necessary in some instances, such as lighting the fire lines or quickly getting water to an escape point. A fire plow will be used only in the event that a break over occurs and cannot be controlled by any other method. The deep trench of the plow would leave a very long lived scar. This trench could be repaired by filling, which would eliminate it from view after 5 to 10 years.

#### *4.1.9.4 Listed Species*

All prescribed fires will be at least one-half mile from known Bald Eagle nests. The decurrent false aster will be managed consistent with guidance from its recovery plan. Prescribed fires will also occur outside of the breeding season of Indiana bats. We conducted a Section 7 review concurrent with the review of the draft CCP. The Section 7 review examined the prescribed fire program along with the CCP.

#### *4.1.9.5 Soils*

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

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

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

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

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

#### *4.1.9.6 Escaped Fire*

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

If a prescribed fire jumps a firebreak and burns into unplanned areas, there is a high probability of rapid control with minimal adverse impact. The network of firebreaks and roads will greatly assist in rapid containment. In most cases, all of the Refuge fire fighting equipment will be immediately available at the scene and nearby water sources identified. The county 911 dispatchers will always be notified of a prescribed burn. Thus, maximum numbers of experienced personnel and equipment will be immediately available for wildland fire suppression activities.

#### *4.1.9.7 Water Quality*

While not a primary objective of the Refuge Complex, water quality improvements in the Illinois River Corridor would be realized under all alternatives (surface and sub-surface) primarily as a result of conversion of previously developed land to natural habitats (e.g., wetlands, prairies, savannas, forests)(approximately 5,000 acres). Although this would occur over a relatively long period of time (at least 15-20 years), the ultimate result would be a reduction in sediments and farm chemicals entering the waterways. Restoring and developing wetlands as well as certain uplands would increase the water filtration and ground water recharge capabilities within the area. Stabilizing riverbanks would decrease erosion.

### 4.1.10 Land Acquisition by the U.S. Fish and Wildlife Service

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. Under all alternatives landowners will in no way be coerced into selling their land or any interest in their land.

#### *4.1.10.1 Landowner Rights*

None of the future management alternatives considered in this document propose expanding the currently authorized boundaries for any of the Illinois River Refuges. However, Emiquon NWR and Meredosia NWR still have lands remaining to be acquired within their approved boundaries. 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.

### 4.1.11 Mosquito Control

Over time people have expressed concern that the development of a wetlands will increase the incidence of disease transmitted by mosquitoes. Commonly referred to as the "swamp syndrome," this concern is based on assumptions that since mosquitoes are common in swamps, more swamps (wetlands) means more mosquitoes and more mosquitoes means more disease. It is not a simple issue to understand since there is much misinformation upon which assumptions are based that lead to faulty conclusions. It is also an emotional issue involving legitimate concern for personal health and safety. To analyze the stated concern that the proposed project will increase the risk of disease due to an increase in mosquitoes due to an increase in wetland habitat, requires a basic understanding of the mechanism of disease transmission by mosquitoes.

For mosquitoes to offer a disease threat to humans certain prerequisites are necessary:

- The disease causing organism (pathogen) must be present in the area.
- There must be a host animal that carries the pathogen.

- The specific species of mosquito capable of transmitting the pathogen must be present.
- Habitat conditions that support reproduction of the problem species of mosquito must be present.

Many of the diseases spread by mosquitoes have been eliminated. Malaria is a good example. In the 1920s and 1930s the Wabash River Valley in Indiana was a notorious area for malaria. However, the last serious outbreak of malaria occurred near Terre Haute in the 1950s. A combination of factors led to control and near elimination of this disease. The species of mosquito most responsible for spreading malaria was *Anopheles quadrimaculatus*. As swamps were drained and waters became more polluted with organic wastes, the offending mosquito decreased because it was very intolerant of pollution which was concentrated from drainage. The use of screening in homes and spraying DDT also became very widespread after World War II.

The *Anopheles quardrimaculatus* mosquito population decreased, access to people decreased, fewer and fewer people became carriers and eventually the malaria pathogen disappeared or reached such low levels that it was rarely present in other host animals. Even though the problem mosquito is still present under suitable habitat conditions, it no longer provides a serious threat because host animals rarely carry the pathogen in their blood. Today, when occasional cases of malaria are reported, it can almost always be traced back to the presence of returning war veterans, foreign travelers or illegal aliens residing temporarily in local communities.

Mosquitoes have always been present in the Basin and will continue to be there. The larvae are an important part of the food chain for many species of fish and wildlife. The adults also serve as important pollinators of plants. Under all Action alternatives, Service biologists would work cooperatively with the State Department of Health and County Health Departments to assist in administering a mosquito monitoring program where Service lands may be involved. The monitoring program will maintain an awareness of potential problems which will lead to actions that control the problem.

### 4.1.12 County Tax Revenues and Refuge Revenue Sharing Payments

Since all alternatives involve the acquisition of land from willing sellers within approved units of the Refuge Complex, there may be some impact to the area's tax base. 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 System 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 Illinois, 3/4 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.

While the Service does not pay taxes, it does make an annual Refuge Revenue Sharing payment to the counties where Service-owned land is present. Since these payments are based on land value, an acre of land valued at $1,000 would generate a $7.50 payment each year, or $7,500 per million of land value (at full entitlement). In the counties where the Refuge Complex holds land, Refuge Revenue Sharing payments at full entitlement are roughly equal to or exceed what taxes would be if lands had remained in private ownership. As such, there would minimal tax consequences to the

counties as a result of Service acquisition of land. In recent years, Revenue Sharing payments have fallen short of full entitlement.

### 4.1.13 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 "...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. Preserving natural habitat for wildlife is the heart of any long range plan for national wildlife refuges. The actions proposed in all alternatives in this document would preserve or restore land and water, and would enhance carbon sequestration. Since Alternative 3 has the greatest potential for restoration and conservation of land, this alternative would have the greatest positive effect on carbon sequestration, especially through the development of grasslands and forest cover. All of the habitat management actions in this document (regardless of alternative) would positively contribute toward efforts to mitigate human-induced global climate changes.

### 4.1.14 Environmental Justice

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.

### 4.1.15 Archaeological and Cultural Resource Values

Under all alternatives, where acquisition and management of land would occur, the Service would take into consideration impacts on historic properties and other cultural resources (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 Complex land would be provided by the Refuge Complex Manager to the Regional Historic Preservation Officer who will analyze the undertaking for potential effects on historic properties. The Refuge Complex 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 Complex 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 Complex Manager will similarly involve the Regional Historic Preservation in other cultural resources issues on the Refuge Complex.

# 4.2 Alternative 1 – No Action

## 4.2.1 Wildlife Management Issues

### *4.2.1.1 Listed Species*

Populations of listed species are expected to remain stable or increase under this alternative. Periodically lowering water levels on large impoundments to benefit migrating waterfowl would lower populations of fish used as food by nesting Bald Eagles. Bald Eagles primarily use the Refuge as a wintering ground and benefit from increased numbers of prey (waterfowl) produced by these same management actions. The decurrent false aster is expected to be protected from human disturbance by physical barriers that will restrict vehicle and foot traffic. No impacts are anticipated for other federally listed species.

### *4.2.1.2 Migratory Birds*

Under this alternative, 200 acres of native grassland, 4,500 acres of native forest, and 6,000 acres of wetlands would be protected and managed on the Refuge Complex. This is expected to produce 50 breeding pairs of dabbling ducks, 550,000 goose use-days during spring and fall migration, and 1,400 Wood Ducks. Restoration, protection, and management of upland and lowland habitats on the Refuge Complex would improve conditions for many nesting and migrating waterfowl and songbirds, and contribute to the long-term recovery of some neotropical migrant populations.

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 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 Complex would help ensure that migrating ducks arrive on wintering areas and on their northern breeding grounds in better reproductive condition.

### *4.2.1.3 Fish and Mussels: Diversity and Disease*

Native fish and mussel habitat and populations are likely to continue to decline under this alternative. No change is expected in biological diversity and abundance. Wildlife depredation would remain at its present low levels, and be handled on a case-by-case basis. A project to improve water level manipulation on Lake Chautauqua soon will be completed, and will help in reducing conditions favorable to avian botulism.

### 4.2.2 Habitat Management Issues

Existing wetland, forest, and grassland habitats would be maintained, but quality may be degraded by increased presence of exotic and nuisance species. Populations of wildlife associated with these habitats are expected to remain stable.

The Service will pursue purchasing lands from willing sellers where drainage is affected by oxbow habitat restoration.

Sedimentation of the Illinois River Corridor would continue at present levels.

### 4.2.3 Visitor Services Management Issues

Recreational opportunities would remain at present levels, but facilities would be improved to meet safety standards. Public awareness of the Refuge Complex and its mission likely would be unchanged.

The quality of waterfowl hunting would remain at present levels. The Refuge Complex would continue to be managed to provide sanctuary and food for migrating waterfowl. This would not include management practices intended to prolong the stay of migrating waterfowl, such as manipulating pools to delay ice formation.

## 4.3 Alternative 2 – Refuge Focus

### 4.3.1 Wildlife Management Issues

#### *4.3.1.1 Listed Species*

Populations of listed species are expected to remain stable or increase under this alternative. Periodically lowering water levels on large impoundments to benefit migrating waterfowl would lower populations of fish used as food by nesting Bald Eagles. Bald Eagles primarily use the Refuge as a wintering ground and benefit from increased numbers of prey (waterfowl) produced by these same management actions. The decurrent false aster is expected to be protected by physical barriers and its population to remain stable or increase. Forest restoration would improve habitat conditions for the Indiana bat within the Refuge Complex, and encourage colonization. There would be increased knowledge of the status and distribution of listed species through inventory and assessment done in cooperation with state and federal biologists. No impacts are anticipated for other federally listed species.

#### *4.3.1.2 Migratory Birds*

Under this alternative, 1,000 acres of native grassland, 200 acres of native savanna, 6,000 acres of native forest, and 10,000 acres of wetlands would be protected and managed on the Refuge Complex. This is expected to increase the number of dabbling ducks from its current level of 50 breeding pairs to 200 breeding pairs, and diving ducks to 20 breeding pairs. It would maintain 550,000 goose use-days during spring and fall migration. Restoration, protection, and management of additional upland and lowland habitats on the Refuge Complex would improve conditions for many nesting and migrating waterfowl and songbirds, and contribute to the long-term recovery of some neotropical migrant populations beyond levels in Alternative 1. The diversity and breeding pair populations of grassland, savanna, forest, and wetland bird species of concern are expected to increase.

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 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 Complex would help ensure that migrating ducks arrive on their northern breeding grounds in better reproductive condition.

*4.3.1.3 Fish and Mussels: Diversity and Disease*

Native fish and mussel habitat and populations are expected to increase, and aquatic nuisance species to decrease under this alternative. Biological diversity and abundance are expected to increase as native habitats are restored, exotic and invasive species are controlled or eliminated, and additional lands are acquired. Wildlife depredation would remain at its present low levels, and be handled on a case-by-case basis. A project to improve water level manipulation on Lake Chautauqua soon will be completed, and will help in reducing conditions favorable to avian botulism.

### 4.3.2 Habitat Management Issues

Within the Refuge Complex, grassland, savanna, forest, and wetland habitats would be increased beyond existing levels. Degradation of these habitats would be slowed through control of exotic and nuisance species. Populations of wildlife associated with these habitats are expected to increase above levels in Alternative 1.

The Service will pursue purchasing lands from willing sellers where drainage is affected by oxbow habitat restoration.

Sedimentation of the Illinois River Corridor would continue at present levels.

### 4.3.3 Visitor Services Management Issues

Opportunities for wildlife dependent recreation would increase above present levels. Recreational facilities would be improved to meet safety and accessibility standards. Increased outreach activities would improve visibility and knowledge of the Refuge Complex and its mission within local communities beyond levels in Alternative 1.

The quality of waterfowl hunting likely would improve because of increased amounts of restored and protected habitats. The Refuge Complex would continue to be managed to provide sanctuary and food for migrating waterfowl. This would not include management practices intended to prolong the stay of migrating waterfowl, such as manipulating pools to delay ice formation.

## 4.4 Alternative 3 – Refuge Resource Area Focus (Preferred Alternative)

### 4.4.1 Wildlife Management Issues

*4.4.1.1 Listed Species*

Populations of listed species are expected to remain stable or increase under this alternative. Periodically lowering water levels on large impoundments to benefit migrating waterfowl would lower populations of fish used as food by nesting Bald Eagles. Bald Eagles primarily use the Refuge as a wintering ground and benefit from increased numbers of prey (waterfowl) produced by these same management actions. The decurrent false aster is expected to be protected by physical barriers and its population to remain stable or increase. Forest restoration would improve habitat conditions for the Indiana bat within the Refuge Complex, and encourage colonization. There would be increased knowledge of the status and distribution of listed species through inventory and assessment done in cooperation with state and federal biologists. No impacts are anticipated for other federally listed species.

We conducted a Section 7 review concurrent with the review of the draft CCP. The Section 7 review examined the proposed actions of the preferred alternative.

#### *4.4.1.2 Migratory Birds*

Under this alternative, 1,000 acres of native grassland, 200 acres of native savanna, 6,000 acres of native forest, and 10,000 acres of wetlands would be protected and managed on the Refuge Complex. This is expected to increase the number of dabbling ducks from its current level of 50 breeding pairs to 200 breeding pairs, and diving ducks to 20 breeding pairs. It would maintain 550,000 goose use-days during spring and fall migration. Restoration, protection, and management of additional upland and lowland habitats on the Refuge Complex would improve conditions for many nesting and migrating waterfowl and songbirds, and contribute to the long-term recovery of some neotropical migrant populations beyond levels in Alternative 1 and the same as Alternative 2. The diversity and breeding pair populations of grassland, savanna, forest, and wetland bird species of concern are expected to increase.

