United States Department of the Interior

FISH AND WILDLIFE SERVICE
Bishop Henry Whipple Federal Building
1 Federal Drive
Fort Snelling, MN 55111-4056

IN REPLY REFER TO:

FWS/ARW/RE-AP

AUG 16 [illegible]

Dear Reviewer:

The U.S. Fish and Wildlife Service (Service) is pleased to provide you with this copy of the Environmental Assessment (EA) and Finding of No Significant Impact for the proposed Grand Kankakee Marsh National Wildlife Refuge located in the Kankakee River Basin (Basin) in northwestern Indiana and northeastern Illinois.

The EA describes and assesses five alternatives, including a "No Action" alternative. The alternatives describe the Service's level of involvement in restoration and preservation of valuable fisheries and wildlife resources and their habitats in the Basin. The Service's proposed action would provide a mixture of activities in habitat management, watershed stewardship, and public use, while providing, to the extent possible, that the widest spectrum of benefits associated with this great area be enhanced and made available to the public.

Included in the front of the EA is the Selection of Alternative and Finding of No Significant Impact, which was based on public input and the analysis of the opportunities and concerns illustrated in the EA.

The Service recognizes that there is rarely total consensus on issues of fish and wildlife resource management, and this project has certainly been no exception. However, we feel this project will provide lasting benefits to fish, wildlife, and the people of this Nation.

We appreciate the efforts of those who contributed to the planning and public involvement process which made this project a reality.

Sincerely,

William F. Hartwig
Regional Director

Enclosure

Selection of Alternative and Finding of No Significant Impact

Grand Kankakee Marsh National Wildlife Refuge Indiana and Illinois

An Environmental Assessment (EA) has been prepared to publicly disclose the possible environmental consequences that development of the Grand Kankakee Marsh National Wildlife Refuge in the Kankakee River Basin (Basin) could have on the quality of the physical, biological, and human environment, as required by the National Environmental Policy Act of 1969.

The EA presents and evaluates five alternatives, a "No Action" alternative (maintain the status quo) and four "Action" alternatives. The alternative selected for implementation is Alternative 5.

This Finding of No Significant Impact (FONSI), EA, and supporting material will be made available to the public for 30 days from the date below. During this 30-day period the FONSI will not be final, nor will the U.S. Fish and Wildlife Service implement the selected alternative.

Restoring, preserving, and managing upland, wetland, and riparian habitats by the U.S. Fish and Wildlife Service in the Basin will provide important benefits to threatened and endangered species, waterfowl and other migratory birds, native fish, and resident flora and fauna, as well as provide the public with additional wildlife-dependent recreation and education opportunities.

For reasons presented below and based on an evaluation of the information contained in the Environmental Assessment, we have determined that Alternative 5 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.

Reasons:

1. Economic impacts will be negligible compared to the overall economic base of the Basin.
2. Land acquisition will be from willing sellers only.
3. Where Service fee-title acquisition is concerned, annual revenue sharing payments will be made to the counties to help off-set potential impacts to the tax base.
4. Cultural resource inventory surveys are planned to ensure protection of archeological, historical, and architectural resources.
5. This action will not have an adverse impact on threatened or endangered species.
6. This action will not adversely impact drainage networks.

7. This action will not adversely impact floodplains.
8. This action will not adversely impact other planning efforts in the Basin.

Supporting References:

Environmental Assessment
Economic Impact Assessment

Regional Director

August 16, 1999
Date

U.S. FISH & WILDLIFE SERVICE

DEPARTMENT OF THE INTERIOR

Regional Director
Great Lakes - Big Rivers Region
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SUMMARY

Introduction

In 1996 the Service initiated a planning process aimed at evaluating the feasibility of developing a new national wildlife refuge in the Kankakee River Basin (Basin) in northwestern Indiana and northeastern Illinois (Figure 1). The process included a thorough review of opportunities and issues related to fish and wildlife resource management by the Service in the Basin as well as an assessment of roles the Service might take in achieving its mission, that of the National Wildlife Refuge System, and resource objectives for the Region. The planning process was initiated in response to the declining status of numerous Service trust resources in the Basin.

Project Scoping and Public Involvement

Numerous Federal, state, local, and private entities were involved in the planning process. These include Indiana's and Illinois' Congressional Delegations, the U.S. Department of Agriculture, U.S. Department of Interior, Indiana and Illinois Legislative members representing the counties involved, Indiana Department of Natural Resources, Illinois Department of Natural Resources, representatives from County, Township, and other local governments, representatives of national, state, and local conservation organizations, Farm Bureau, landowners, and many other interested groups and citizens.

Information about the proposed project was provided to the general public through news-releases, presentations, interviews, seven newsletters, one-on-one briefings, and the Internet. Over 5,000 copies of the draft environmental assessment were distributed for a 150-day public review and comment period. The Service coordinated its public involvement effort closely, and corresponded frequently with many of the aforementioned entities. To-date, more than 14,000 people from 44 different states have commented on this Refuge proposal (Figure 7).

Public comments covered a wide range of potential opportunities, issues, and concerns. Many comments encouraged the development of a new national wildlife refuge, while others cited potential conflicts that would need to be addressed before the Refuge proposal moved forward. Some of these opportunities, issues, and concerns included: if developed, what effect would the Refuge have on: 1) biological diversity and abundance; 2) water quality in the Kankakee River; 3) drainage, runoff, and flood control within the Basin; 4) county tax revenues and refuge revenue sharing payments and apportionment; 5) local economies; 6) private property rights; 7) infrastructure, 8) mosquitos; 9) other planning efforts in the Basin; 10) agricultural land, and 11) environmental justice.

Proposed Action

The Service's proposed action in this environmental assessment is to develop the Grand Kankakee Marsh National Wildlife Refuge "*for the development, advancement, management, conservation, and protection of fish and wildlife resources*" (Fish and Wildlife Act of 1956) and "*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...*"(Emergency Wetlands Resources Act of 1986).

The following Refuge mission, vision, guiding principles, goals, objectives, and strategies provide an interim framework for the Refuge until a Comprehensive Conservation Plan has been completed (approximately 12-18 months).

The mission for the Refuge will be to protect, restore, and manage ecological processes within the Kankakee River Basin that benefit threatened and endangered species, migratory birds, native fish, and diverse flora and fauna populations, while providing the public, to the extent possible, high quality wildlife-dependent environmental interpretation, education, and recreation experiences that build an understanding and appreciation for these resources, and the role humankind plays in their stewardship.

The Service's vision for the Refuge is to restore and preserve an ecological system that supplies the needs of migratory waterfowl, neotropical migratory songbirds, native fish, native plant communities, and threatened and endangered flora and fauna. The Refuge and its staff will be leaders in building mutually-beneficial relationships with the public and our partners which will lead to a greater understanding and appreciation of the natural world, and the role humankind plays in its stewardship.

Development and management of the Refuge will be guided by the following principles:

- *Use an ecosystem approach*: The ecosystem approach is a collaboratively developed vision of desired future conditions that integrates ecological, scientific, economic, and social factors. It is applied within a geographic framework based primarily on ecological factors.
- *Rely on sound science*: Restoration and preservation of ecological processes will be scientifically sound, ecologically credible, economically and socially acceptable, and legally defensible. Refuge management decisions will be based on sound information from the full range of natural and social sciences.
- *Use adaptive management processes*: An adaptive management approach features a structured, iterative process that recognizes that most information used in decision making is imperfect and that, as decisions are made, a process is in place to gain better information and to allow managers to make appropriate mid-course corrections.
- *Results through partnerships*: Partnership initiatives require extensive coordination and communication between federal agencies; state, tribal, and local governments; and stakeholders and customers.
- *Ensure public involvement*: Refuge planning will include a clear, credible, and meaningful role for public input from the full spectrum of social and cultural backgrounds. Public sentiment and comment at the local, State, and national levels will be considered.

Interim Refuge goals will be consistent with those for the National Wildlife Refuge System. They are:

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

Interim Refuge objectives and strategies will include:
Coordination:

- Provide Service leadership and support to other Federal, state, local, and private agencies for the restoration and preservation of ecological processes in the Basin that benefit migratory birds, threatened and endangered species, native fish, and their habitats (Service trust resources).

- ☞ Foster improved communication and collaboration between Service programs, the states, non-government organizations, and other Federal agencies.
- ☞ Focus Federal, state, and local agencies having related responsibility and/or expertise in the Basin to increase efficiency and develop consistency in natural resource conservation.
- ☞ Accelerate the current status and trends effort toward natural resource restoration and preservation in the Basin through a comprehensive and coordinated system, that complements existing authorities.
- ☞ Intensify and concentrate Federal, state, local, and private habitat restoration and enhancement mechanisms aimed at benefitting Service trust resources in the Basin (such as the Wetland Reserve Program, Conservation Reserve Program, Environmental Quality Incentives Program, Wildlife Habitat Incentives Program, set-aside programs, North American Waterfowl Management Plan, local land trusts, water quality improvement programs, etc.).

Planning

- ☞ Provide a comprehensive statement of Refuge management direction through the development of a Comprehensive Conservation Plan (CCP) and associated step-down management plans (the CCP will replace guidance contained in the draft conceptual management plan).
- ☞ Provide avenues for effective coordination, interaction, and cooperation with affected parties, including Federal agencies, state conservation agencies, tribal governments, local governments, non-government organizations, and landowners.

Research

- ☞ Support, promote, and coordinate scientific research on, and monitoring of, Service trust resources and their habitat, to improve management decision-making.
- ☞ Use expertise from various agencies, universities, and other sources to develop and disseminate knowledge about natural resources and human uses and values associated with those resources.

Habitat Restoration and Management

- ☞ Through a combination of voluntary partnerships, easements, and land acquisition, restore and preserve approximately 30,000 acres of wetlands, prairies, and oak savanna habitat to meet the needs of migratory birds, threatened and endangered species, and aquatic resources in the Basin (willing buyer/willing seller only).
- ☞ Leverage Service restoration and preservation efforts by connecting or enlarging existing managed areas.
- ☞ Restore backwater habitats and reconnect side channels that have been artificially cut-off on the Kankakee River to promote biological diversity and rehabilitate fish spawning, nursery, and overwintering areas.
- ☞ Enhance migratory bird production and use of the area by restoring, enhancing, and managing wetland, savanna, and prairie habitats.
- ☞ Restore and manage areas at the landscape scale to provide the most favorable matrix possible for the refuge and other protected areas (see Noss and Harris 1986, O"Connell and Noss 1992, Missouri Dept. of Conservation 1994).
- ☞ Intensify the Service's Partner's for Fish and Wildlife habitat restoration efforts and identify new opportunities to restore wetlands and grasslands on private lands.

Education and Interpretation

- ☞ Expand public awareness, understanding, appreciation, and stewardship of the Basin's natural resources through high quality wildlife-dependent public interpretive and recreation programs.
- ☞ Establish Refuge outreach programs to develop a more involved citizenry in support of fish and wildlife conservation.

Successful Refuge development will rely on partnerships formed with landowners in the Basin, volunteers and interested citizens, farm and conservation organizations, and other government agencies. Restoration and preservation of habitat by the Service would be on a willing buyer/willing seller basis only. Only lands that the Service acquires would become part of the Refuge. All lands acquired by the Service would be managed as units of the Grand Kankakee Marsh National Wildlife Refuge. Funding for Service land acquisition would be the Land and Water Conservation Fund and the Migratory Bird Conservation Fund.

Alternatives

The Service formulated five alternatives (four Action and one No Action) to develop a new national wildlife refuge in the Basin. For each Action alternative, the Service identified a set of "focus areas" which constitute subsets of the Basin (Figures A, B, C)(see Chapter 2 also). In this regard focus areas are the first cut in a planning process aimed at narrowing down high potential geographic areas with significant resource value in the Great Lakes-Big Rivers Region, ie. ⇨ Kankakee River Basin ⇨ focus area ⇨ individual refuge units. However, focus areas are not Refuge boundaries. Refuge boundaries would ultimately conform to individual land tracts as they are purchased from willing sellers within the focus areas. The aim of all action alternatives is to develop a new national wildlife refuge to restore and preserve Service trust resources through a landscape-scale approach in the Kankakee River Basin. The No Action alternative reflects the current state of conservation activity (status quo) within the Basin.

Common to all Action alternatives is the development of a Comprehensive Conservation Plan that the Service will complete with partner organizations and the public to determine how best to implement National Wildlife Refuge System projects and programs within the focus areas. In addition to continued public involvement, this step-down planning process will involve hydrologic and ecologic planning with partners such as the Army Corp of Engineers, the U.S. Geological Survey, State DNR's, and others to ensure Service activities will meet habitat and wildlife objectives set for the area, complement other programs and on-going planning efforts, and be responsive to concerns of landowners in the Basin.

Alternative 1 - No Action, the Service would not develop the Grand Kankakee Marsh National Wildlife Refuge. Restoration and preservation activities in the Basin on behalf of Service trust resources would be expected to proceed at the status quo.
Alternative 2 - through voluntary partnerships, easements, and land acquisition, restore and preserve approximately 30,000 acres (primarily wetlands) in the Basin. This alternative would focus mainly on existing and restorable wetland habitats (Figure 9).
Alternative 3 - through voluntary partnerships, easements, and land acquisition, restore and preserve approximately 30,000 acres (primarily prairie and oak savanna) in the Basin. This alternative would focus mainly on existing and restorable grasslands and important oak-savanna habitat (Figure 10).
Alternative 4 - through voluntary partnerships, easements, and land acquisition, restore and preserve approximately 30,000 acres (primarily endangered species habitat) in the Basin. This alternative would focus on the protection of Federally endangered and threatened species habitat (Figure 11).
Alternative 5 - through voluntary partnerships, easements, and land acquisition restore and preserve approximately 30,000 acres within the Basin. Alternative 5 would be a "hybrid" of alternatives 2-4 (select components of Alternatives 2-4) and is the Service's Preferred Alternative (Figure 12).

Environmental Consequences

Potential environmental consequences or impacts of the No Action alternative and the four Action alternatives with regard to the opportunities and issues are discussed in Chapter 4 of the EA.

CHAPTER 1 - PURPOSE AND NEED FOR ACTION

I. PURPOSE

Pursuant to the National Environmental Policy Act of 1969 (NEPA) (P.L. 91-190, as amended), this Environmental Assessment (EA) has been prepared to identify and publicly disclose the possible environmental consequences that development of the Grand Kankakee Marsh National Wildlife Refuge (Refuge) by the U.S. Fish and Wildlife Service (Service) could have on the quality of the physical, biological, and human environment. The Refuge will be located in the 3.3 million acre Kankakee River Basin in northwestern Indiana and northeastern Illinois (Figure 1).

Figure 1 - Kankakee River Basin

Using the authorities of the Fish and Wildlife Act of 1956 and the Emergency Wetlands Resources Act of 1986, the purpose(s) of the Refuge is "*for the development, advancement, management, conservation, and protection of fish and wildlife resources*" (Fish and Wildlife Act of 1956) and "*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...*"(Emergency Wetlands Resources Act of 1986).

II. BACKGROUND

1. The U.S. Fish and Wildlife Service

The U.S. Fish and Wildlife Service is the Nation's primary Federal agency responsible for conserving, protecting, and enhancing America's fish and wildlife resources and their habitats.

Authority

The authority of the Director, U.S. Fish and Wildlife Service, as delegated by the Assistant Secretary for Fish, Wildlife, and Parks (U.S. Department of the Interior), is set forth in Part 242 of the Departmental Manual (see Fish and Wildlife Service Manual at our Internet site at *www.fws.gov.*)

Mission of the 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.*

Goals of the Service

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

Objectives of the Service

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

Functions of the Service

- Acquire, protect, and manage unique ecosystems necessary to sustain fish and wildlife such as migratory birds, resident species, and endangered species.
- Operate a National Fish Hatchery System in support of the restoration of depleted interjurisdictional fish stocks, the recovery of federally listed threatened and endangered species, and the fulfillment of Federal mitigation responsibilities.
- Provide protection of fish and wildlife from dislocation or destruction of their habitats, overuse, and industrial, agricultural, and domestic pollutants.
- Render financial and professional technical assistance to States through Federal Aid programs for the enhancement and restoration of fish and wildlife resources.
- Conduct programs of enforcement, management, and professional technical assistance to other agencies for the protection of endangered species.
- Promulgate and enforce regulations for the protection of migratory birds, marine mammals, fish and other non-endangered wildlife from illegal taking, transportation, or sale within the United States or from foreign countries.
- Conduct programs of planning, evaluation, and professional technical assistance to other agencies for the proper use and protection of fish and wildlife habitat that directly benefit the living natural resource and add quality to human life.

- Conduct programs of interpretation, education, and recreation to foster a stewardship ethic in the

- Conduct programs of interpretation, education, and recreation to foster a stewardship ethic in the American public through high quality fish and wildlife oriented experiences.
- Communicate information essential for public awareness and understanding of the importance of fish and wildlife resources and interprets fish and wildlife changes reflecting environmental degradation that ultimately will affect the welfare of human beings.

The Service manages over 500 national wildlife refuges, 66 national fish hatcheries, and 78 ecological services field offices nationwide. The Kankakee River Basin is located in the Great Lakes-Big Rivers Region (Region) of the Service, which includes the states of Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Ohio, and Wisconsin. The Region manages 1.2 million acres of land and water on 46 national wildlife refuges and 9 wetland management districts, including more than 240,000 acres in waterfowl production areas. The Region also manages 6 national fish hatcheries, 9 fisheries stations, 10 ecological services field offices, and 18 law enforcement field offices (Figure 2).