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 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 Complex would help ensure that migrating ducks arrive on their northern breeding grounds in better reproductive condition.

#### *4.4.1.3 Fish and Mussels: Diversity and Disease*

Native fish and mussel habitat and populations are expected to increase, and aquatic nuisance species to decrease under this alternative. Biological diversity and abundance are expected to increase as native habitats are restored, exotic and invasive species are controlled or eliminated, and additional lands are acquired. Increased connectivity of Refuge Complex habitats with those in surrounding Refuge Focus Areas also are expected to increase biological diversity and abundance beyond levels in Alternatives 1 and 2. Wildlife depredation would remain at its present low levels and be handled on a case-by-case basis. A project to improve water level manipulation on Lake Chautauqua soon will be completed, and will help in reducing conditions favorable to avian botulism.

### 4.4.2 Habitat Management Issues

Within the Refuge Complex, restoration and protection of grassland, savanna, forest, and wetland habitats would be increased beyond existing levels. Additional acres of grassland, savanna, and forest habitats would be restored on lands within the Refuge Focus Areas. Degradation of these habitats would be slowed through control of exotic and nuisance species on the Refuge Complex and increased conservation efforts within Refuge Focus Areas. Populations of wildlife associated with these habitats are expected to increase above levels in Alternatives 1 and 2.

The Service will pursue purchasing lands from willing sellers where drainage is affected by oxbow habitat restoration.

Sedimentation of the Illinois River Corridor would decrease slightly below present levels because of conservation efforts within the Refuge Focus Areas.

### 4.4.3 Visitor Services Management Issues

Opportunities for wildlife dependent recreation would increase above present levels. Recreational facilities would be improved to meet safety and accessibility standards. Increased outreach activities as well as conservation efforts within Refuge Focus Areas would improve visibility and knowledge of the Refuge Complex and its mission within local communities beyond levels in Alternatives 1 and 2.

The quality of waterfowl hunting likely would improve because of increased amounts of restored and protected habitats. The Refuge Complex would continue to be managed to provide sanctuary and food for migrating waterfowl. This would not include management practices intended to prolong the stay of migrating waterfowl, such as manipulating pools to delay ice formation.

## 4.5 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. 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.

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). The recent trend in wetland loss across America developed in three phases. From the 1950s to the mid-1970s, agricultural conversions accounted for 87 percent of all wetland losses. Much of this drainage work was subsidized with Federal funds to encourage increased production of commodity crops. From the mid-1970s to the mid-1980s, wetland losses were more evenly distributed between agricultural land use and "other" land use with agriculture accounting for an estimated 54 percent of wetland losses. During this period, the average annual loss of wetlands was approximately 290,000 acres (Dahl, 1991). Since the mid-1980s, indications are that wetland losses are slowing due to programs protecting wetlands and a growing public recognition of the values of wetlands.

Of the 8,212,000 acres of wetlands that existed in Illinois, only 15 percent remain. With intensifying agriculture, rapidly expanding urban pressures, and increasing industrialization, the quantity of high quality wetland habitat continues to decline in Illinois. The total wetlands in the Illinois River Corridor prior to European settlement was approximately 350,000 acres. Less than 170,000 acres remain, primarily due to drainage for development. State and federal management areas protect approximately 16,500 acres of palustrine-type wetlands. Another 16,000-plus acres are estimated to be protected by private hunt clubs, many of which have the ability to manage water levels and provide waterfowl feeding and resting functions. Environmental Management Program (HREP) funding over the past 6 years within this area has exceeded $29 million. Funds are approved and construction is scheduled on two sites, estimated at $6 million, and planning is under way on another $10 million of work, all of which will greatly enhance the quality of foraging habitat for migrating waterfowl within the Illinois River Valley.

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. By 1976, less than 1/100th of one percent, or 2,352 acres, of high-quality original prairie remained in the Prairie State, and four of every five that remained were less than 10 acres in size (Illinois DNR, 1994). Loss of prairie within project area combined with changes in natural processes have had negative consequences for many grassland plants and associated animals.

Prior to European settlement, oak savanna covered approximately 27-32 million acres of the Midwest (Nuzzo 1985). This same author indicates that in 1985, only 113 sites (2,607 acres) of high-quality oak savanna remained. Nationwide, over 99 percent of the original savanna has been lost, and mid-western oak savannas are among the rarest ecosystems in the Nation. The once widespread oak savannas have become one of the nation's more endangered ecosystems (Noss et al. 1995). Development has destroyed, fragmented, and disrupted natural processes needed to maintain quality oak savanna ecosystems. Currently, there are remnants of low quality savanna within and around the Refuge Complex. The long-term effect of landscape-scale loss of savanna has yet to be determined.

The consequences of intensive conversion of wetlands, prairies, and oak savannas has resulted in 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.

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 grasslands 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 experiencing serious declines that utilize the Refuge include the Bobolink, Henslow's Sparrow, Grasshopper Sparrow, Vesper Sparrow, Savannah Sparrow, Lark Sparrow, Field Sparrow, Dickcissel, Eastern Meadowlark, and American Bittern. All of the alternatives have the potential to reverse many of the above mentioned population declines (at least locally) for many bird species by restoring and managing additional wetlands, prairies, and oak savanna habitat within the Refuge Complex, and Illinois River Focus Areas (Alternative 3 only).

All of the alternatives offer opportunities for additional actions relating to the protection, restoration, and management of habitat for the benefit of Service trust resources. 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 USDA'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 Complex land is 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 (or even slightly positive) 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 to the counties where Service-owned land is present. Since these payments are based on land value, an acre of land valued at $1,000 would generate a $7.50 payment each year, or $7,500.00 per million of land value (at full entitlement). In the counties where the Refuge Complex own land, refuge revenue sharing payments at full entitlement roughly equal what taxes would be if lands had remained in private ownership.

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 county (due in part to the presence of a Refuge), taxable real estate such as new homes, hobby farms, 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 as a national wildlife refuge will represent a compensating factor to make up for the loss. Long-term environmental benefits would be gained from habitat protection and enhancement resulting from Service activities in this area. Biodiversity, including numbers and variety of non-game species, would be enhanced. As more of the area becomes protected 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 Complex 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. Visits to the Refuge Complex 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 cropland found in existing Refuge units 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 any county area due to refuge development and other things such as road construction, commercial and residential development, and other factors would not jeopardize the agriculture infrastructure in any county.

**Table 3: Summary of Consequences**

| Environmental Issue | Alternative 1<br>No Action | Alternative 2<br>Refuge Focus | Alternative 3<br>Refuge/Resource Area Focus |
|---|---|---|---|
| **WILDLIFE MANAGEMENT ISSUES** | | | |
| Protect listed species | ■ No change | ■ Indiana bats encouraged to colonize on Refuge Complex through forest restoration<br>■ More knowledge of listed species through increased inventory and assessment in the river corridor | ■ Same as Alternative 2 |
| Perpetuate waterfowl and other migratory birds | ■ No change–50 breeding pairs of dabbling ducks<br>■ 550,000 goose use-days during spring and fall migration | ■ 200 breeding pairs of dabbling ducks<br>■ 20 breeding pairs of diving ducks; 550,000 goose use-days during spring and fall migration<br>■ increased species diversity and breeding pairs of grassland, oak savanna, forest, and wetland bird species | ■ Same as Alternative 2 |
| Recover native fish and mussels | ■ No change | ■ Fish and mussels benefit from aquatic nuisance control, monitoring, and restoration efforts | ■ Same as Alternative 2 |

**Table 3: Summary of Consequences (Continued)**

| Environmental Issue | Alternative 1<br>No Action | Alternative 2<br>Refuge Focus | Alternative 3<br>Refuge/Resource Area Focus |
|---|---|---|---|
| Safeguard biological integrity, diversity, and environmental health | ■ No change | ■ Increase due to forest conversion, control of exotic and invasive plants, continued land acquisition | ■ Greatest increase due to forest conversion, control of exotic and invasive plants, continued land acquisition, increased connectivity of lands, and greater conservation efforts in the focus areas |
| Wildlife are creating crop depredation | ■ Wildlife depredation is not severe or widespread and is dealt with on a case by case basis. | ■ Same as Alternative 1 | ■ Same as Alternative 1 |
| Avian botulism as a problem on Lake Chautauqua | ■ Project to alleviate this problem is underway and will be complete prior to completion of CCP. | ■ Same as Alternative 1 | ■ Same as Alternative 1 |
| **HABITAT MANAGEMENT ISSUES** | | | |
| Loss of wetlands | ■ Existing wetlands maintained | ■ 4,000 more acres of wetland restored and managed on the Refuge complex | ■ Same as Alternative 2 |
| Loss of native forest | ■ Existing forest maintained | ■ 1,500 more acres of native forest restored and managed on the Refuge Complex | ■ 2,500 more acres of native forest restored and managed on Refuge Complex and in the Focus Areas |
| Loss of native grasslands | ■ Existing grasslands maintained | ■ 800 more acres of grasslands restored and managed on the Refuge Complex | ■ 1,180 more acres of grasslands restored and managed on Refuge Complex and in the Focus Areas |

**Table 3: Summary of Consequences (Continued)**

| Environmental Issue | Alternative 1<br>No Action | Alternative 2<br>Refuge Focus | Alternative 3<br>Refuge/Resource Area Focus |
|---|---|---|---|
| Loss of native savanna | ■ No change–no savanna on the Refuge Complex | ■ 200 acres of savanna created and restored on the Refuge Complex | ■ 400 acres of savanna created and protected on Refuge Complex and in the Focus Areas |
| Habitat is being degraded | ■ Degradation continues at current rate | ■ Degradation is slowed through increased control of exotic and nuisance species on the Refuge Complex | ■ Degradation is slowed the greatest amount through increased control of exotic and nuisance species on the Refuge Complex and increased conservation efforts in the Focus Areas |
| Oxbow restoration on Emiquon NWR is affecting drainage on local land | ■ The Service will pursue purchasing affected lands from willing sellers. | ■ Same as Alternative 1 | ■ Same as Alternative 1 |
| Sedimentation is filling in areas in Illinois River Corridor | ■ Sedimentation will be unchanged. | ■ Same as Alternative 1 | ■ Sedimentation will decrease slightly due to work within Focus Areas |
| **VISITOR SERVICES MANAGEMENT ISSUES** | | | |
| Recreational opportunities identified by the public | ■ No change in recreational opportunities | ■ More opportunities for wildlife-dependent recreation on the Refuge Complex. Approximately 4,000 more acres open to hunting; more bank fishing and a boat ramp; auto-tour route open more with more pull-outs; more interpretive signs and materials. | ■ Same as Alternative 2 |

**Table 3: Summary of Consequences (Continued)**

| Environmental Issue | Alternative 1<br>No Action | Alternative 2<br>Refuge Focus | Alternative 3<br>Refuge/Resource Area Focus |
|---|---|---|---|
| Recreational facilities need improvement for safety and universal accessibility | ■ Improvement of facilities to meet safety standards. | ■ Safety standards met and increased opportunities due to increases in accessible hunting blinds and bank fishing facilities | ■ Same as Alternative 2 |
| Refuge Complex needs increased visibility and understanding of its mission | ■ No change | ■ Increased knowledge of the Refuge Complex among local communities due to increased outreach | ■ Greatest increase in knowledge of the Refuge complex among local communities and landowners due to increased outreach and activities in the Focus Areas |
| The quality of waterfowl hunting in the area is seen as a function of management on the Refuge Complex. | ■ Service policy is to avoid management practices, such as manipulating pools to delay ice formation, intended to prolong the stay of migrating waterfowl. The Refuge Complex will be managed to provide sanctuary and food for migrating waterfowl consistent with this policy. | ■ Same as Alternative 1 | ■ Same as Alternative 1 |
| **Other Issues** | | | |
| Fire Management | ■ Fire managed for minimal impact from smoke and ground disturbing activities. | ■ Same as Alternative 1 | ■ Same as Alternative 1 |
| Cultural Resources | ■ Impacts of management activities minimized through reviews and surveys. | ■ Same as Alternative 1 | ■ Same as Alternative 1 |

**Table 3: Summary of Consequences (Continued)**

| Environmental Issue | Alternative 1<br>No Action | Alternative 2<br>Refuge Focus | Alternative 3<br>Refuge/Resource Area Focus |
|---|---|---|---|
| Environmental Justice | ■ No minority or low-income populations will be disproportionately impacted. | ■ Same as Alternative 1 | ■ Same as Alternative 1 |
| Climate Change | ■ Positive contributions toward mitigating human-induced global climate change. | ■ More positive contributions toward mitigating human-induced global climate change. | ■ Most positive contributions toward mitigating human-induced global climate change. |

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# Chapter 7: Glossary of Terms

| | |
|---|---|
| *Alluvial* | Of and/or relating to river and stream deposits |
| *Amphibian* | 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. |
| *Biological Diversity* | The variety of life and its processes, including the variety of living organisms, the genetic differences among them, and communities and ecosystems in which they occur. |
| *Biological Integrity* | Biotic composition, structure, and functioning at genetic, organism, and community levels comparable with historic conditions, including the natural biological processes that shape genomes, organisms, and communities. |
| *Biomass* | 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. |
| *Bloom* | A readily visible concentrated growth or aggregation of plankton (plant and animal). |
| *Community* | All the groups of organisms living together in the same area, usually interacting or depending on each other for existence. |
| *Cumulative Effects* | 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. |
| *Dissolved Oxygen* | Amount of oxygen dissolved in water. |
| *Drainage Basin* | An area mostly bound by ridges or other similar topographic features, encompassing part, most, or all of a watershed. |
| *Ecology* | The study of the relations between organisms and the totality of the biological and physical factors affecting them or influenced by them. |
| *Ecological Integrity* | The integration of biological integrity, natural biological diversity, and environmental health; the replication of natural conditions. |

*Ecosystem* An ecological system; the interaction of living organisms and the nonliving environment producing an exchange of materials between the living and nonliving.

*Ecosystem Approach* 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.

*Ecosystem Management* Management of an ecosystem that includes all ecological, social, and economic components which make up the whole of the system.

*Effects* Effects, impacts, and consequences, as used in the environmental assessment, are synonymous. Effects may be direct, indirect, or cumulative.

*Endangered Species* 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.

*Environmental Analysis* An analysis of alternative actions and their predictable short-term and long-term environmental effects, incorporating physical, biological, economic, and social considerations.

*Environmental Assessment* 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.

*Environmental Health* Composition, structure, and functioning of soil, water, air, and other abiotic features comparable with historic conditions, including the natural abiotic processes that shape the environment.

*Eutrophication* The intentional or unintentional enrichment of water.

*Fauna* All the animals of a particular region or a particular era.

*Flora* All the plants of a particular region or a particular era.

*Food Chain* 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.

*Goals* Broad statements of direction; end results or positions to be achieved.

*Hardness* A measurement of the content of dissolved calcium and magnesium in water.

*Historic Conditions* Composition, structure, and functioning of ecosystems resulting from natural processes that we believe, based on sound professional judgment, were present prior to substantial human related changes to the landscape.

*Hydrology* The science of water in the hydrological cycle, the sun-driven movement of water between aquatic and terrestrial environments and the atmosphere, including evapostranspiration, condensation, precipitation, and runoff.

*Impoundment* A natural or artificial body of water that is held back by a dam.

*Interdisciplinary Team* 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.

*Invertebrate* An animal without a backbone or internal bony skeleton. Insects, crustaceans, worms, corals, and molluscs are examples.

*Mesic* Describing an environment having moderate rainfall and moderately moist, well-drained soils. Mesic plants are those that require moisture.

*Monitoring* 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).

*National Environmental Policy Act* 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.

*Native* With respect to a particular ecosystem, a species that, other than as a result of an introduction, historically occurred or currently occurs in that ecosystem.

*Natural Conditions* 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.

*Objectives* 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.

*pH* 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.

*Reptile* 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.

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| | Egg fertilization is internal, there is no larval stage, and eggs have a protective, hard shell. |
| *Riparian Area* | 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. |
| *Riparian Zones* | 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. |
| *Savanna* | 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. |
| *Sedge* | 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 *peryginium*. |
| *Sedimentation* | The settling-out or deposition of suspended materials. |
| *Sensitive Species* | 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. |
| *Species Richness* | The number of different species in a given area. |
| *Stakeholder* | Any group or individual who is affected by or who can affect the future of the Refuge. |
| *Step-Down Management Plans* | Tactical plans that describe in detail specific strategies and implementation schedules for management functions (e.g., habitat management, public use, fire, safety, etc). |
| *Strategic Framework* | 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. |
| *Strategies* | 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. |
| *Succession* | 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. |

*Threatened Species* 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.

*Total Dissolved Solids* A measure of the total quantity of dissolved substances contained in water or effluent, including organic matter, minerals, and other inorganic substances.

*Viable Population* 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.

*Warm Season Grasses* A grass that grows most during the warmest seasons of the year.

*Watershed* The drainage basin contributing water, organic matter, dissolved nutrients, and sediments to a water body.

*Watershed Analysis* 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.

*Watershed Restoration* 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.

*Watershed Treatments* 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).

# Appendix B: Glossary

# Appendix B: Glossary

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| *Alternative* | A set of objectives and strategies needed to achieve refuge goals and the desired future condition. |
| *Biological Diversity* | The variety of life forms and its processes, including the variety of living organisms, the genetic differences among them, and the communities and ecosystems in which they occur. |
| *Compatible Use* | A wildlife-dependent recreational use, or any other use on a refuge that will not materially interfere with or detract from the fulfillment of the mission of the Service or the purposes of the refuge. |
| *Comprehensive Conservation Plan* | A document that describes the desired future conditions of the refuge, and specifies management actions to achieve refuge goals and the mission of the National Wildlife Refuge System. |
| *Ecosystem* | A dynamic and interrelated complex of plant and animal communities and their associated non-living environment. |
| *Ecosystem Approach* | A strategy or plan to protect and restore the natural function, structure, and species composition of an ecosystem, recognizing that all components are interrelated. |
| *Ecosystem Management* | Management of an ecosystem that includes all ecological, social and economic components that make up the whole of the system. |
| *Endangered Species* | 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. |
| *Environmental Assessment* | A systematic analysis to determine if proposed actions would result in a significant effect on the quality of the environment. |
| *Extirpation* | The local extinction of a species that is no longer found in a locality or country, but exists elsewhere in the world. |
| *Goals* | Descriptive statements of desired future conditions. |

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| *Interjurisdictional Fish* | Fish that occur in waters under the jurisdiction of one or more states, for which there is an interstate fishery management plan or which migrates between the waters under the jurisdiction of two or more states bordering on the Great Lakes. |
| *Issue* | Any unsettled matter that requires a management decision. For example, a resource management problem, concern, a threat to natural resources, a conflict in uses, or in the presence of an undesirable resource condition. |
| *Meta-population:* | A set of local populations connected by migratory individuals. |
| *National Wildlife Refuge System* | All lands, waters, and interests therein administered by the U.S. Fish and Wildlife Service as wildlife refuges, wildlife ranges, wildlife management areas, waterfowl production areas, and other areas for the protection and conservation of fish, wildlife and plant resources. |
| *Objectives* | Actions to be accomplished to achieve a desired outcome. |
| *Preferred Alternative* | The Service's selected alternative identified in the Draft Comprehensive Conservation Plan. |
| *Scoping* | A process for determining the scope of issues to be addressed by a comprehensive conservation plan and for identifying the significant issues. Involved in the scoping process are federal, state and local agencies; private organizations; and individuals. |
| *Species* | A distinctive kind of plant or animal having distinguishable characteristics, and that can interbreed and produce young. A category of biological classification. |
| *Strategies* | A general approach or specific actions to achieve objectives. |
| *Wildlife-dependent Recreational Use* | A use of refuge that involves hunting, fishing, wildlife observation and photography, or environmental education and interpretation, as identified in the National Wildlife Refuge System Improvement Act of 1997. |
| *Threatened Species* | Those plant or animal species likely to become endangered species throughout all of 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. |

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| *Vegetation* | Plants in general, or the sum total of the plant life in an area. |
| *Vegetation Type* | A category of land based on potential or existing dominant plan species of a particular area. |
| *Watershed* | The entire land area that collects and drains water into a stream or stream system. |
| *Wetland* | Areas such as lakes, marshes, and streams that are inundated by surface or ground water for a long enough period of time each year to support, and that do support under natural conditions, plants and animals that require saturated or seasonally saturated soils. |
| *Wildlife Diversity* | A measure of the number of wildlife species in an area and their relative abundance. |

# Appendix C: Species Lists

# Illinois River Plant Species List

**Trees**

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| Box elder | *Acer negundo* |
| Silver maple | *Acer saccharinum* |
| Sugar maple | *Acer saccharum* |
| Pawpaw | *Asimina triloba* |
| River birch | *Betula nigra* |
| Flowering dogwood | *Cornus florida* |
| Roughleaf dogwood | *Cornus drummondi* |
| Pale dogwood | *Cornus oblique* |
| Red cedar | *Juniperus virginiana* |
| Persimmon | *Diospyros virginiana* |
| Swamp white oak | *Quercus bicolor* |
| Shingle oak | *Quercus imbricaria* |
| Cinquapin oak | *Quercus muhlenbergii* |
| Bur oak | *Quercus macrocarpa* |
| Blackjack oak | *Quercus marilandica* |
| Pin oak | *Quercus palustris* |
| Northern red oak | *Quercus rubra* |
| Post oak | *Quercus stellata* |
| Black oak | *Quercus velutina* |
| Bitternut hickory | *Carya cordifornis* |
| Pecan | *Carya illinoensis* |
| Shellbark hickory | *Carya laciniosa* |
| Shagbark hickory | *Carya ovata* |
| Mockernut hickory | *Carya tomentosa* |
| Butternut | *Juglans cinera* |
| Black walnut | *Juglans nigra* |
| Sassafras | *Sassafras albidum* |
| Redbud | *Cercus canadensis* |
| Honey Locust | *Gleditsia triacanthos* |
| Kentucky coffee tree | *Gymnocladus dioica* |
| Black Locust | *Robinia pseudoacacia* |
| Osage orange | *Maclura pomifera* |
| White mulberry | *Morus alba* |
| Red mulberry | *Morus rubra* |
| White ash | *Frazinum american* |
| Green ash | *Fraxinus pennsylvanica* |
| Sycamore | *Platanus occidentalis* |
| Red haw | *Crataegus mollis* |
| Prairie crab-apple | *Malus ioensis* |

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| Peachleaf willow | *Salix armygdaloides* |
| Sandbar willow | *Salix interior* |
| Black willow | *Salix nigra* |
| Autumn willow | *Salix rigida* |
| American basswood | *Tilia americana* |
| Sugarberry | *Celtis leavigata* |
| American hackberry | *Celtis occidentalis* |
| Upland hackberry | *Celtis tenuifolia* |
| American elm | *Ulmus americana* |
| Siberian elm | *Ulmus purnila* |
| Slippery elm | *Ulmus rubra* |

**Shrubs**

| | |
|---|---|
| Fragrant sumac | *Phus aromatica* |
| Smooth sumac | *Rhus glabra* |
| Poison ivy | *Rhus radicans* |
| Swamp holly | *Ilex decidua* |
| Bluevine | *Ampelamus albidus* |
| Trumpet-creeper | *Campsis radicans* |
| Japanese honeysuckle | *Lonicera japonica* |
| Honeysuckle | *Lonicera morrowi* |
| Common elder | *Sambuscus Canadensis* |
| Burning bush | *Euonymous atropurpureus* |
| Bittersweet | *Celastrus scandens* |
| Common spicebush | *Lindera benzoin* |
| Dull-leafed indigobush | *Amorpha fruticosa* |
| Greenbriar | *Smilax sp..* |
| Swamp privet | *Forestiera acuminate* |
| Berries | *Rubus spp.* |
| Buttonbush | *Cephalanthus occidentalis* |
| American ampelopsis | *Ampelopsis cordata* |
| Virginia creeper | *Partheocissus quinquefolia* |
| Summer grape | *Vtis aestivalis* |
| Winter grape | *Vitis cinerea* |
| Riverbank grape | *Vitis riparia* |
| Frost grape | *Vitis vulpina* |

**Forbs**

| | |
|---|---|
| Hairy ruellia | *Ruellia hurnilis* |
| Smooth ruellia | *Ruellia strepens* |
| Carpetweed | *Mollugo verticillata* |

| | |
|---|---|
| Cottonweed | *Froelichia gracilis* |
| Blue star | *Amsonia tabernaemontana* |
| Indian hemp | *Apocynum cannabinum* |
| Indian hemp | *Apocynum sibericum* |
| Green dragon | *Arisaerna dracontium* |
| Mead's milkweed | *Asclepias meadii* |
| Tall green milkweed | *Asclepias hirtella* |
| Swamp milkweed | *Asclepia incarnate* |
| Purple milkweed | *Asclepias purpuras* |
| Common milkweed | *Asclepias syriaca* |
| Climbing milkweed | *Matelea gonocarpa* |
| Tennessee milk vetch | *Astragalus tennesseensis* |
| Spotted touch-me-not | *Impatiens biflora* |
| Pale touch-me-not | *Impatiens pallida* |
| American bellflower | *Campanula americana* |
| Cardinal flower | *Lobelia cardinalis* |
| Venus looking-glass | *Specularia perfoliata* |
| Clammyweed | *Polanisia dodecandra* |
| James'clammyweed | *Polanisia jamessii* |
| Common mouse-eared chickweed | *Cerastium vulgatum* |
| Deptford pink | *Dianthus armeria* |
| Evening campion | *Lychnis alba* |
| Sleepy catchfly | *Silene stellata* |
| Common chickweed | *Stellaria media* |
| Lamb's quarter | *Chenopodium album* |
| Goosefoot | *Chenopodium bushianum* |
| Winged pigweed | *Cycloloma atriplicifolium* |
| Day flower | *Commelina diffusa* |
| Prairie spiderwort | *Tradescantia braceata* |
| Morning glory | *Convolvulus serpium* |
| False tarragon | *Artemisia dracunculus* |
| Pineapple-weed | *Matricaria matricariodes* |
| Prairie dandelion | *Microseris cuspidate* |
| Blanket flower | *Gaillardia puchella* |
| Common ragweed | *Ambrosia artemisilfolia* |
| Giant ragweed | *Ambrosia trifida* |
| Forked aster | *Aster furcatus* |
| Side-flowered aster | *Aster lateriflorus* |
| Small-headed aster | *Aster parviceps* |
| Hairy aster | *Aster pilosus* |
| Panicle aster | *Aster simplex* |