By law and treaty, the Service has national and international management and law enforcement responsibilities for migratory birds, threatened and endangered species, interjuristictional fish, and certain marine mammals.

U.S. Fish and Wildlife Service

Ecosystems - Region 3

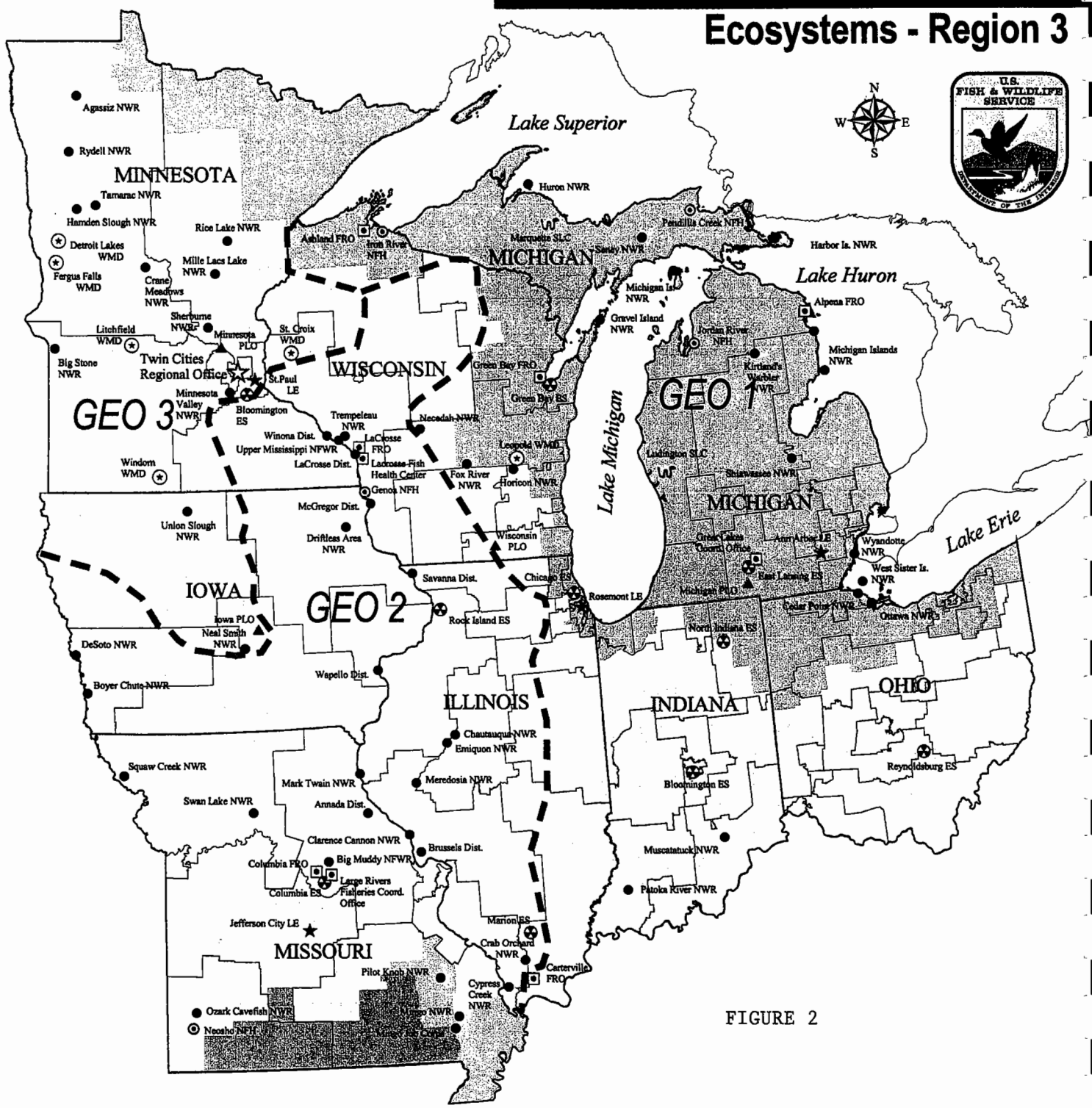


FIGURE 2

Ecosystems of USFWS Region 3
- Great Lakes
- Upper Mississippi River / Tallgrass Prairie
- Mississippi Headwaters / Tallgrass Prairie
- Ohio River Valley
- Lower Missouri River
- Lower Mississippi River
- Ozark Watersheds
- Arkansas / Red Rivers

0 100 200 Miles

U.S. Fish and Wildlife Service Facilities
- National Wildlife Refuge
- Ecological Services
- Fisheries Resource Office
- National Fish Hatchery
- Sea Lamprey Control
- Law Enforcement
- Private Land Office
- Wetland Management District HQ
- Congressional Districts

Map Produced in the Division of Realty - May 1999

2. The National Wildlife Refuge System

The National Wildlife Refuge System is the world's largest and most diverse collection of lands 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 bird sanctuary.

Today, over 500 national wildlife refuges have been established from the Arctic Ocean to the South Pacific, from Maine to the Caribbean. Varying in size from a half-acre parcel to thousands of square miles, they encompass more than 92 million acres of the nation's best wildlife habitats (Figure 3).

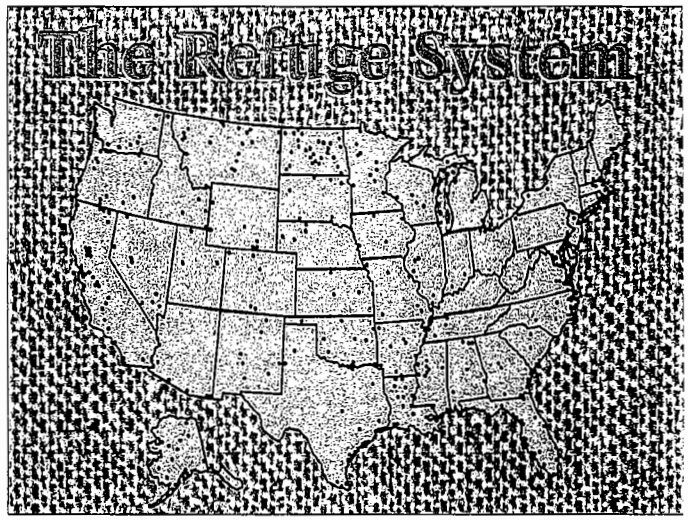


Figure 3 - The National Wildlife Refuge System

Like Pelican Island, many early wildlife refuges were created for herons, egrets, and other water birds. Others were set aside for large mammals like elk and bison. But by far the most have been created to protect migratory 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.

National wildlife refuges also play a vital role in preserving endangered and threatened species and their habitats. Among the refuges that are well known for providing endangered species habitat are Aransas in Texas, the winter home of the whooping crane; the Florida Panther refuge, which protects one of the nation's most endangered mammals; and the Hawaiian Islands refuge, home of the Laysan duck, monk seal, and many other unique species.

National wildlife refuges offer the public a wide variety of wildlife-dependent recreational and educational opportunities. Many refuges have fishing and hunting programs, visitor centers, wildlife trails, and environmental education programs.

Nationwide, some 34 million visitors annually hunt, fish, observe, and photograph wildlife or participate in wildlife-dependent interpretive activities on Service national wildlife refuges.

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.*

Goals of the National Wildlife Refuge System

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

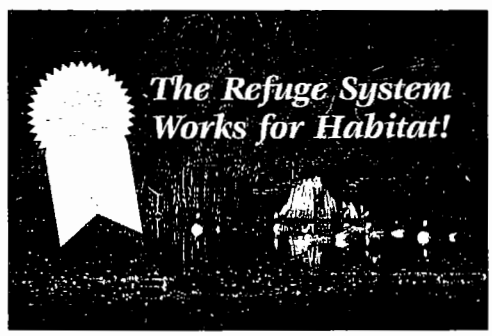
National Wildlife Refuge System Guiding Principles

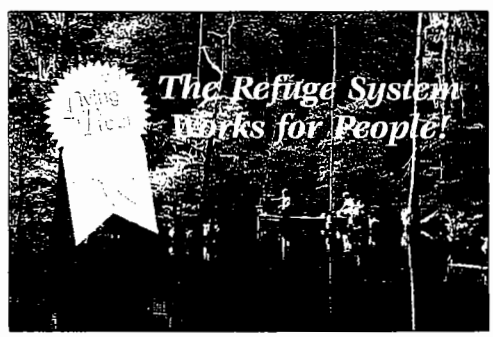
- *Habitat:* Fish and wildlife will not prosper without high quality habitat, and without fish and wildlife, traditional uses of refuges cannot be sustained. The Refuge System will continue to conserve and enhance the quality and diversity of fish and wildlife habitat within refuges.

- *Public Use:* The Refuge System provides important opportunities for compatible wildlife-dependent recreational activities involving hunting, fishing, wildlife observation and photography, and environmental education and interpretation.

- *Partnerships:* America's sportsmen and women were the first partners who insisted on protecting valuable wildlife habitat with wildlife refuges. Conservation partnerships with other Federal agencies, state agencies, tribes, organization, industry, and the general public can make significant contributions to the growth and management of the Refuge System.

- *Public Involvement:* The public should be given full and open opportunity to participate in decisions regarding the acquisition and management of our national wildlife refuges.





III. NEED FOR ACTION

The need for fish and wildlife restoration, preservation, and management in the Basin by the Service has been made clear by the declining status of numerous Service trust resources and studies that indicate habitat loss and degradation are common causal factors in those declines.

1. Grasslands and Associated Species Declines

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 twelve states and one Canadian province since European settlement. Loss and fragmentation of prairie landscapes combined with changes in natural processes have had negative consequences for many grassland plants and associated animals

Tallgrass prairie habitat once dominated the landscape from western Indiana to the eastern portions of Kansas, Nebraska, and North and South Dakota and south to Oklahoma and Texas. Today less than 1 percent of original tallgrass prairie remains in the Basin.

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 Basin, agricultural grassland are at their lowest level in more than 100 years (Figure 4).

Consequently, grassland-dependent birds have shown steeper, more consistent, and geographically more widespread declines (25-65%) than any other group of North American birds (Samson and Knopf 1994).

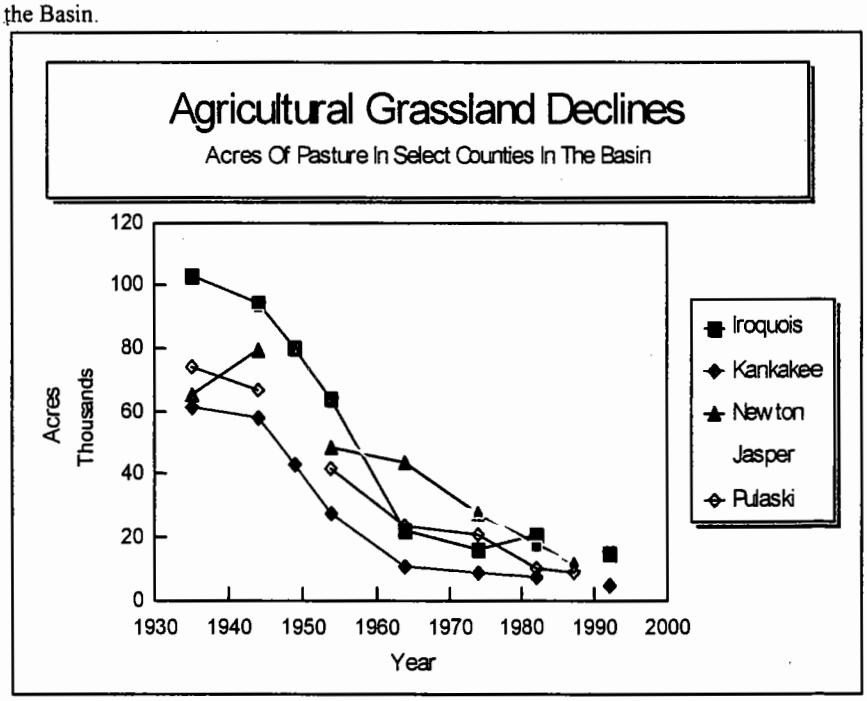
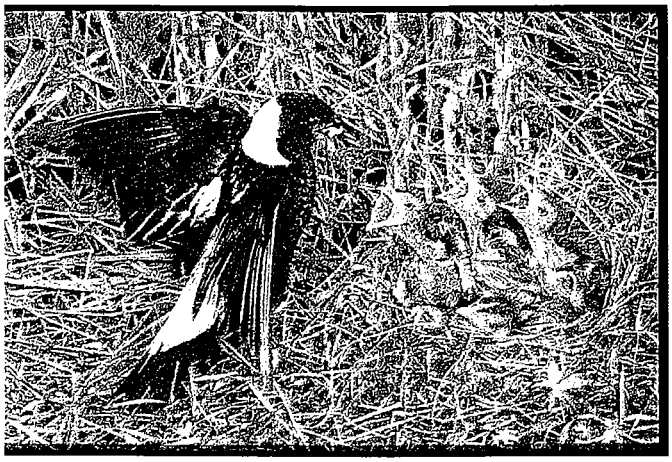


Figure 4 - Agricultural grasslands (on average) have declined throughout the Basin over the past 50 years.



The bobolink is one of several migratory grassland bird pecies that have shown severe declines in recent years as a esult of habitat loss and degradation in the region.

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).

Breeding Bird Surveys for the Great Lakes-Big Rivers Region indicate that grassland-nesting non-game species such as the grasshopper sparrow (-5.5%), dickcissel (-3.6%), bobolink (-3.3%), Henslow's sparrow (-7.6%), vesper sparrow (-1.7%), savannah sparrow (-1.1%), lark sparrow (-2.7%), field sparrow (-3.0%), eastern meadowlark (-2.9%) and western meadowlark (-4.0%) have shown significant average annual declines since the mid-1960's (National Biological Survey 1995).

Until the 1950's, 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 (Figure 4), 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 Basin is highly fragmented and dominated by human activity (the process by which habitats are broken up into smaller isolated parcels is called habitat fragmentation). Without proper management, these 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. Habitat fragmentation diminishes habitat suitable for area-sensitive species, like the bobolink. Herkert (1991) considered 10-30 ha the bobolink's minimum area requirements (minimum amount of contiguous grassland habitat required before an area will be occupied by a species). Habitat size, shape, and amount and type of edge are important factors in the reproductive success of many grassland birds. Restoration and preservation of ecosystem structure and function requires management actions to mitigate or reverse the effects of human-induced influences.

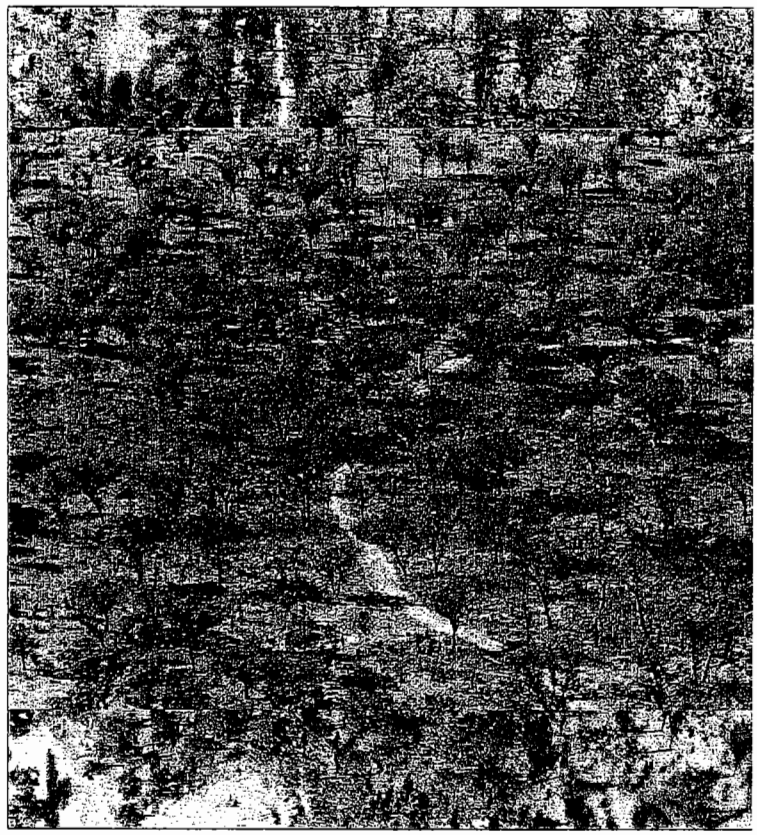
Red fox and other predators prey extensively on birds, their eggs, and their young.

Ground nesting birds that utilize these remaining prairie areas must now 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. Further, fire control and woody plantings have favored increases in numbers of forest-edge birds, historically only present in mid-western oak and eastern deciduous forests (Samson and Knopf 1994), thus adding to the competition for remaining habitat.

2. Oak Savanna and Associated Species Declines

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. Historically, nearly 1,605,500 acres or 7.5% of Indiana was either prairie or oak-savanna, most of which occurred in the Grand Prairie Natural Region (Betz 1978) (Figure 5). Over 99 percent of the original savanna has been lost, and mid-western oak savanna are among the rarest ecosystems in the world. Development has destroyed, fragmented, and disrupted natural processes needed to maintain quality oak savanna ecosystems. Despite this, the Kankakee River Basin contains among the greatest concentrations anywhere of what remains.

Associated species of concern to the Service found in this habitat type in the Basin include the red-headed woodpecker, northern flicker, and loggerhead shrike.