| | |
|---|---|
| White-top | *Erigeron annuus* |
| Horseweed | *Erigeron canadensis* |
| Daisy fleabane | *Erigeron strigosus* |
| Blue boneset | *Eupatorium coelestinum* |
| Spotted joe-pye-weed | *Eupatorium masculatum* |
| White snakeroot | *Eupatorium rugosum* |
| Late boneset | *Eupatorium serotinum* |
| Common sunflower | *Helianthus annuus* |
| Marsh-elder | *Iva annua* |
| Wild lettuce | *Lactuca canadensis* |
| Woodland lettuce | *Lactuca floridana* |
| False dandelion | *Pyrrhopappus carolinianus* |
| Wild golden-glow | *Rudbeckia laciniata* |
| Tall goldenrod | *Solidago canadensis* |
| Common sow thistle | *Sonchus oleraceum* |
| Yellow crownbeard | *Verbesina helianthoides* |
| Common ironweed | *Veronica gigantea* |
| Missouri ironweed | *Veronica missurica* |
| Marsh speedwell | *Veronica scutellarta* |
| Common cocklebur | *Xanthium strumacium* |
| American bindweed | *Calystegia septium* |
| Dodder | *Cuscuta cuspidate* |
| Ivy-leaved morning-glory | *Ipomoea hederaceae* |
| Small white morning-glory | *Ipomoea lacunosa* |
| Wild sweet potato-vine | *Ipomoea pandurata* |
| Water cress | *Nastortium officinale* |
| Spring cress | *Cardamine bulbosa* |
| Winter cress | *Barbarea vulgaris* |
| Shepherd's purse | *Capsella bursapastoris* |
| Poor-man's-pepper | *Lepidium virginicum* |
| Marsh Yellow cress | *Rorippa islandica* |
| Sessile-flowered yellow cress | *Rorippa sessiliflora* |
| Silky bladderpod | *Lesquerelle ludoviciana* |
| Bur-cucumber | *Sicyos angulatus* |
| Wild yam | *Dioscorea villosa* |
| Common horse-tail | *Equisetum arvensa* |
| Wort spurge | *Euphorbie heliscopia* |
| Three-seeded mercury | *Acaltpha rhombiodea* |
| Three-seeded mercury | *Acalypha virginica* |
| Milk spurge | *Chamaesyce humistrata* |
| Nodding spurge | *Chamaesyce maculata* |

| | |
|---|---|
| Bugleweed | *Lycopus virginicus* |
| False dragonhead | *Physostegia speciosa* |
| False dragonhead | *Physostegia virginiana* |
| Field mint | *Martha arvensis* |
| Self-heal | *Prunella vulgaris* |
| Motherwort | *Leonurus cardiaca* |
| Mad-dog skullcap | *Scutellaria fateriflora* |
| Woundwort | *Stachys palustris* |
| Smooth hedge nettle | *Stachys tenuifolia* |
| American germander | *Teucrium carradense* |
| Hog-peanut | *Amphicarpa bracteata* |
| Ground nut | *Apios americana* |
| White wild indigo | *Baptisia leucantha* |
| Partridge pea | *Cassia fasciculate* |
| Maryland senna | *Cassia marilandica* |
| Illinois mimosa | *Desmanthus illinoensis* |
| Hoary tick-trefoil | *Desmodium canescens* |
| Panicled tick-trefoil | *Desmodium paniculatum* |
| Foxglove beardtongue | *Penstomen digitalis* |
| White sweet clover | *Melilotus albus* |
| Yellow sweet clover | *Melilotus officinalis* |
| Buffalo clover | *Trifolium reflexum* |
| Red clover | *Trifolium pratense* |
| White clover | *Trifolium repens* |
| Asparagus | *Asperagus officnalis* |
| Trout lily | *Erythronium americanum* |
| Bristly cat-briar | *Smilax hisipida* |
| Carrion flower | *Smilax tasioneura* |
| Winged loosestrife | *Lythrum alarum* |
| Velvet-leaf | *Abustilon theophrasti* |
| Prickly mallow | *Sida spinosa* |
| Canada moon-seed | *Menispermum canadense* |
| Creeping primrose-willow | *Jurssiaea repens* |
| Cinnamon willow-herb | *Epilooium cloratum* |
| Creeping water primrose | *Ludwigia decurrens* |
| Seed box | *Ludwigia alternifolia* |
| Common evening primrose | *Oenothera biennis* |
| Cut-leaved evening primrose | *Oenothera laciniata* |
| Grass pink orchid | *Calopogon tuberosus* |
| Tubercled orched | *Platanthera flava herbiola* |
| Prairie white-fringed orchid | *Platanthera* leucopheae |

| | |
|---|---|
| Water smartweed | *Polygonum amphibium* |
| Prostrate knotweed | *Polygonum aviculare* |
| Knotweed | *Polygonum ramosissimum* |
| Climbing false buckwheat | *Polygonum scandens* |
| Woodland knotweed | *Polygonum virginianum* |
| Mud plantain | *Hereranthera limosa* |
| Purslane | *Portulaca oleracea* |
| Fringed loosestrife | *Lysimachia cilata* |
| Loosestrife | *Lycimachia lanceolata* |
| Moneywort | *Lysimachia nummularia* |
| Canada anemone | *Anemona canadensis* |
| Tall anemone | *Amemone virginiana* |
| Heatherflower | *Clernatis pitcheri* |
| Dwarf larkspur | *Delphinium tricorne* |
| Kidneyleaf buttercup | *Ranunculus aborivus* |
| Swamp buttercup | *Ranunculus septentrionalis* |
| Queen-of-the-prairie | *Filipendula rubra* |
| Avens | *Geum canadensis* |
| Rough cinquefoil | *Potentilla norvegica* |
| Rough-fruted cinquefoil | *Potentilla recta* |
| Branbles | *Rubus spp.* |
| Goosegrass | *Galium aparine* |
| Wild locorice | *Galium circaezans* |
| Shining bedstraw | *Galium concinnum* |
| Smooth buttonweed | *Spermacoce glabra* |
| Kitten tails | *Besseya bullii* |
| Lizard's tail | *Saurutus cernuus* |
| Ditch stonecrop | *Penthorum sedoides* |
| Slender false foxglove | *Gerardia tenuifolia* |
| Ear-leafed foxglove | *Tornanthera auriculata* |
| Slender false pimpernel | *Lindernaia anagaliidea* |
| False pimpernel | *Lindernia dubia* |
| Yellow monkey-flower | *Minulus glabratus* |
| Sharp-winged monkey-flower | *Mimulus alatus* |
| Squre-stemmed monkey-flower | *Mimulus ringens* |
| Mullein foxglove | *Seymaria macrophylla* |
| Moth mullein | *Verbascum blattaria* |
| Common mullein | *Verbascum thapsus* |
| Common night-shade | *Solanum americanum* |
| Horse nettle | *Solanum carolinense* |
| Water hemlock | *Cicute maculate* |

| | |
|---|---|
| Clearweed | *Pilea purnila* |
| Blue vervain | *Verbena hastate* |
| Vervain | *Verbena stricta* |
| White vervain | *Verbena urticifolia* |
| Arrow-leaved violet | *Viola sagittata* |
| Slender corydalis | *Corydalis micrantha* |
| Dutchman's breeches | *Dicentra cuccallaria* |

**Grasses**

| | |
|---|---|
| Red top | *Agrastris alba* |
| Common foxtail | *Alopecurus carolinianus* |
| Big bluestem | *Andropogon gerardii* |
| Awnless brome | *Bromus inermis* |
| Japanese chess | *Bromus japonicus* |
| Downey chess | *Bromus tectorum* |
| Bluejoint grass | *Calamagrostis canadensis* |
| Muskgrass | *Chara spp.* |
| Stout wood reed | *Cinna arundinacea* |
| Orchard grass | *Dactylis glomerata* |
| Smooth crab grass | *Digitaria ischaernum* |
| Crab grass | *Digitaria sanguinalis* |
| Barnyard grass | *Echinochloa muricata* |
| Goose grass | *Eleusine indica* |
| Wild rye | *Elymus riparius* |
| Virginia wild rye | *Elymus virginicus* |
| Stinking love grass | *Eragrostis cilianensis* |
| Love grass | *Eragrastis pectinacea* |
| Nodding fescue | *Festuca obtuse* |
| Squirel-tail grass | *Hordeum jubatum* |
| Little barley | *Hordeum pusillum* |
| Muhley | *Muhlenbergia spp.* |
| Witch grass | *Panicaum capillare* |
| Broad-leaved panic grass | *Panicum clandestinum* |
| Tall panicum | *Panicum dichotomiflorum* |
| Panic grass | *Panicum gattingeri* |
| Switch grass | *Panicum virgatum* |
| Hairy bead grass | *Paspalum bushii* |
| Bead grass | *Paspalum ciliatifolium* |
| Swamp bead grass | *Rspalum fluitans* |
| Reed canary grass | *Phalaris arundinacea* |
| Timothy | *Phleum pratense* |

| | |
|---|---|
| Johnson grass | *Sorghum halepense* |
| Prairie cord grass | *Spartina pectinata* |
| Tall slough grass | *Spartina michauxiana* |
| Wedge grass | *Sphenopholis obtusata* |
| Purple top | *Tridens flavus* |

**Emergent Plants**

| | |
|---|---|
| Arrowhead | *Sagitaria calycinus* |
| Narrow-leaved arrowleaf | *Sagittaria graminea* |
| Duck potato | *Sagittaria latifolia* |
| Spike rush | *Eleocharis macrostachya* |
| Spike rush | *Eleocharis smallii* |
| Elodea | *Elodea nuttalli* |
| Hardstem bulrush | *Scirpus acutus* |
| River bulrush | *Scirpus fluviatilis* |
| Roundstem bulrush | *Scirpus validus* |
| Swamp loosestrife | *Decodon verticllatus* |
| Halbered-leaved rose mallow | *Hibiscus militaris* |
| Swamp rose mallow | *Hibiscus moscheutos* |
| Poppy mallow | *Calfirhoe triangulata* |
| Wild rice | *Zizania aquiatica* |
| Marsh smartweed | *Polygonum coccinuum* |
| Pickerelweed | *Pontederia cordata* |
| Common bur-reed | *Sparganium eurycarpum* |
| Cattail | *Typha latifolia* |
| Narrow-leaved cattail | *Typha angustifolia* |
| Hybred cattail | *Typha glavea* |

**Submergent Plants**

| | |
|---|---|
| Coontail | *Ceratophyllum demersum* |
| Lesser duckweed | *Lemna minor* |
| Spiked water milfoil | *Myriophyllum exalbescens* |
| Water milfoil | *Myriophyllum spicatum* |
| Naiad | *Najas flexilis* |
| Bushy pondweed | *Najas guadalupensis* |
| Spotted pondweed | *Potamogeton pulcher* |
| Curlyleaf pondweed | *Potamogeton crispus* |
| Leafy pondweed | *Potamogeton foliosus* |
| Small pondweed | *Potamogeton pusillu* |
| Longleaf pondweed | *Potamogeton nodosus* |
| Greater duckweed | *Spirodela polyrhiza* |

**Floating Aquatic Plants**

| | |
|---|---|
| American lotus | *Nelumbo lutea* |
| Yellow pond lily | *Nymphaea advena* |
| White pond lily | *Nymphaea tuberose* |

**Moist Soil Plants**

| | |
|---|---|
| Water hemp | *Amaranthus rudis* |
| Pigweed | *Amaranthus tuberculatus* |
| Nodding bur marigold | *Bidens cernua* |
| Beggar-ticks | *Bidens cornosa* |
| Common beggar-ticks | *Bidens frondosa* |
| Fall begger-ticks | *Bidens vulgate* |
| Sedge | *Carex comosa* |
| Spreading sedge | *Carex laxiculmis* |
| Pale sedge | *Carex pallascens* |
| Sedge | *Carex squarrosa* |
| Shaved sedge | *Carex tonsa* |
| Short-pointed cyperus | *Cyperus acuminatus* |
| Red-rooted nutgrass | *Cyperus erythrorhizos* |
| Chufa | *Cyperus esculentus* |
| Gray's sedge | *Cyperus grayioides* |
| Awned cyperus | *Cyperus inflexus* |
| Galingale | *Cyperus strigosus* |
| Japanese millet | *Echinochloa frumentacea* |
| Walter's millet | *Echinochloa walteri* |
| Spike rush | *Eleocharis obtusa* |
| Spike rush | *Eleocharis palustris* |
| Teal rush | *Eragrostis hypnoides* |
| Rush | *Juncas Canadensis* |
| Catchfly grass | *Leersia lenticularis* |
| Rice cutgrass | *Leersia oryzoides* |
| White grass | *Leersia virginica* |
| marsh cord grass | *Spartina michauxiana* |
| Long-leaved ammannia | *Ammannia coccinea* |
| Swamp smartweed | *Polygonum hydropiperoides* |
| Nodding smartweed | *Polygonum lapthifolium* |
| Largeseed smartweed | *Polygonum pennsylvanicum* |
| Lady's thumb | *Polygonum persicaria* |
| Dotted smartweed | *Polygonum punctatum* |
| Curled dock | *Rumex crispus* |
| Swamp dock | *Rumex verticillatus* |