Remnant oak savanna in Indiana. Oak savanna in the Basin constitutes among the best and most concentrated Midwest oak savanna anywhere.

Midwest oak savannas are among the world's most threatened communities (Anderson, et al. 1993). Oak savanna remains among the most vulnerable to loss in the Basin, especially from development.

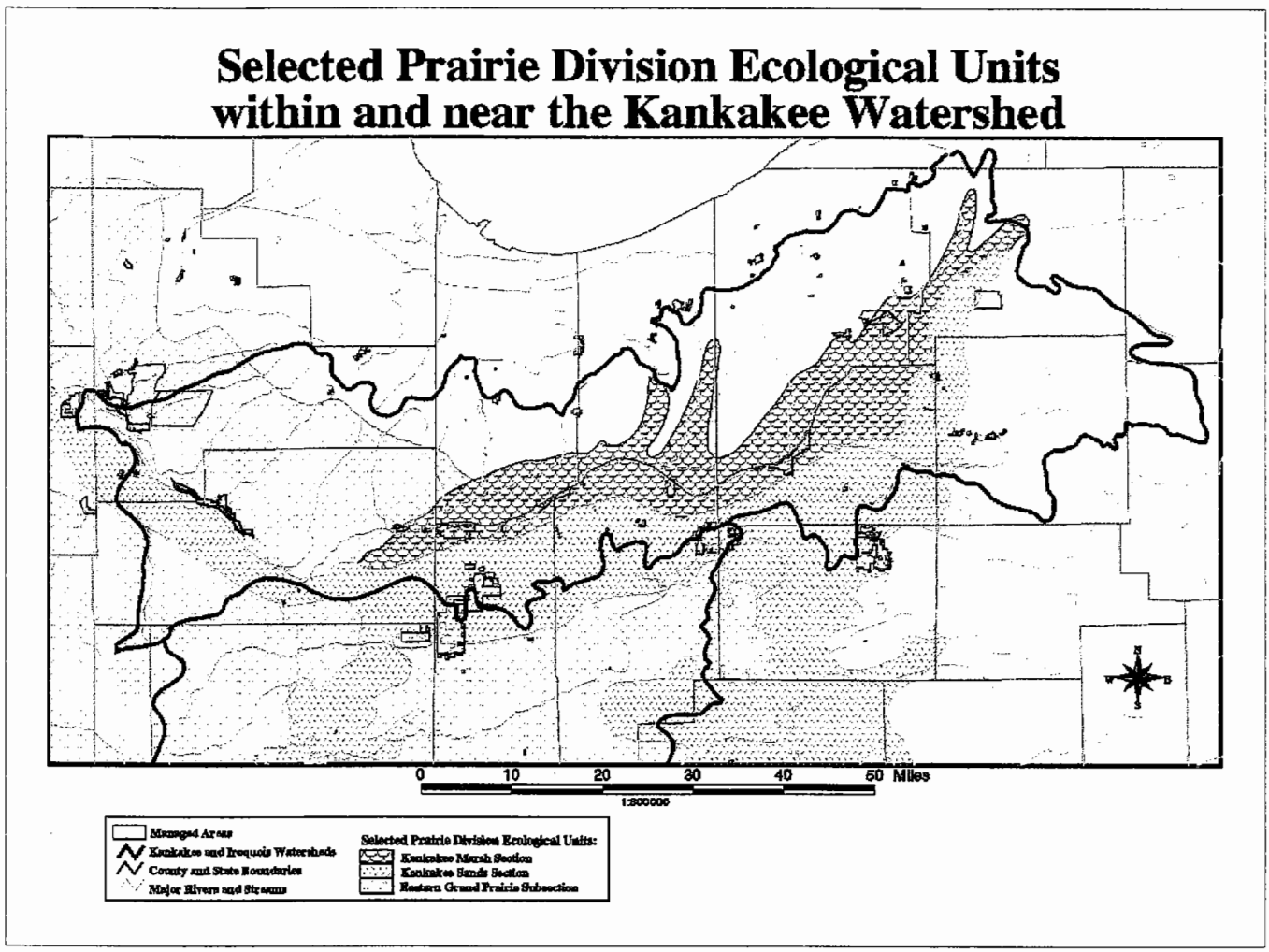


Figure 5 - The occurrence of the Grand Marsh within the eastern peninsula of the tallgrass prairie juxtaposed wetlands, tallgrass prairie, and oak savanna in one watershed.

3. Wetlands and Associated Species Declines

Of the estimated 221 million acres of wetland habitat present in the lower 48 states at the time of colonial America, only 103 million acres remain (47%). Draining, dredging, filling, leveling, and flooding have reduced wetlands by 50% 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 1950's to the mid - 1970's, 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 - 1970's to the mid - 1980's, 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-1980's, 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, both the quantity and

quality of wetland habitat continue to decline in Illinois. Likewise, of the estimated 5,600,000 acres of wetlands that existed in Indiana prior to European settlement, a mere 13 percent remain (Rolley, 1991). Historically, about 85 percent of the wetland loss in Indiana has been for agricultural proposes with the remainder attributable to urban and industrial development (Indiana DNR, 1988). Currently, the Indiana Division of Fish and Wildlife and the Service estimate an annual loss of 5 percent of remaining wetlands.

Of the wetlands remaining in Indiana and Illinois, only a small percentage remain as they existed 200 years ago, and few support their original complement of plants and animals. This biological diversity has been degraded as a result of impacts to water quality, alterations of water levels and upstream watersheds, and other surface disturbances. The seriousness of this loss is best recognized by the fact that in Indiana over 120 different plants that occur naturally in wetlands and over 60 species of wetland-dependent animals are listed as either endangered, threatened, or of special concern by the Indiana Department of Natural Resources (IDNR). Of all wetland types, the palustrine-forested wetlands (bottomland hardwoods) have been identified in Indiana as the "state wetland priority type." This means priority for protection is based on the historical pattern of loss and alterations occurring in Indiana and the multiple value they have to fish, wildlife, and plant resources (Indiana DNR, 1988).

Historically, the Kankakee River Basin was among the most important freshwater wetland ecosystems in the world, supporting a rich and diverse composition of fish, wildlife, and plants. This unique landscape was important for its diverse plant life, breeding grassland-dependent species, and was internationally renowned for its abundance of waterfowl and other wetland-dependent wildlife. Historical records indicate marshes along the Kankakee River comprised nearly a million acres, ranging from 1 to 14 miles in width and spread over two distinct areas: the “grand marsh”, which included about 400,000 acres and remained flooded throughout most of the year, and the “upper marsh”, which included about 600,000 acres that was frequently, but not permanently flooded. Today only remnants remain, and few of these support the full array of plants and animals which existed in this habitat originally.

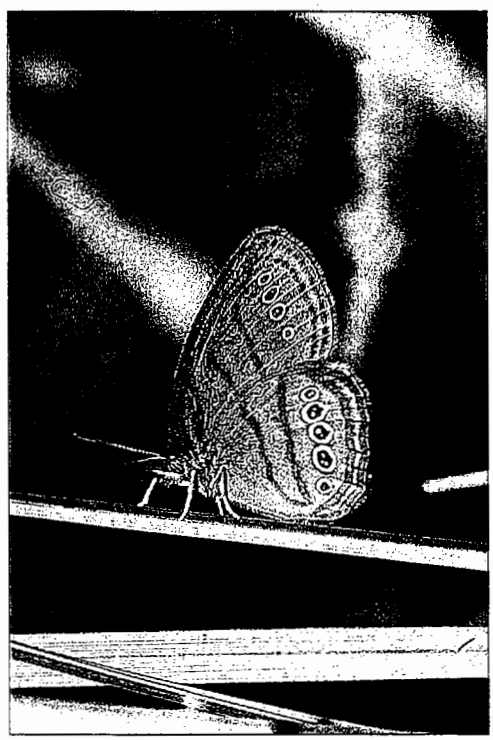
Wetlands are important because they provide habitat for about one-third of our Federally listed threatened or endangered plant and animal species. They provide essential nesting, migratory, and wintering areas for more than 50 percent of our Nation's migratory bird species. Over one third of our Nations biological organisms are found in wetlands, yet wetlands occupy a mere 3 percent of our Nations land surface.

Associated species of concern to the Service found in this habitat type in the Basin include the Mitchell's satyr butterfly, sedge wren, veery, black tern, American bittern, and the eastern massasauga rattlesnake.