## Illinois River NWR Fish List

**Fish**

| | |
|---|---|
| Chestnut lamprey | *Ichthyomzon castaneus* |
| Lake sturgeon | *Acipenser fulvescens* |
| Shovelnose Sturgeon | *Scaphirhynchus platorynchus* |
| Paddlefish | *Polyodon spathula* |
| Spotted gar | *Lepisosteus oculatus* |
| Longnose gar | *Lepisosteus occeus* |
| Shortnose gar | *Lepisosteus platostornus* |
| Bowfin | *Amia calva* |
| Goldeye | *Hiodon alosoides* |
| Mooneye | *Hiodon turgisus* |
| American eel | *Anguilla rostrata* |
| Skipjack herring | *Alosa chrysochloris* |
| Gizzard shad | *Dorosoma cepedianum* |
| Threadfin shad | *Dorosoma petensese* |
| Central stoneroller | *Campostoma anomalium* |
| Goldfish | *Carassius auratus* |
| Grass carp | *Ctenopharyngodon idella* |
| Red shiner | *Cyprinella lutrensis* |
| Common carp | *Cyprinus carpio* |
| Mississippi silvery minnow | *Hybognathus nuchalis* |
| Bighead carp | *Hypophrhalmichthys nobilis* |
| Striped shiner | *Luxilis chrysocephalus* |
| Speckled chub | *Extranius aestifalis* |
| Silver chub | *Macrhybopsis storeriana* |
| Hornyhead chub | *Nocomis biguttatus* |
| Golden shiner | *Noternigonus crysoleucas* |
| Emerald shiner | *Notropis atherinoides* |
| River shiner | *Notropis blennius* |
| Bigmouth shiner | *Hybopsis dorsalis* |
| Spottail shiner | *Notropis hudsonius* |
| Silverhand shiner | *Notropis shumardi* |
| Sand shiner | *Notropis stramineus* |
| Pugnose minnow | *Opsopoedus emiliae* |
| Suckermouth minnow | *Phenacobius mirabilis* |
| Southern redbelly dace | *Phoxinus erythrogaster* |
| Bluntnose minnow | *Pimephales promelas* |
| Fathead minnow | *Pimephales vigilax* |
| Bullhead minnow | |

| | |
|---|---|
| Mud darter | Etheostoma asprigene |
| Bluntnose darter | Etheostoma chlorosomum |
| Johnny darter | Etheostoma nigrum |
| Orangethroat darter | Etheostoma spectabile |
| Yellow perch | Perca flavesens |
| Logperch | Percina caprodes |
| Blackside darter | Percina maculata |
| Slenderhead darter | Percina phoxocephala |
| River darter | Percina shumardi |
| Sauger | Stizostedion canadense |
| Walley | Stizostedion vitreum |
| Freshwater drum | Aplodinotus grunniens. |
| Smallmouth buffalo | Ictiobus bubalus |
| Bigmouth buffalo | Ictiobus cyprinellus |
| Black buffalo | Ictiobus niger |
| Spotted sucker | Minytrema melanops |
| Silver redhorse | Maxostoma anisurum |
| Golden redhorse | Maxostoma erythrurum |
| Shorthead redhorse | Maxostoma macrolepidaturn |
| Lake chubsucker | Erimyzon sucetta |
| White catfish | Ictalurus catus |
| Ironcolor shiner | Notropis chalybaeus |
| Striped bass | Morone saxatilis |
| Black bullhead | Ameriurus melas |
| Yellow bullhead | Ameriurus natalis |
| Brown bullhead | Ameriurus nebulosaus |
| Blue catfish | Ictalurus furcatus |
| Channel catfish | Ictalurus punctatus |
| Stonecat | Noturus flavus |
| Tadpole madtom | Noturus gyrinus |
| Flathead catfish | Pylodictis olivaris |
| Grass pickerel | Esox americanus vermiculatus |
| Northern pike | Eox lucius |
| Rainbow smelt | Osmerus mordax |
| Rainbow trout | Oncorgyncus mykiss |
| Trout-perch | Percopsis orniscornaycus |
| Pirate perch | Aphredoderus sayanus |
| Burbot | Lota lota |
| Starhead topminnow | Fundulus dispar |
| Blackstripe topminnow | Fundulus notatus |
| Western mosquitofish | Gambusia affinis |
| Brook silverside | Labidesthes sicculus |
| White bass | Morone chrysops |
| Yellow bass | Morone mississippiensi |
| Rock bass | Amblophlites rupestris |

| | |
|---|---|
| Green sunfish | Lepornis cyanellus |
| Pumpkinseed | Lepornis gubbosus |
| Warmouth | Lepornis gulosus |
| Orangespotted sunfish | Lepornis humilis |
| Bluegill | Lornis macrochirus |
| Longear sunfish | Lepornis megalotis |
| Redear sunfish | Lepornis microlophus |
| Spotted sunfish | Lepornis punctatus |

## List of Mammals of the Illinois River National Wildlife and Fish Refuges

The following mammal list includes only those that have actually been observed on the refuges. Additional species can be expected, and will be added to the list as time passes. The 28 species listed are represented by official records and specimens preserved in the U.S. Fish and Wildlife Service collections at Washington, D.C., in the Museum of Natural History of the University of Illinois, and elsewhere.

Opossum (*Didelphis marsupialis*)
Eastern Mole (*Scalopus aquaticus*)
Little Brown Myotis (*Myotis lucifungus*)
Big Brown Bat (*Eptesicus fuscus*)
Hoary Bat (*Lasiurus cinereus*)
Eastern Cottontail (*Sylvilagus floridanus*)
Woodchuck (*Marmota monax*)
Eastern Fox Squirrel (*Sciurus niger*)
Southern Flying Squirrel (*Glaucomys volans*)
Plains Pocket Gopher (*Geomys bursarius*)
Beaver (*Castor canadensis*)
Deer Mouse (*Peromyscus maniculatus*)
White-footed Mouse (*Peromyscus leucopus*)
Southern Bog Lemming (*Synaptomys cooperi*)
Meadow Vole (*Microtus pennsylvanicus*)
Pine Vole (*Pitymys pioneetorum*)
Muskrat (*Onodatra zibethicus*)
Norway Rat (*Rattus norvegicus*)
House Mouse (*Mus musculus*)
Meadow Jumping Mouse (*Zapus hudsonius*)
Coyote (*Canis latrans*)
Red Fox (*Vulpes fulva*)
Gray Fox (*Urocyon cinereoargenteus*)
Raccoon (*Procyon lotor*)
Mink (*Mustela vison*)
Badger (*Taxidea taxus*)
Striped Skunk (*Mephitus mephitus*)
Whitetail Deer (*Odocoileus virgineanus*)

## Illinois River NWFR Bird Checklist

Legend:
S=Spring
s=Summer
F=Fall
W=Winter

a = Abundant - Common species that is numerous
c = Common - Certain to be seen or heard in suitable habitat
"u = Uncommon - Present, but not certain to be seen"
o = Occasional - Seen only a few times during a season
r = Rare - Seen at intervals of 2 to 5 years
* = Species that nests in the refuge
+ = Species that is threatened or endangered in Illinois

| **Common Name** | **S** | **s** | **F** | **W** |
|---|---|---|---|---|
| Loons | | | | |
| Common Loon | o | | o | |
| | | | | |
| Grebes | | | | |
| Pied-billed Grebe + | c | | o | |
| Horned Grebe | u | | | u |
| | | | | |
| Pelicans | | | | |
| American White Pelican | o | | o | |
| Cormorants | | | | |
| Double-crested Cormorant + | c | o | c | |
| | | | | |
| Herons and Bitterns | | | | |
| American Bittern + | r | o | r | |
| Least Bittern + | r | r | r | |
| Great Blue Heron + | a | a | a | o |
| Little Blue Heron + | u | | u | |
| Great Egret + | a | a | c | |
| Snowy Egret + | r | | r | |
| Cattle Egret | u | u | u | |
| Green Heron * | c | c | c | |
| Black-crowned Night Heron + * | o | u | o | |
| | | | | |
| "Swans, Geese, and Ducks" | | | | |
| Tundra Swan | r | | o | r |
| Trumpeter Swan | | | o | o |
| Greater White-fronted Goose | o | | o | |
| Snow Goose | u | | u | |
| Canada Goose * | c | c | a | u |
| Wood Duck * | a | a | a | o |
| Green-winged Teal | c | u | a | r |
| American Black Duck | c | u | c | o |
| Mallard * | a | a | a | u |
| Northern Pintail | c | r | a | o |
| Blue-winged Teal * | c | u | a | r |
| Northern Shoveler | c | | c | |
| Gadwall | u | o | u | r |

| Common Name | S | s | F | W |
|---|---|---|---|---|
| American Wigeon | c | r | c | r |
| Canvasback | c | | c | o |
| Redhead | u | | c | o |
| Ring-necked Duck | c | | c | o |
| Lesser Scaup | a | | c | o |
| Greater Scaup | r | | o | |
| Black Scoter | r | | r | |
| Surf Scoter | | | r | r |
| White-winged Scoter | | | r | r |
| Common Goldeneye | u | | u | r |
| Bufflehead | u | | u | o |
| Hooded Merganser | o | r | o | o |
| Common Merganser | a | | u | c |
| Red-breasted Merganser | o | | o | |
| Ruddy Duck | u | o | c | o |
| Vultures | | | | |
| Turkey Vulture * | c | o | c | |
| Hawks and Eagles | | | | |
| Osprey + | u | r | u | |
| Bald Eagle + * | u | r | u | c |
| Northern Harrier + | o | r | o | o |
| Sharp-shinned Hawk + | u | o | u | o |
| Cooper's Hawk + | u | | u | r |
| Red-shouldered Hawk + * | r | r | r | r |
| Broad-winged Hawk * | o | r | o | |
| Red-tailed Hawk * | c | c | c | c |
| Rough-legged Hawk | u | | u | u |
| Falcons | | | | |
| American Kestrel * | c | c | c | o |
| Merlin | r | | r | |
| Peregrine Falcon + | r | | o | |
| Upland Game Birds | | | | |
| Ring-necked Pheasant | o | o | o | o |
| Wild Turkey | o | o | o | o |
| Northern Bobwhite * | c | c | c | c |
| Rails and Coots | | | | |
| King Rail | r | | r | |
| Virginia Rail | u | o | u | |
| Sora * | c | r | c | |
| Common Moorhen + | r | | r | |
| American Coot | a | o | a | u |
| Cranes | | | | |
| Sandhill Crane + | r | | r | |

| Common Name | S | s | F | W |
|---|---|---|---|---|
| Shorebirds | | | | |
| Black-bellied Plover | o | | o | |
| Lesser Golden Plover | o | | o | |
| Semipalmated Plover | u | | c | |
| Piping Plover + | r | | r | |
| Killdeer * | c | c | a | o |
| American Avocet | r | | u | |
| Greater Yellowlegs | c | u | c | |
| Lesser Yellowlegs | c | u | a | |
| Solitary Sandpiper | c | o | c | |
| Willet | r | | o | |
| Spotted Sandpiper * | c | c | c | |
| Upland Sandpiper + | r | | r | |
| Hudsonian Godwit | r | r | r | |
| Ruddy Turnstone | r | | o | |
| Red Knot | | r | r | |
| Sanderling | r | r | r | |
| Semipalmated Sandpiper | u | o | u | |
| Western Sandpiper | r | r | o | |
| Least Sandpiper | u | u | u | |
| Baird's Sandpiper | r | r | o | |
| Pectoral Sandpiper * | c | u | c | |
| Buff-breasted Sandpiper | r | o | o | |
| Dunlin | r | | o | |
| Stilt Sandpiper | r | o | c | |
| Short-billed Dowitcher | o | o | u | |
| Long-billed Dowitcher | o | o | u | |
| Common Snipe | u | r | u | |
| American Woodcock | u | o | o | |
| Wilson's Phalarope + | r | | r | |
| Red-necked Phalarope | r | | o | |
| Gulls and Terns | | | | |
| Laughing Gull | r | r | r | |
| Franklin's Gull | r | r | u | |
| Bonaparte's Gull | u | | o | |
| Ring-billed Gull | c | u | c | c |
| Herring Gull | c | r | c | c |
| Caspian Tern | o | | u | |
| Common Tern + | u | | u | |
| Forster's Tern + | o | r | u | |
| Least Tern + | o | o | o | |
| Black Tern + | u | o | c | |
| Doves | | | | |
| Rock Dove | c | c | c | c |
| Mourning Dove * | c | a | a | c |
| Cuckoos | | | | |
| Black-billed Cuckoo | u | o | u | |
| Yellow-billed Cuckoo * | u | c | u | |

| Common Name | S | s | F | W |
|---|---|---|---|---|
| Owls | | | | |
| Eastern Screech Owl * | u | u | u | u |
| Great Horned Owl * | c | c | c | c |
| Barred Owl * | c | c | c | c |
| Short-eared Owl | o | o | o | o |
| Nighthawks and Nightjars | | | | |
| Common Nighthawk * | u | c | c | |
| Whip-poor-will * | o | u | o | |
| Swifts | | | | |
| Chimney Swift | u | c | u | |
| Hummingbirds | | | | |
| Ruby-throated Hummingbird * | u | u | c | |
| Kingfishers | | | | |
| Belted Kingfisher * | c | c | c | o |
| Woodpeckers | | | | |
| Red-Headed Woodpecker * | c | c | c | c |
| Red-bellied Woodpecker * | c | c | c | c |
| Yellow-bellied Sapsucker | c | | c | o |
| Downy Woodpecker * | c | c | c | c |
| Hairy Woodpecker * | u | u | u | u |
| Northern Flicker * | c | c | c | c |
| Pileated Woodpecker | c | c | c | c |
| Flycatchers | | | | |
| Olive-sided Flycatcher | r | | o | |
| Eastern Wood Pewee * | c | c | c | |
| Yellow-bellied Flycatcher | o | | o | |
| Acadian Flycatcher | u | o | u | |
| Alder Flycatcher | r | | o | |
| Willow Flycatcher | u | u | r | |
| Least Flycatcher | c | | u | |
| Eastern Phoebe * | u | u | u | |
| Great Crested Flycatcher | c | c | c | |
| Eastern Kingbird * | c | c | c | |
| Larks | | | | |
| Horned Lark * | c | c | c | c |
| Swallows | | | | |
| Purple Martin * | c | c | u | |
| Tree Swallow * | c | a | c | |
| Northern Rough-winged Swallow * | c | c | u | |
| Bank Swallow | u | c | c | |
| Cliff Swallow | u | u | u | |
| Barn Swallow * | c | c | a | |