American bittern with young

4. Threatened And Endangered Species

Several Federally endangered and threatened species occur in the Kankakee River Basin. These include the Mitchell's Satyr butterfly (*Neonympha mitchellii*), Indiana bat (*Myotis sodalis*), copperbelly watersnake (*Nerodia erythrogaster neglecta*), Mead's milkweed (*Asclepias meadii*), and eastern prairie-fringed orchid (*Platanthera leucophaea*). The Hine's emerald dragonfly (*Somatochlora hineana*) is a Federally listed species that may occur in the Basin although no populations have been documented. The eastern massasagua (*Sistrurus catenatus catenatus*) is a species currently under review for listing. Both the Mitchell's satyr and the Indiana bat inhabit sites within the Basin. In addition, counties that contain focus areas include more than 75 state-listed species. For example, in the Kankakee River or its tributaries in Illinois, six species of mussels and 6 fish species are listed as either state threatened or state endangered. In Indiana, grassland adapted mammals like the plains pocket gopher (*Geomys bursarius*) and Franklin's ground squirrel (*Spermophilus franklinii*) are state-listed species.



Mitchell's Satyr butterfly, one of several endangered species found in the Basin.

5. Urban Sprawl

Urban sprawl is a principal threat to both agriculture and natural systems in the Kankakee River Basin. The human population within the region is rapidly expanding, introducing greater development pressures on undeveloped lands and making opportunities for future habitat restoration and preservation more scarce and costly. Many existing natural areas within the Basin face increasing threats to their naturalness from air and water pollution, exotic species, and particularly habitat fragmentation caused by development. Population growth, sedimentation, runoff, and urban development are all expected to increase in the Basin.

The U.S. population of 266.5 million is growing by about 2.5 million persons per year. The Census Bureau projects that the U.S. population will reach 347 million by 2030 if current trends continue. The Basin has a current population of approximately 1.6 million. This population is expected to increase significantly as more people move southward from Chicago metropolitan areas.

According to a recent study just released by the Chicago-based Openlands Project, the Chicago metropolitan region is predicted to double in size over the next 30 years. It is estimated that the population will grow by 48% during the next 30 years, but land development will increase by a whopping 165%. Moreover, the authors of the report contend that without concerted efforts to contain growth, urban sprawl threatens to reach north to Milwaukee, west to Dekalb, south to Kankakee, and east to South Bend, Indiana.

Similarly, the comprehensive plan for Kankakee County, Illinois, states: "residential growth for the most part has taken place in or near the urban areas of the county. However, in recent years another trend has

become prevalent, that is, small, scattered subdivision and metes and bounds divisions in outlying areas." (Kankakee County Regional Planning Commission 1992). Over time, these development processes could increase flood peaks, increase runoff and sedimentation, and subject more property to damage at higher monetary costs. Demands for certain types of recreation could also intensify, putting many important biological resources at higher risks.

Land use within the Basin has changed enormously from pre-settlement wetlands, prairies, and oak savannas to intensive agriculture. The Basin is currently undergoing a second generation of human-induced change from agricultural ecosystems to a more densely developed state aptly called "rurbanization" (Figure 6). It is this type of development that particularly threatens the remaining oak-savanna habitat in this region. The effect of rurbanization on species dependent on the existing landscape could produce impacts as significant as those that resulted from the change from natural to agricultural ecosystems. An emerging concept in conservation biology is discontinuity and synergism which suggests that stresses to the environment can work in concert to produce rapid and unexpected environmental consequences (Myers 1996). Not only the most conservative species, but species that we cannot anticipate could be extirpated as the Basin changes from rural to urban.

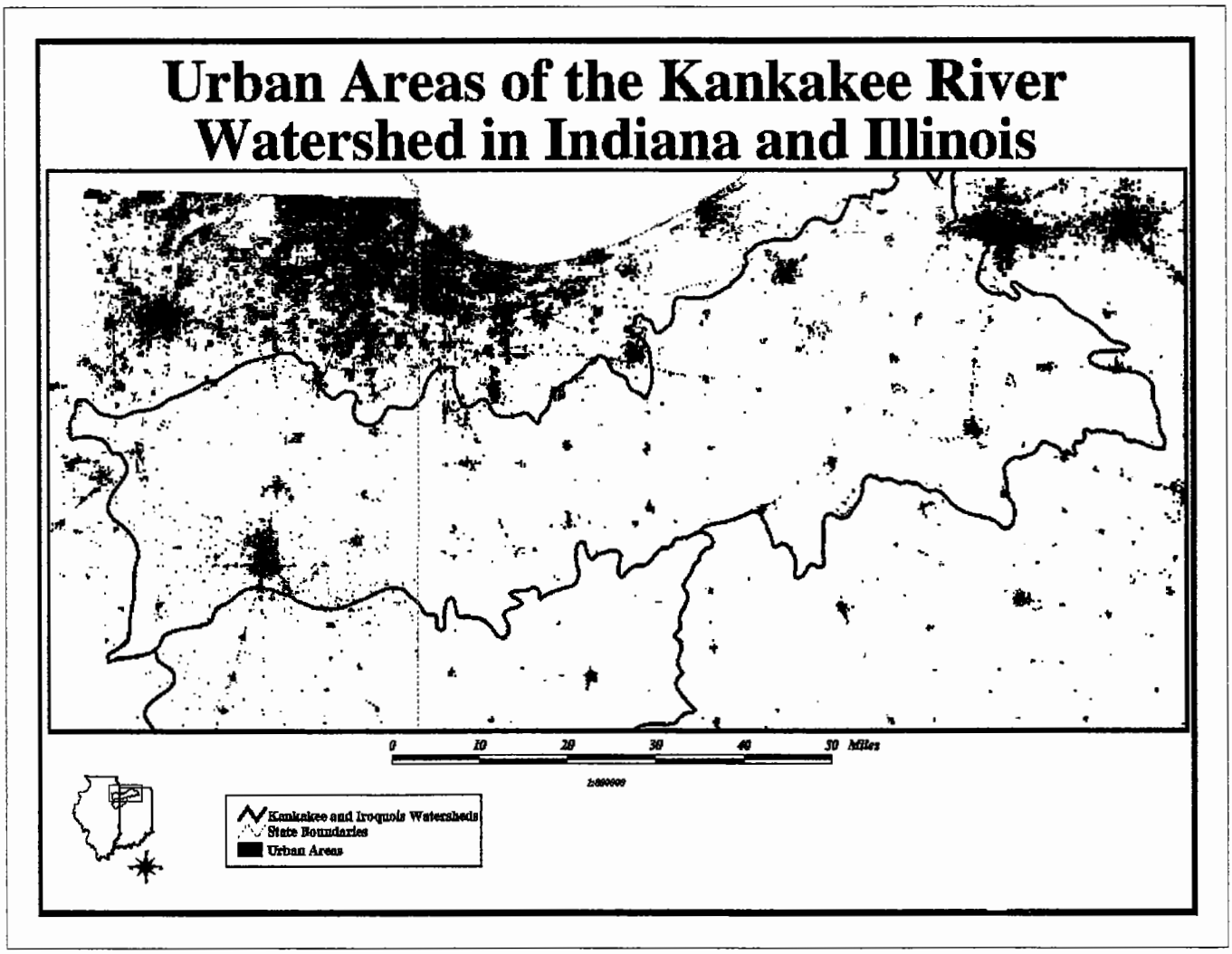


Figure 6 - Urban sprawl approaching the Basin. The Chicago-based Openlands Project predicts the Chicago metropolitan region will double in size over the next 30 years.

6. High Restoration Potential

The Kankakee River Basin has the biological foundation necessary for a highly significant contribution to the conservation of fish and wildlife resources of continental importance.

First, the Basin's historic importance to waterfowl, other migratory birds, and fish is well documented. As stated earlier, the occurrence of the grand marsh within the eastern peninsula of the tallgrass prairie juxtaposed wetlands, tall-grass prairie, and oak savanna in one watershed (Figure 5).

Second, high quality remnant and restorable wetlands, oak savanna, and prairie habitat remain there. Most of the existing wetlands once formed part of the grand marsh, a wetland area of continental importance that covered numerous counties in 2 states. The oak savanna in the Basin constitutes among the best and most concentrated Midwest oak savanna anywhere. While very little prairie has persisted, there is an opportunity to protect and enhance the small "islands" that endure. Some pieces of the puzzle are left, some will have to be remade, and a broad partnership will be required to put the puzzle together.

Third, the Basin still has a comparatively sparse human population, although development is underway and is expected to increase significantly. One of the most compelling arguments for pursuing a bold plan to restore an important part of this watershed now is that the opportunity to achieve landscape scale restoration and protection exists now. It is conceivable that in a few decades or less, because of more intensive landuse, the chance to work across the watershed restoring ecosystem structure and function will be lost forever.

Fourth, the Kankakee River corridor links multiple managed core areas of habitat. The Service recognizes that outstanding conservation work has already occurred in the Basin. The proposed Refuge provides another mechanism to augment existing protection and restoration efforts in a larger context. A useful analogy might be assembling a bicycle. The wheels, the pedals, the handlebars, and the seat are there, but they require a frame to make the bicycle function. The proposed Refuge can be seen as the frame that holds these critical parts together.