| Common Name | S | s | F | W |
|---|---|---|---|---|
| Jays and Crows | | | | |
| Blue Jay * | a | c | a | c |
| American Crow * | c | c | c | a |
| Chickadees and Titmice | | | | |
| Black-capped Chickadee * | c | c | c | c |
| Tufted Titmouse | c | c | c | c |
| Nuthatches | | | | |
| Red-breasted Nuthatch | r | | r | o |
| White-breasted Nuthatch * | c | c | c | c |
| Creepers | | | | |
| Brown Creeper | o | r | c | c |
| Wrens | | | | |
| Carolina Wren * | c | c | c | u |
| Bewick's Wren + | r | r | | |
| House Wren | c | c | c | |
| Winter Wren | u | | u | u |
| Marsh Wren | r | o | r | |
| "Kinglets, Bluebirds, and Thrushes" | | | | |
| Golden-crowned Kinglet | u | | u | u |
| Ruby-crowned Kinglet | c | | c | u |
| Blue-gray Gnatcatcher | u | u | o | |
| Eastern Bluebird * | o | r | o | r |
| Veery + | u | | u | |
| Gray-cheeked Thrush | c | | c | |
| Swainson's Thrush | c | | c | |
| Hermit Thrush | c | | c | r |
| Wood Thrush * | u | u | u | |
| American Robin * | a | a | a | u |
| Mimics | | | | |
| Gray Catbird * | c | c | c | |
| Northern Mockingbird * | u | o | u | o |
| Brown Thrasher * | c | c | u | r |
| Pipits | | | | |
| American Pipit | r | | u | |
| Waxwings | | | | |
| Cedar Waxwing | c | u | c | r |
| Shrikes | | | | |
| Loggerhead Shrike + | r | | r | |
| Starlings | | | | |
| European Starling * | a | c | a | a |

| Common Name | S | s | F | W |
|---|---|---|---|---|
| Vireos | | | | |
| White-eyed Vireo | r | r | r | |
| Bell's Vireo * | u | u | o | |
| Solitary Vireo | u | | u | |
| Yellow-throated Vireo | o | r | o | |
| Warbling Vireo * | c | c | u | |
| Philadelphia Vireo | u | | u | |
| Red-eyed Vireo * | c | c | c | |
| Warblers | | | | |
| Blue-winged Warbler | r | | r | |
| Golden-winged Warbler | r | | r | |
| Tennessee Warbler | c | | o | |
| Orange-crowned Warbler | u | | u | |
| Nashville Warbler | c | | c | |
| Northern Parula | c | u | c | |
| Yellow Warbler * | c | c | c | |
| Chestnut-sided Warbler | c | | c | |
| Magnolia Warbler | c | | c | |
| Cape May Warbler | r | | r | |
| Black-throated Green Warbler | c | | c | |
| Blackburnian Warbler | c | o | c | |
| Pine Warbler | r | | r | |
| Palm Warbler | r | | r | |
| Bay-breasted Warbler | o | | o | |
| Blackpoll Warbler | c | | u | |
| Cerulean Warbler | r | | r | |
| Black-and-white Warbler | c | | c | |
| American Redstart * | c | u | u | |
| Prothonotary Warbler * | c | c | u | |
| Ovenbird | c | u | c | |
| Northern Waterthrush | c | | c | |
| Louisiana Waterthrush | u | | r | |
| Kentucky Warbler | o | r | r | |
| Connecticut Warbler | r | | r | |
| Mourning Warbler | r | | r | |
| Common Yellowthroat * | c | c | u | r |
| Hooded Warbler | o | | r | |
| Wilson's Warbler | c | | c | |
| Canada Warbler | u | | u | |
| Yellow-breasted Chat | u | r | u | |
| Tanagers | | | | |
| Summer Tanager | u | | u | |
| Scarlet Tanager | u | r | u | |
| "Grosbeaks, Buntings, and Sparrows" | | | | |
| Northern Cardinal * | a | a | a | a |
| Rose-breasted Grosbeak * | c | c | c | |
| Blue Grosbeak | r | r | r | |
| Indigo Bunting * | c | a | a | r |
| Dicksissel * | c | c | c | |

| Common Name | S | s | F | W |
|---|---|---|---|---|
| Eastern Towhee * | c | c | u | r |
| American Tree Sparrow | c | | c | a |
| Chipping Sparrow * | c | c | c | |
| Clay-colored Sparrow + | r | | r | |
| Field Sparrow * | c | a | c | o |
| Vesper Sparrow * | o | o | o | r |
| Savannah Sparrow | u | | u | |
| Grasshopper Sparrow | o | r | r | |
| Le Conte's Sparrow | o | | o | |
| Nelson's Sharp-tailed Sparrow | r | | r | |
| Fox Sparrow | c | | c | o |
| Song Sparrow * | c | c | c | u |
| Lincoln's Sparrow | o | | o | |
| Swamp Sparrow | u | | u | o |
| White-throated Sparrow | c | | c | o |
| White-crowned Sparrow | u | | u | |
| Harris' Sparrow | r | | r | |
| Dark-eyed Junco | c | | c | a |
| Lapland Longspur | r | | r | |
| Blackbirds and Orioles | | | | |
| Bobolink | o | | o | |
| Red-winged Blackbird * | a | a | a | u |
| Eastern Meadowlark * | c | c | c | o |
| Rusty Blackbird | c | c | c | o |
| Common Grackle * | c | a | c | o |
| Brown-headed Cowbird * | c | c | c | o |
| Baltimore Oriole * | c | c | c | |
| Finches | | | | |
| Purple Finch | u | | c | u |
| House Finch | u | u | u | u |
| Pine Siskin | u | | u | o |
| American Goldfinch | a | a | a | c |
| Evening Grosbeak | r | | r | r |
| Old World Sparrows | | | | |
| House Sparrow | a | a | a | a |
| Eurasian Tree Sparrow | u | u | u | u |

Rare and Accidental Birds

| | |
|---|---|
| Eared Grebe | Snow Bunting |
| Cinnamon Teal | Oldsquaw |
| Northern Goshawk | Sharp-tailed Sandpiper |
| Whimbrel | Red Phalarope |
| Red Crossbill | Little Gull |
| Thayer's Gull | Iceland Gull |
| Glaucous Gull | Snowy Owl |
| Long-eared Owl | Chuck-wills-widow |
| Black-throated Blue Warbler | |

| Common Name | Scientific Name |
|---|---|
| *Mollusks* | |
| | *Actinonaias ligamentina* |
| three-ridge | *Amblerma plicata* |
| common floater | *Anodonta grandis* |
| paper pondshell | *Anodonta imbecillis* |
| flat floater | *Anodonta suborbiculata* |
| rock pocketbook | *Arcidens confragosus* |
| asiatic clam | *Corbicula flurninea* |
| purple wartyback | *Cyclonaias tuberculata* |
| | *Dreissena polymorpha* |
| elephant ear | *Elliptio crassidens* |
| spike | *Elliptio dilatata* |
| | *Ellipsaria lineolata* |
| ebonyshell | *Fusconaia abena* |
| abash pigtoe | *Fusconaia flava* |
| plain pocketbook | *Lampsilis cardium* |
| Higgin's eye | *Lampsilis higginsi* |
| fatmucker | *Lampsilis siliquoidea* |
| yellow sandshell | *Lampsilis teres* |
| white healsplitter | *Lasmigona complanata* |
| fragile papershell | *Leptodea iragilis* |
| black sandshell | *Ligumia recta* |
| washboard | *Megalonaias nervosa* |
| three-horned wartyback | *Obliquaria reflexa* |
| hickorynut | *Obovaria olivaria* |
| bullhead | *Plethobasus cyphyus* |
| | *Pleurobema simox* |
| pink heelsplitter | *Potamilus alatus* |
| pink papershell | *Potamilus obiensis* |
| monkeyface | *Quadrula metanevra* |
| wartyback | *Quadrula nodulata* |
| pimpleback | *Quadrula pustulosa* |
| mapleleaf | *Quadrula quadrula* |
| squawfoot | *Strophitus undulates* |
| lilliput | *Toxolasma parvus* |
| | *Tritogonia verrucosa* |
| fawnsfoot | *Trunicilla donaciformis* |
| deertoe | *Trunicilla truncate* |

**Crustaceans**

| | |
|---|---|
| isopod | *Caecidotea forbesi* |
| isopod | *Caecidotea intermedia* |
| crayfish | *Cambarus diogenes* |
| amphipod | *Crangonyx forbesi* |
| amphipod | *Gammarus pseudolimnaeus* |
| amphipod | *Hyalella azteca* |
| crayfish | *Orconectes vinlis* |
| crayfish | *Palaemonetes kadiakensis* |
| crayfish | *Procambarus acutus* |
| crayfish | *Procambarus gracilis* |

**Reptiles**

| | |
|---|---|
| northern copperhead | *Agkistrodon contormix mokeson* |
| common snapping turtle | *Chelydra serpentine serpentine* |
| painted turtle | *Chrysemys picta belli* |
| midland painted turtle | *Chrysemys picta marginata* |
| Kirtland's snake | *Clonophis kirtlandi* |
| six-lined racerunner | *Cnemidophorus sexlineatus* |
| eastern yellowbelly racer | *Coluber constrictor flaviventris* |
| northern ringneck snake | *Diadophis punctatus edwardsii* |
| black rat sanke | *Elephe obsoleta obsoleta* |
| fox snake | *Elephe vulpine* |
| western fox snake | *Elephe vulpine vulpine* |
| Blanding's turtle | *Emydoidea blaningi* |
| five-lined skink | *Eumeces fasciatus* |
| broad-headed skink | *Eumeces laticpes* |
| map turtle | *Grapemys geograhica* |
| Ouchita map turtle | *Graptemys ouachitensis* |
| false map turtle | *Graptemys pseudogeographica* |
| dusty hognose snake | *Heterodon nasicus gloydi* |
| plains hognose snake | *Heterdon nasicus nasicus* |
| eastern hognose snake | *Heterodon platyrhinos* |
| Illinois mud turtle | *Kinosternon flavescens spooneri* |
| prairie kingsnake | *Lampropeltis calligaster* |
| speckled kingsnake | *Lampropeltis getulus holbrooki* |
| eastern milk snake | *Lampropeltis triangulum* |
| red milk snake | *Lampropeltis triangulum syspila* |
| alligator snapping turtle | *Macroclemys temmincki* |
| yellowbelly water snake | *Natrix erythrogaster flavigaster* |
| Graham's water snake | *Natrix grahami* |
| diamondback water snake | *Natrix rhombifera* |
| diamondback water snake | *Natrix rhombifera rhombifera* |

| | |
|---|---|
| queen snake | *Natrix septemvittata* |
| northern water snake | *Natrix sipedon sipedon* |
| western smooth green snake | *Opheadrys vernalis blanchardi* |
| western slender glass lizard | *Ophisaurus attenuatus* |
| bullsnake | *Pituophis melanoleucus sayi* |
| red-eared turtle | *Pseudemys scripta elegans* |
| ground skink | *Scincella lateralis* |
| eastern massasauga | *Sistrurus catenatus catenatus* |
| pond slider | *Trachemys scripta elegans* |
| smooth softshell | *Trionyx muticus muticus* |
| eastern spiny softshell | *Trionyx spiniferus spiniferus* |

**Amphibians**

| | |
|---|---|
| Blanchard's cricket frog | *Acris crepitans blanchardi* |
| small-mouthed salamander | *Ambystoma texanum* |
| tiger salamander | *Ambystoma tigrinum* |
| eastern tiger salamander | *Ambystoma tigrinum tigrinum* |
| American toad | *Bufo americanus americanus* |
| Woodhouse's toad | *Bufo woodhousei* |
| Fowler's toad | *Bufo woodhousei fowleri* |
| nortem spring peeper | *Hyla crucifer crucifer* |
| eastern gray tree frog | *Hyla versicolor* |
| mud puppy | *Necturus maculosus maculosus* |
| Illinois chorus frog | *Pseudacris streckeri illinoensis* |
| western chorus frog | *Pseudacris triseriata triseriata* |
| crawfish frog | *Rana areolata* |
| plains leopard frog | *Rana blairi* |
| bullfrog | *Rana catesbeiana* |
| green frog | *Rana clamitans melanota* |
| northern leopard frog | *Rana pipiens pipiens* |
| southern leopard frog | *Rana shenocephala* |
| western lesser siren | *Siren intermedia nettingi* |

# Appendix D: Compatibility Determinations

# Appendix D: Compatibility Determinations

As part of the planning process, compatibility determinations were drafted and made available for public review during public meetings during the planning process. The approved compatibility determinations are available for review at Refuge headquarters. The following public uses were found compatible with Refuge Complex purposes:

- Wildlife Observation and Photography
- Waterfowl Hunting
- Upland Game Hunting
- Sport Fishing
- Environmental Education and Interpretation
- Research, Biological Monitoring, Habitat Restoration
- Farming
- Nut, Berry and Mushroom Picking

# Appendix E: Compliance Requirements

# Appendix E / Compliance Requirements

*Rivers and Harbor Act (1899) (33 U.S.C. 403):* Section 10 of this Act requires the authorization by the U.S. Army Corps of Engineers prior to any work in, on, over, or under a navigable water of the United States.

*Antiquities Act (1906):* Authorizes the scientific investigation of antiquities on Federal land and provides penalties for unauthorized removal of objects taken or collected without a permit.

*Migratory Bird Treaty Act (1918):* Designates the protection of migratory birds as a Federal responsibility. This Act enables the setting of seasons, and other regulations including the closing of areas, Federal or non Federal, to the hunting of migratory birds.

*Migratory Bird Conservation Act (1929):* Establishes procedures for acquisition by purchase, rental, or gift of areas approved by the Migratory Bird Conservation Commission.

*Fish and Wildlife Coordination Act (1934), as amended:* Requires that the Fish and Wildlife Service and State fish and wildlife agencies be consulted whenever water is to be impounded, diverted or modified under a Federal permit or license. The Service and State agency recommend measures to prevent the loss of biological resources, or to mitigate or compensate for the damage. The project proponent must take biological resource values into account and adopt justifiable protection measures to obtain maximum overall project benefits. A 1958 amendment added provisions to recognize the vital contribution of wildlife resources to the Nation and to require equal consideration and coordination of wildlife conservation with other water resources development programs. It also authorized the Secretary of Interior to provide public fishing areas and accept donations of lands and funds.

*Migratory Bird Hunting and Conservation Stamp Act (1934):* Authorized the opening of part of a refuge to waterfowl hunting.

*Historic Sites, Buildings and Antiquities Act (1935), as amended:* Declares it a national policy to preserve historic sites and objects of national significance, including those located on refuges. Provides procedures for designation, acquisition, administration, and protection of such sites.

*Refuge Revenue Sharing Act (1935), as amended:* Requires revenue sharing provisions to all fee-title ownerships that are administered solely or primarily by the Secretary through the Service.

*Transfer of Certain Real Property for Wildlife Conservation Purposes Act (1948):* Provides that upon a determination by the Administrator of the General Services Administration, real property no longer needed by a Federal agency can be transferred without reimbursement to the Secretary of Interior if the land has particular value for migratory birds, or to a State agency for other wildlife conservation purposes.

*Federal Records Act (1950):* Directs the preservation of evidence of the government's organization, functions, policies, decisions, operations, and activities, as well as basic historical and other information.

*Fish and Wildlife Act (1956):* Established a comprehensive national fish and wildlife policy and broadened the authority for acquisition and development of refuges.

*Refuge Recreation Act (1962):* Allows the use of refuges for recreation when such uses are compatible with the refuge's primary purposes and when sufficient funds are available to manage the uses.

*Wilderness Act (1964), as amended:* Directed the Secretary of Interior, within 10 years, to review every roadless area of 5,000 or more acres and every roadless island (regardless of size) within National Wildlife Refuge and National Park Systems and to recommend to the President the suitability of each such area or island for inclusion in the National Wilderness Preservation System, with final decisions made by Congress. The Secretary of Agriculture was directed to study and recommend suitable areas in the National Forest System.

*Land and Water Conservation Fund Act (1965):* Uses the receipts from the sale of surplus Federal land, outer continental shelf oil and gas sales, and other sources for land acquisition under several authorities.

*National Wildlife Refuge System Administration Act (1966), as amended by the National Wildlife Refuge System Improvement Act (1997)16 U.S.C. 668dd668ee. (Refuge Administration Act):* Defines the National Wildlife Refuge System and authorizes the Secretary to permit any use of a refuge provided such use is compatible with the major purposes for which the refuge was established. The Refuge Improvement Act clearly defines a unifying mission for the Refuge System; establishes the legitimacy and appropriateness of the six priority public uses (hunting, fishing, wildlife observation and photography, or environmental education and interpretation); establishes a formal process for determining compatibility; established the responsibilities of the Secretary of Interior for managing and protecting the System; and requires a Comprehensive Conservation Plan for each refuge by the year 2012. This Act amended portions of the Refuge Recreation Act and National Wildlife Refuge System Administration Act of 1966.

*National Historic Preservation Act (1966), as amended:* Establishes as policy that the Federal Government is to provide leadership in the preservation of the nation's prehistoric and historic resources.

*Architectural Barriers Act (1968):* Requires federally owned, leased, or funded buildings and facilities to be accessible to persons with disabilities.

*National Environmental Policy Act (1969):* Requires the disclosure of the environmental impacts of any major Federal action significantly affecting the quality of the human environment.

*Uniform Relocation and Assistance and Real Property Acquisition Policies Act (1970), as amended:* Provides for uniform and equitable treatment of persons who sell their homes, businesses, or farms to the Service. The Act requires that any purchase offer be no less than the fair market value of the property.

*Endangered Species Act (1973):* Requires all Federal agencies to carry out programs for the conservation of endangered and threatened species.

*Rehabilitation Act (1973):* Requires programmatic accessibility in addition to physical accessibility for all facilities and programs funded by the Federal government to ensure that anybody can participate in any program.

*Archaeological and Historic Preservation Act (1974):* Directs the preservation of historic and archaeological data in Federal construction projects.

*Clean Water Act (1977):* Requires consultation with the Corps of Engineers (404 permits) for major wetland modifications.

*Surface Mining Control and Reclamation Act (1977) as amended (Public Law 95-87) (SMCRA):* Regulates surface mining activities and reclamation of coal-mined lands. Further regulates the coal industry by designating certain areas as unsuitable for coal mining operations.

*Executive Order 11988 (1977):* Each Federal agency shall provide leadership and take action to reduce the risk of flood loss and minimize the impact of floods on human safety, and preserve the natural and beneficial values served by the floodplains.

*Executive Order 11990:* Executive Order 11990 directs Federal agencies to (1) minimize destruction, loss, or degradation of wetlands and (2) preserve and enhance the natural and beneficial values of wetlands when a practical alternative exists.

*Executive Order 12372 (Intergovernmental Review of Federal Programs):* Directs the Service to send copies of the Environmental Assessment to State Planning Agencies for review.

*American Indian Religious Freedom Act (1978):* Directs agencies to consult with native traditional religious leaders to determine appropriate policy changes necessary to protect and preserve Native American religious cultural rights and practices.

*Fish and Wildlife Improvement Act (1978):* Improves the administration of fish and wildlife programs and amends several earlier laws including the Refuge Recreation Act, the National Wildlife Refuge System Administration Act, and the Fish and Wildlife Act of 1956. It authorizes the Secretary to accept gifts and bequests of real and personal property on behalf of the United States. It also authorizes the use of volunteers on Service projects and appropriations to carry out a volunteer program.

*Archaeological Resources Protection Act (1979), as amended:* Protects materials of archaeological interest from unauthorized removal or destruction and requires Federal managers to develop plans and schedules to locate archaeological resources.

*Federal Farmland Protection Policy Act (1981), as amended:* Minimizes the extent to which Federal programs contribute to the unnecessary and irreversible conversion of farmland to nonagricultural uses.

*Emergency Wetlands Resources Act (1986):* Promotes the conservation of migratory waterfowl and offsets or prevents the serious loss of wetlands by the acquisition of wetlands and other essential habitats.

*Federal Noxious Weed Act (1990):* Requires the use of integrated management systems to control or contain undesirable plant species, and an interdisciplinary approach with the cooperation of other Federal and State agencies.

*Native American Graves Protection and Repatriation Act (1990):* Requires Federal agencies and museums to inventory, determine ownership of, and repatriate cultural items under their control or possession.

*Americans With Disabilities Act (1992):* Prohibits discrimination in public accommodations and services.

*Executive Order 12898 (1994):* Establishes environmental justice as a Federal government priority and directs all Federal agencies to make environmental justice part of their mission. Environmental justice calls for fair distribution of environmental hazards.

*Executive Order 12996 Management and General Public Use of the National Wildlife Refuge System (1996):* Defines the mission, purpose, and priority public uses of the National Wildlife Refuge System. It also presents four principles to guide management of the System.

*Executive Order 13007 Indian Sacred Sites (1996):* Directs Federal land management agencies to accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners, avoid adversely affecting the physical integrity of such sacred sites, and where appropriate, maintain the confidentiality of sacred sites.

*National Wildlife Refuge System Improvement Act (1997):* Considered the "Organic Act of the National Wildlife Refuge System. Defines the mission of the System, designates priority wildlife-dependent public uses, and calls for comprehensive refuge planning.

*National Wildlife Refuge System Volunteer and Community Partnership Enhancement Act (1998):* Amends the Fish and Wildlife Act of 1956 to promote volunteer programs and community partnerships for the benefit of national wildlife refuges, and for other purposes.

*National Trails System Act:* Assigns responsibility to the Secretary of Interior and thus the Service to protect the historic and recreational values of congressionally designated National Historic Trail sites.

*Treasury and General Government Appropriations Act of 2001 (Public Law 106-554):* In December 2002, Congress required federal agencies to publish their own guidelines for ensuring and maximizing the quality, objectivity, utility, and integrity of information that they disseminate to the public (44 U.S.C. 3502). The amended language is included in Section 515(a). The Office of Budget and Management (OMB) directed agencies to develop their own guidelines to address the requirements of the law. The Department of the Interior instructed bureaus to prepare separate guidelines on how they would apply the Act. The U.S. Fish and Wildlife Service has developed "Information Quality Guidelines" to address the law.

# Appendix F: RONS and MMS Lists

## Table 1: Refuge Operating Needs System, Tier 1 Projects

| Project No. | Project Title | Cost Estimate (Thousands) |
|---|---|---|
| 97009 | Improve Refuge Public Use and Outreach (Outdoor Recreation Planner) | $128 |
| 97007 | Improve Refuge Operations at Meredosia NWR (Manager) | $128 |
| 99005 | Improve Resources Data Analysis on Illinois River Refuges (Biologist) | $139 |
| 99018 | Enhance Operations of Meredosia NWR (Maintenance Worker) | $119 |
| 97003 | Meredosia NWR Prairie Restoration on Shearl and Skinner Tracts | $54 |
| 99011 | Construct Accessible Platform at Chautauqua NWR | $26.6 |
| 97011 | Enhance Administrative Support (Administrative Technician) | $110 |
| 99004 | Improve Entrance Road to Illinois River NW&FR Headquarters | $214 |
| 00005 | Restore Bottomland Forest Within the Emiquon NWR | $162 |
| *Totals:* | | $1,080,6000 |

**Top Ranked MMS Items Greater than $100,000**

| Number | Description | Amount ($) |
|---|---|---|
| 99109716 | Replace deficient shop facilities (Chautauqua NWR) | $481 |
| 04133337 | Replace worn out pump station electric pump motor (Chautauqua NWR) | $150 |
| 04133191 | Remove trees and repair erosion on perimeter low hazard dam (Chautauqua NWR) | $350 |
| 02118914 | CN Headquarters entrance road, FHWA Rout No. 010 (Chautauqua NWR) | $100 |
| 01109354 | Replace John Deere Tracked Excavator | $152 |
| 04133336 | Replace John Deere 750 Dozer | $134 |
| 01111063 | Replace Champion 710A Road Grader | $111 |
| 04133335 | Construct water control structures on Liverpool Lake | $250 |
| 01122986 | Restoration of Liverpool Side Channel and Liverpool Lake Public Hunting Area | $2,600 |
| 02118416 | Repair pump station and other water management facilities (South Globe) (Emiquon NWR) | $182 |
| 02118415 | Rehabilitate erosion on perimeter levee on the Old Globe Drainage District (Emiquon NWR) | $482 |

# Appendix G: Mailing List

# Appendix G: Mailing List

The following is an initial list of elected officials, government offices, private organizations, and individuals who will receive notice of the availability of the draft CCP. We continue to add to this list.

**Elected Officials**

Gov. Rod R. Blagojevich
Sen. Peter Fitzgerald
Sen. Richard Durbin
Rep. Ray LaHood
Rep. Lane Evans

**Local Government**
City of Havana, Illinois
Mason County, Illinois
Morgan County, Illinois
Cass County, Illinois
Marshall County, Illinois
Fulton County, Illinois

**Government Agencies**

Environmental Protection Agency, Chicago, Illinois
Environmental Protection Agency, Kansas City, Kansas
Holt County FSA, USDA Building
Illinois River National Wildlife and Fish Refuge, Havana, Illinois
Natural Resource Conservation Service, Hardin, Illinois
NRCS District Conservationist, Murphysboro, Illinois
Shawnee National Forest, Murphysboro, Illinois
U.S. Fish and Wildlife Service, Marion, Illinois
U.S. Fish and Wildlife Service ES Office, Rock Island, Illinois
Illinois State Police
Illinois Department of Natural Resources
Pere Marquette State Park, Grafton, Illinois
Shawnee Resource Conservation, Marion, Illinois
University of Illinois, State Extension Office, Urbana, Illinois

**Organizations**

Bassmasters
Ducks Unlimited
Great Rivers Chapter, Illinois Audubon Society
Illinois EcoWatch
Illinois Rivers Project
Ilinois Wildlife Foundation
Illinois-Indian Sea Grant College
Izaak Walton League of America, Inc.
Illinois Federation of Outdoor Resources
Migratory Waterfowl Hunters, Inc.
National Audobon Society

National Wildlife Foundation
The Nature Conservancy
Nature Institute
Northeast Midwest Institute
Partners for Wetlands
Sierra Club
Southwestern Illinois Resource
American Fisheries Society
American Fisheries Society, Illinois Chapter
Clean Water Fund
Conservation Fund
Illinois Audubon Society
Illinois Bass Chapter Federation
Illinois Chapter Federation
Illinois Environmental Council
Illinois Natural Heritage Foundation
National Waterways Conference
National Wildlife Refuge Association
Natural Resources Council
Sierra Club
Wildlife Management Institute

# Appendix H: List of Preparers

## Appendix H: List of Preparers

Ross Adams
Project Leader, U.S. Fish and Wildlife Service, Illinois River National Wildlife and Fish Refuge Complex, Havana, Il. Responsible for public involvement and CCP and environmental assessment preparation and review (overall).

Gabriel DeAllesio
Biologist/GIS, Regional Office, Branch of Ascertainment and Planning. Responsible for preparing figures and maps used in the draft EA and CCP.

Ron Fisher
Assistant Project Leader, U.S. Fish and Wildlife Service, Illinois River National Wildlife and Fish Refuge Complex, Havana, Il. Responsible for public involvement and CCP and environmental assessment preparation and review (overall).