Finally, there are several influential conservation partnerships currently working in the Basin, such as the U.S. Army of Corps of Engineers, the U.S. Department of Agriculture, the Illinois and Indiana DNR's, The Nature Conservancy, and several effective local groups. The challenge for the Service is to provide a compelling vision of landscape scale restoration in the Kankakee that will inspire a cooperative effort to achieve it. The Service has demonstrated through its Partners for Fish and Wildlife program and the North American Waterfowl Management Plan (NAWMP) the feasibility of working with the states, other partners, and private landowners to restore wetlands and native grasslands in the Basin. By continuing this effort, the Service can provide the leadership necessary for a comprehensive and coordinated approach to ecosystem restoration in the Basin

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The Service's proposed action in this EA is to develop the Grand Kankakee Marsh National Wildlife Refuge "for the development, advancement, management, conservation, and protection of fish and wildlife resources" (Fish and Wildlife Act of 1956) and 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..."(Emergency Wetlands Resources Act of 1986). The Service's aim is to expand and accelerate past and present efforts of the Grand Kankakee Marsh Restoration Project of the North American Waterfowl Management Plan, a multi-partner conservation coalition which has been restoring wetlands and associated uplands in the Basin for several years. The following Refuge mission, vision, guiding principles, goals, objectives, and strategies provide an interim framework for the Refuge until a Comprehensive Conservation Plan has been completed (approximately 12-18 months).

Refuge Mission Statement

The mission for the Refuge will be to protect, restore, and manage ecological processes within the Kankakee River Basin that benefit threatened and endangered species, migratory birds, native fish, and diverse flora and fauna populations, while providing the public, to the extent possible, high quality wildlife-dependent environmental interpretation, education, and recreation experiences that build an understanding and appreciation for these resources, and the role humankind plays in their stewardship.

Refuge Vision Statement

The Service's vision for the Refuge is to restore and preserve an ecological system that supplies the needs of migratory waterfowl, neotropical migratory songbirds, native fish, native plant communities, and threatened and endangered flora and fauna. The Refuge and its staff will be leaders in building mutually-beneficial relationships with the public and our partners which will lead to a greater understanding and appreciation of the natural world, and the role humankind plays in its stewardship.

Guiding Principles

Development and management of the Refuge will be guided by the following principles:

- *Use an ecosystem approach*: The ecosystem approach is a collaboratively developed vision of desired future conditions that integrates ecological, scientific, economic, and social factors. It is applied within a geographic framework based primarily on ecological factors.
- *Rely on sound science*: Restoration and preservation of ecological processes will be scientifically sound, ecologically credible, economically and socially acceptable, and legally defensible. Refuge management decisions will be based on sound information from the full range of natural and social sciences.
- *Use adaptive management processes*: An adaptive management approach features a structured, iterative process that recognizes that most information used in decision making is imperfect and that, as decisions are made, a process is in place to gain better information and to allow managers to make appropriate mid-course corrections.
- *Results through partnerships*: Partnership initiatives require extensive coordination and communication between Federal agencies; state, tribal, and local governments; and stakeholders and customers.

☞ *Ensure public involvement*: Refuge planning will include a clear, credible, and meaningful role for public input from the full spectrum of social and cultural backgrounds. Public sentiment and comment at the local, State, and national levels will be considered.

1. Interim Refuge Goals

Interim Refuge goals will be consistent with those for the National Wildlife Refuge System. They are:

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

2. Interim Refuge Objectives and Strategies:

Coordination:

☞ Provide Service leadership and support to other Federal, state, local, and private agencies for the restoration and preservation of ecological processes in the Basin that benefit migratory birds, threatened and endangered species, native fish, and their habitats (Service trust resources).

☞ Foster improved communication and collaboration between Service programs, the states, non-government organizations, and other Federal agencies.

☞ Focus Federal, state, and local agencies having related responsibility and/or expertise in the Basin to increase efficiency and develop consistency in natural resource conservation.

☞ Accelerate the current status and trends effort toward natural resource restoration and preservation in the Basin through a comprehensive and coordinated system, that complements existing authorities.

☞ Intensify and concentrate Federal, state, local, and private habitat restoration and enhancement mechanisms aimed at benefitting Service trust resources in the Basin (such as the Wetlands Reserve Program, Conservation Reserve Program, Environmental Quality Incentives Program, Wildlife Habitat Incentives Program, set-aside programs, North American Waterfowl Management Plan, local land trusts, water quality improvement programs, etc.).

Planning

☞ Provide a comprehensive statement of Refuge management direction through the development of a Comprehensive Conservation Plan (CCP) and associated step-down management plans by 2001 (the CCP will replace guidance contained in the draft conceptual management plan which was included with the draft EA)(see appendix V for planning process and schedule).

☞ Provide avenues for effective coordination, interaction, and cooperation with affected parties, including Federal agencies, state conservation agencies, tribal governments, local governments, non-government organizations, and landowners.

Research

- ☞ Support, promote, and coordinate scientific research on, and monitoring of, Service trust resources and their habitat, to improve management decision-making.
- ☞ Use expertise from various agencies, universities, and other sources to develop and disseminate knowledge about natural resources and human uses and values associated with those resources.

Habitat Restoration and Management

- ☞ Through a combination of voluntary partnerships, easements, and land acquisition, restore and preserve approximately 30,000 acres of wetlands, prairie, and oak savanna habitat to meet the needs of migratory birds, threatened and endangered species, and aquatic resources in the Basin (willing buyer/willing seller only).
- ☞ Leverage Service restoration and preservation efforts by connecting or enlarging existing managed areas.
- ☞ Restore backwater habitats and reconnect side channels that have been artificially cut-off on the Kankakee River to promote biological diversity and rehabilitate fish spawning, nursery, and overwintering areas.
- ☞ Restore and manage areas at the landscape scale to provide the most favorable matrix possible for the refuge and other protected areas (see Noss and Harris 1986, O"Connell and Noss 1992, Missouri Dept. of Conservation 1994).
- ☞ Intensify the Service's Partner's for Fish and Wildlife habitat restoration efforts and identify new opportunities to restore wetlands and grasslands on private lands.

Education, Interpretation, and Recreation

- ☞ Expand public awareness, understanding, appreciation, and stewardship of the Basin's natural resources through high quality wildlife-dependent public education, interpretation, and recreation programs on Refuge lands.
- ☞ Establish Refuge outreach programs to develop a more involved citizenry in support of fish and wildlife conservation.

Successful development of this Refuge will rely on partnerships formed with landowners in the Basin, volunteers and interested citizens, farm and conservation organizations, and other government agencies. Restoration and preservation of habitat by the Service would be on a willing buyer/willing seller basis only. Only lands that the Service acquires would become part of the Refuge. All lands acquired by the Service would be managed as units of the Grand Kankakee Marsh National Wildlife Refuge. Funding for Service land acquisition would be the Land and Water Conservation Fund using the authority of the Fish and Wildlife Act of 1956, and the Migratory Bird Conservation Fund using the authority of the Migratory Bird Conservation Act.

V. PROJECT INCEPTION

The Service has long been aware of the tremendous natural resource value of the Basin. The following Federal, state, local, and private entities, resource management plans, and conservation initiatives helped

provide background and a framework for the Service's proposed action. Appendix V contains an outline of the planning process the Service followed for this project.

In 1986, to address the declining status of North American waterfowl populations, the United States and Canada signed the ***North American Waterfowl Management Plan (NAWMP)***. The purpose of the NAWMP is to restore a continental breeding population of 62 million ducks, including 8.7 million mallards, 6.3 million pintails, and a fall flight of 100 million ducks during years of average environmental conditions. Habitat objectives for the ***Upper Mississippi River and Great Lakes Region Joint Venture - Kankakee River Basin Focus Area*** in Indiana include "permanently protect, enhance, restore, and/or create 28,000 acres of wetland and associated uplands on public and private lands by the year 2012." In Illinois, the 1,900-acre Momence wetlands are part of the Northeastern Illinois Focus Area, representing one of the last good examples of the historic Grand Kankakee Marsh.

In 1986, the U.S. Congress authorized the Emergency Wetlands Resources Act to protect critical wetlands and promote wetland conservation. One of the requirements of the Act was the preparation of a national plan to identify high priority wetlands for protection. In 1989 the Department of the Interior developed the ***National Wetlands Priority Conservation Plan***, as directed by the Act.

The ***Kankakee River Master Plan*** (SEG Engineers and Consultants, Inc. 1989) was developed through funding from the Indiana Legislature. The Plan proposed 30 miles of setback levees on each side of the Kankakee River to contain the 100 year flood, alleviate land-use conflicts, and address environmental concerns in the Indiana portion of the Kankakee River Basin.

In 1990, the Service developed a ***Regional Wetlands Concept Plan*** for the Great Lakes-Big Rivers Region (Illinois, Indiana, Minnesota, Iowa, Missouri, Wisconsin, Michigan, and Ohio). The purpose of the plan was to identify wetlands that were valuable for protection in conformance with the Emergency Wetlands Resources Act of 1986. One of the recommendations in the Regional Wetland Concept Plan for the States of Illinois and Indiana was restoration and protection of palustrine-emergent and palustrine-forested wetland habitat within the Kankakee River Basin.