Jeff Gosse
Regional National Environmental Policy Act Coordinator, U.S. Fish and Wildlife Service, Great Lakes-Big Rivers Regional Office, Fort Snelling, Minnesota. Responsible for CCP and environmental assessment review and editing and NEPA compliance.

Dean Granholm
Refuge Planner, Regional Office, Branch of Ascertainment and Planning. Responsible for writing and editing draft EA.

Jane Hodgins
Technical Writer/Editor, U.S. Fish and Wildlife Service, Great Lakes-Big Rivers Regional Office, Fort Snelling, MN. Responsible for CCP and environmental assessment review and editing.

Liz Jones
Wildlife Biologist, U.S. Fish and Wildlife Service
Contributed to writing the draft CCP.

Sean Killen
Cartographer, U.S. Fish and Wildlife Service, Great Lakes-Big Rivers Regional Office, Fort Snelling, MN. Responsible for GIS development and maps.

Thomas V. Lerczak
Natural Areas Preservation Specialist, Illinois Nature Preserves Commission, Havana, Illinois. Responsible for CCP editing and review.

Thomas Larson
Chief of Ascertainment and Planning, U.S. Fish and Wildlife Service, Great Lakes-Big Rivers Regional Office, Fort Snelling, MN. Responsible for CCP and environmental assessment review.

Thomas Magnuson
Fish and Wildlife Biologist (Project Manager), U.S. Fish and Wildlife Service, Great Lakes-Big Rivers Regional Office, Fort Snelling, MN. Responsible for public involvement and CCP and environmental assessment preparation and review (overall).

Jane Lardy Nelson
Editorial Assistant, Regional Office, Branch of Ascertainment and Planning. Contributed to revising the draft EA.

Georgia Parham
Outreach Coordinator, U.S. Fish and Wildlife Service, Ecological Services Field Office, Bloomington, Indiana. Responsible outreach and media relations.

Robert Russell
Wildlife Biologist, U.S. Fish and Wildlife Service, Office of Migratory Birds and State Programs, Great Lakes-Big Rivers Regional Office. Responsible for CCP/EA editing and review.

John Schomaker
Refuge Planning Specialist, U.S. Fish and Wildlife Office, Branch of Ascertainment and Planning. Responsible for writing and editing draft EA.

Tom Worthington
Chief, Refuge Operations, U.S. Fish and Wildlife Service, Great Lakes-Big Rivers Regional Office, Fort Snelling, MN. Responsible for CCP and environmental assessment development (Visitor Services).

# Appendix I: Resource Conservation Priority List

# Appendix I: Resource Conservation Priority List

In September 1999, in response to the Government Performance and Results Act (GPRA), Region 3 published a document entitled Fish and wildlife resource Conservation Priorities, Region 3 (RCPs). the RCP document contains 182 species considered to be in the greatest need of attention under the Service's full span of authorities. The strategies identified in the document will contribute to the conservation, protection and recovery of migratory birds, threatened and endangered species, and interjurisidctional fish as well as the habits on which they depend, this fulfilling the Service's mission. Benefits of identifying RCPs include:

Assisting employees in prioritizing workloads and opportunities.
Focusing application of the Service's many fish and wildlife conservation tools.
Identifying research priorities and training needs.
Preparation of Refuge comprehensive conservation plans and ecosystem plans.
Developing budgets.

Consideration of RCPs in day-to-day activities will lead to protection, enhancement, and restoration of the most important Regional resources through the efficient and wise application of the Service's people and funding.

**Regional Conservation Priority (RCP) Species Likely to Occur in the Vicinity of the Illinois River Refuges**

| COMMON NAME | SCIENTIFIC NAME | FEDERAL STATUS/ INTEREST |
|---|---|---|
| BIRDS | | |
| Double-crested Cormorant | Phalacrocorax auritus | |
| American Bittern | Botaurus lentiginosus | Rare/declining |
| Least Bittern | Ixobrychus exilis | Rare/declining |
| Canada Goose - Giant Population | Branta canadensis | |
| Canada Goose - Urban Giants | Branta canadensis | |
| Trumpeter Swan | Cygnus buccinator | Rare/declining |
| Wood Duck | Aix sponsa | |
| Mallard | Anas platyrhynchos | |
| Blue-winged Teal | Anas discors | |
| Canvasback | Aythya valisineria | |
| Bald Eagle | Haliaeetus leucocephalus | Threatened |
| Northern Goshawk | Accipiter gentilis | Rare/declining |
| Red-shouldered Hawk | Buteo lineatus | Rare/declining |
| American Woodcock | Scolopax minor | Rare/declining |
| Least Tern - Interior Population | Sterna antillarum | Endangered |
| Black Tern | Chlidonias niger | Rare/declining |
| Loggerhead Shrike | Lanius ludovicianus | Rare/declining |
| Wood Thrush | Hylocichla mustelina | Rare/declining |
| Cerulean Warbler | Dendroica cerulea | Rare/declining |
| Grasshopper Sparrow | Ammodramus savannarum | Rare/declining |
| Dickcissel | Spiza americana | Rare/declining |
| Bobolink | Dolichonyx oryzivorus | Rare/declining |
| Eastern Meadowlark | Sturnella magna | Rare/declining |
| Peregrine Falcon | Falco peregrinis anatum | Endangered |
| Common Loon | Gavia immer | Rare/declining |
| Lesser Scaup | Aythya affinis | Rare/declining |
| Northern Harrier | Circus cyaneus | Rare/declining |
| Upland Sandpiper | Bartramia longicauda | Rare/declining |
| Red-headed Woodpecker | Melanerpes erythrocephalus | Rare/declining |
| Northern Flicker | Colaptes auratus | Rare/declining |
| Bell's Vireo | Vireo bellii | Rare/declining |
| Blue-winged Warbler | Vermivora pinus | Rare/declining |
| Field Sparrow | Spizella pusilla | Rare/declining |
| King Rail | Rallus elegans | Rare/declining |
| Common Moorhen | Gallinula chloropus | Rare/declining |
| Greater Yellowlegs | Tringa flavipes | Rare/declining |
| Whimbrel | Numenius phaeopus | Rare/declining |
| Hudsonian Godwit | Limosa haemastica | Rare/declining |
| Marbled Godwit | Limosa fedoa | Rare/declining |
| Stilt Sandpiper | Calidris himantopus | Rare/declining |
| Buff-breasted Sandpiper | Trygites subruficollis | Rare/declining |
| Short-billed Dowitcher | Limnodromus griseus | Rare/declining |
| Wilson"S Phalarope | Phalaropus tricolor | Rare/declining |
| Forster's Tern | Sterna forsteri | Rare/declining |

| | | |
|---|---|---|
| Black-billed Cuckoo | Coccyzus erythropthalmus | Rare/declining |
| Whip-poor-will | Caprimulgus vociferus | Rare/declining |
| Acadian Flycatcher | Empidonax virescens | Rare/declining |
| Prothonotary Warbler | Protonotaria citrea | Rare/declining |
| Louisiana Waterthrush | Seiurus motacilla | Rare/declining |
| Canada Warbler | Wilsonia canadensis | Rare/declining |
| Le Conte's Sparrow | Ammodramus leconteii | Rare/declining |
| Western Meadowlark | Sturnella neglecta | Rare/declining |
| Rusty Blackbird | Euphagus carolinus | Rare/declining |
| Orchard Oriole | Icterus spurius | Rare/declining |
| | | |
| FISH | | |
| Lake sturgeon - Inland population | Acipenser fulvescens | Rare/declining |
| Pallid sturgeon | Scaphirhynchus albus | Endangered |
| Shovelnose sturgeon | Scaphirhynchus platorynchus | |
| Paddlefish | Polyodon spathula | Rare/declining |
| Plains minnow | Hybognathus placitus | Rare/declining |
| Blue sucker | Cycleptus elongatus | Rare/declining |
| Flathead chub | Hybopsis gracilis | Rare/declining |
| Bighead carp | Hypophthalmichthys nobilis | |
| Grass carp | Ctenopharyngodon idella | |
| | | |
| MUSSSELS | | |
| Black sandshell | Ligumia recta | Rare/declining |
| Elktoe | Alasmidonta marginata | Rare/declining |
| Fat pocketbook | Potamilus capax | Endangered |
| Higgins' eye pearlymussel | Lampsilis higginsi | Endangered |
| Mapleleaf | Quadrula quadrula | |
| Monkeyface | Quadrula metanevra | Rare/declining |
| Pimpleback | Quadrula metanevra | |
| Rock pocketbook | Arcidens confragosus | Rare/declining |
| Round pigtoe | Pleurobema coccineum | Rare/declining |
| Salamander mussel | Simpsonaias ambigua | Rare/declining |
| Scaleshell mussel | Leptodea leptodon | |
| Sheepnose | Plethobasus cyphyus | Rare/declining |
| Slippershell | Alasmidonta viridis | Rare/declining |
| Snuffbox | Epioblasma triquetra | Rare/declining |
| Spectaclecase | Cumberlandi mondonta | Rare/declining |
| Threeridge | Amblema plicata | |
| Pistolgrip | Tritogonia verrucosa | Rare/declining |
| Washboard | Megalonaias nervosa | |
| Asiatic clam | Corbicula fluminea | |
| Zebra mussel | Dreissena polymorpha | |
| | | |
| PLANTS | | |
| Decurrent false aster | Boltonia decurrens | Threatened |

# Appendix J: References

# Appendix J: References


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# Appendix K: Summary and Disposition of Comments on Draft CCP

# Appendix K: Summary and Disposition of Comments on Draft Comprehensive Conservation Plan

The Illinois Department of Natural Resources, three organizations, and ten individuals commented on the Draft Comprehensive Conservation Plan. The following organizations submitted comments: Emiquon Audubon (A Chapter of the Illinois Audubon Society), Ducks Unlimited, The Nature Conservancy.

We considered the comments as we prepared the final Comprehensive Conservation Plan. The following paragraphs summarize the comments and our response. In addition to the comments, some reviewers noted typographical errors and minor editing needs. We thank the reviewers for catching these errors and we have corrected them.

## Water Management

The State commented that the management of Meredosia Lake and the associated weir is not addressed in the plan and more detail should be provided. Meredosia Lake is a meandered lake and the State claims ownership of the lake and controls the weir. Management of the lake is not the Service's responsibility. We will cooperate and provide technical expertise, as requested, in aiding in the State's management of the area.

Our management of the Quiver Creek water control structure on Lake Chautauqua was an issue raised during scoping and addressed in the environmental assessment. Some individuals disagreed, others agreed, with our decision to not maintain open water beyond natural freeze-up in an effort to keep waterfowl in the area. We expect to keep the management outlined in the CCP.

## Habitat Management

The State suggested that the State, The Nature Conservancy, and the Service work jointly to develop management plans for the lands owned by The Nature Conservancy at Emiquon and Spunky Bottoms. We will continue to work cooperatively in these particular areas and the river basin, in general. With respect to The Nature Conservancy lands, at their request we will continue to serve on their science advisory board and provide technical expertise to assist them in making their management decisions. Because The Nature Conservancy owns the land, they are the lead in how it will be managed.

The State asked that the Service consult with a state biologist before using any biological control agent in pest management. We have added a sentence to the strategy of integrated pest management that says we will consult with a state biologist before using a biological control agent.

An organization encouraged us to include wildlife, as well as habitat, objectives in the plan. We have chosen not to include wildlife objectives because so many factors beyond our control affect whether or not they are achieved. Our reason-

ing is that we can manipulate the habitat and that if we achieve our habitat objectives, then wildlife will be provided for.

An individual thought that we should not manage the refuge to provide food for waterfowl, because the ducks will not leave the refuge when there is adequate food and their availability to hunters is reduced. We understand the purpose of the refuge is to provide feeding and resting habitat for waterfowl and other migratory birds. We think the goals and objectives of the CCP reflect that purpose.

### Wildlife Management

An individual suggested that we control beaver on the refuges. Another suggested that we implement deer control at Meredosia NWR. We currently issue special use permits to control beaver to address management needs. We plan to continue beaver control through the issuance of permits. We agree that deer control is needed. We will address this need in the revision of the Hunting Plan.

### Listed Species

The State questioned some of the strategies associated with protection of Bald Eagles and water management and reforestation. We have deleted or changed the strategies to address the questions raised by the State. We will, of course, continue, to protect the Bald Eagle, as required by law. The State recommended that we add a strategy that incorporates site disturbance as a strategy for the management of decurrent false aster. We recognize that disturbance is a possible management technique, which is being evaluated by a cooperating researcher on the Refuge. We expect to implement the best strategy for management of the decurrent false aster based on scientific evaluations. We have modified the strategy in the CCP to indicate explicitly that disturbance is a possible technique that is being considered.

### Visitor Services Management

The State commented that the plan was not clear about whether or not currently planned strategies would be implemented in the draft plan as well. The State suggested that the plan should clearly state that the draft plan will substantially expand the hunting and fishing opportunities beyond 2003 levels. We have edited the environmental assessment to indicate that currently planned activities would be implemented in the CCP. We think that rather than make a general statement about expansion of hunting and fishing opportunities, the specific strategies 4, 5, 6, 7, 8, 9, 12, and13 under the Wildlife Dependent Recreation Objective that detail the expansion of hunting and fishing opportunities does a better job of communicating the expansion of the program.

Two organizations commented and made detailed recommendations about facility development on the Refuges. These comments will be considered when the more specific Visitor Services Plan is written.

## Land Acquisition and Focus Area

One organization expressed disappointment that the Service was not proposing an expansion of the authorized boundary. One individual thought we should not acquire any more land. Another organization would like to see an expanded refuge focus area. Our intent is to complete acquisition within our current boundaries before further expansion. And, the more limited focus area outlined in the plan will allow us to concentrate our efforts. As with all aspects of the plan, we will continue to evaluate our position through adaptive management principles throughout the life of the plan.