The ***Corps of Engineers*** recently completed a "Reconnaissance study" of the Kankakee River Basin that evaluates measures to integrate flood control, ecological protection and restoration, and recreational enhancement within the Basin. That report recommended a more detailed "Feasibility Level" study that would investigate flood damage problems along the Kankakee River and provide recommendations for implementable measures fostering flood control, ecological values, and recreational opportunities. Objectives of that study are to 1) reduce over-bank flood damages along the Kankakee River and its tributaries in Indiana and Illinois, 2) adhere to state of Indiana and Illinois storm water management ordinances and regulations, 3) preserve and/or enhance the social, cultural, ecological, and recreational resources in the Basin, 4) where possible, guide plan formation efforts to be compatible with, and integrate into, existing and future Federal, state, county, and local facilities and flood control projects, and 5) protect, enhance, and restore natural resources and recreational facilities within the Basin.

On April 16, 1999, the Service and U.S. Army Corps of Engineers signed an interagency partnership agreement (appendix III) to work together on Refuge planning and flood control through ecosystem restoration activities within the Basin. As part of that agreement, the Service made a commitment not to adversely impact flood control efforts of the U.S. Army Corp of Engineers.

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The ***Illinois DNR*** has developed a list of Priorities for the Kankakee Sand Area Section in Illinois. These include management of the floodplain forest along the Kankakee River, protection of the high quality aquatic environment of the Kankakee River ecosystem from Indiana to the confluence with the Des Plaines River, protection of the sand savanna and sand prairie of this Grand Prairie Natural Division (particularly the southeastern Kankakee County/northeastern Iroquois County area), and linking the Iroquois State Fish and Wildlife Area in Illinois and the Willow Slough Fish and Wildlife Area in Indiana (William Glass, Illinois Dept. of Natural Resources, 3 July 1996, personal communication).

Likewise, the ***Indiana DNR*** manages several nodes of habitat along the Kankakee River and is similarly interested in protection of important natural features, particularly wetlands and sand savanna/prairie in the Basin.

Earlier this year, ***The Nature Conservancy*** purchased approximately 7,200 acres of historic wetlands, prairie and oak savanna with the goal of implementing a long-term restoration project. This site lies immediately south of the Kankakee River in Newton County, Indiana.

VI. SCOPING AND PUBLIC INVOLVEMENT

Scoping is the process of identifying opportunities and issues related to a proposed action. The Service publicly announced it was evaluating the feasibility of developing a new National Wildlife Refuge in the Kankakee River Basin in June 1997. Prior to that, the Service held informational briefings on the project for congressional members and staff, Federal, state, and local partners, and many others at their request.

Numerous Federal, state, local, and private entities were involved in the scoping process. These include Indiana's and Illinois' Congressional Delegations, the U.S. Department of Agriculture, U.S. Department of Interior, Indiana and Illinois Legislative members representing the counties involved, Indiana Department of Natural Resources, Illinois Department of Natural Resources, representatives from County, Township, and other local governments, representatives of national, state, and local conservation organizations, Farm Bureau, landowners, and many other interested groups and citizens. Information about the proposed project was provided to the general public through news-releases, presentations, interviews, seven newsletters (appendix VI), one-on-one briefings, and the Internet.

In June 1997, the Service hosted three public meetings in Knox and Enos, Indiana, and Bradley, Illinois, to exchange information on the Refuge proposal. In total, approximately 300 people attended those meetings.

In March 1998, the Service issued a Draft Environmental Assessment to publicly disclose the possible environmental consequences that development of the Refuge by the Service could have on the quality of the physical, biological, and human environment.

On May 26 and 27, 1998, the Service held public hearings in Wheatfield, Indiana, and Kankakee, Illinois, to encourage additional public comment. Approximately 600 people attended the Wheatfield meeting and approximately 60 attended the meeting in Kankakee.

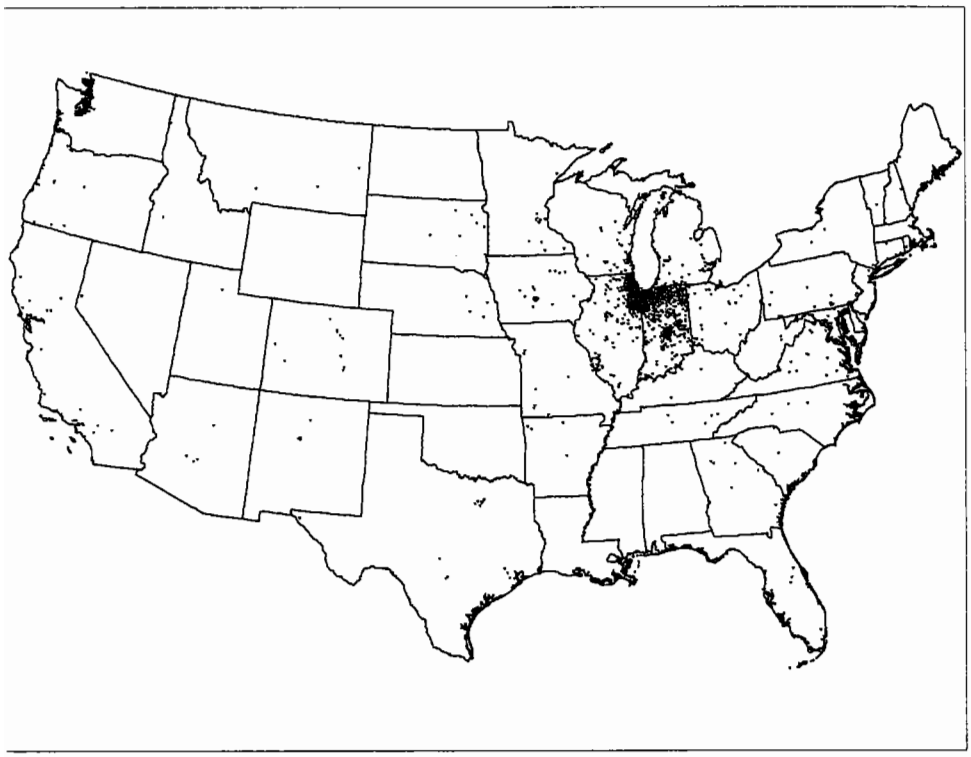


Figure 7 -Distribution of comment letters received by the Service regarding the proposed Refuge since planning was initiated in June 1997.

On August 20, 1998, the Service closed a 150-day comment period on the Draft Environmental Assessment prepared for the project.

The Service coordinated its scoping effort closely, and corresponded frequently with many of the aforementioned entities. To-date, more than 14,000 people from 44 different states (Figure 6) have inquired and/or commented on the refuge proposal.

Comments have covered a wide range of potential opportunities and concerns. Many comments encouraged the development of a new national wildlife refuge, while others cited potential conflicts that would need to be addressed before the Refuge proposal moved forward.

From questions raised in conversations and correspondence with individuals and organizations, the Service identified several opportunities and issues facing this Refuge proposal, namely: If developed, what effect would the Refuge have on:

1) Biological diversity and abundance
2) Water quality in the Kankakee River
3) Agricultural land
4) Drainage, runoff, and flood control within the Basin
5) County tax revenues and refuge revenue sharing payments and apportionment
6) Local economies
7) Private property rights
8) Infrastructure (roads and road maintenance/sewer and water systems)
9) Mosquitos
10) Other planning efforts in the Basin
11) Environmental justice

The Service addressed these and other opportunities and concerns in Chapter 4 of this EA, the appended Economic Impact Assessment prepared by Purdue University (appendix I), the appended "Frequently Asked Questions" (appendix II), and through several of the project Newsletters (appendix VI).

Management and administration of the Refuge will be mandated by a number of laws (Acts) and Executive Orders (EO's). Some of these include:

✓ *National Wildlife Refuge System Improvement Act of 1997* (Refuge Administration Act). This 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 wildlife-dependent 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 Wildlife Refuge System Administration Act of 1966.* This Act defines the National Wildlife Refuge System as including wildlife refuges, areas for the protection and conservation of fish and wildlife which are threatened with extinction, wildlife ranges, game ranges, wildlife management areas, and waterfowl production areas. The Secretary is authorized to permit any use of an area provided such use is compatible with the major purposes for which such area was established. The purchase consideration for rights-of-way go into the Migratory Bird Conservation Fund for the acquisition of lands. By regulation, up to 40 percent of an area acquired for a migratory bird sanctuary may be opened to migratory bird hunting unless the Secretary finds that the taking of any species of migratory game birds in more than 40 percent of such area would be beneficial to the species. The Act requires an Act of Congress for the divestiture of lands in the system, except (1) lands acquired with Migratory Bird Conservation Commission funds, and (2) lands can be removed from the system by land exchange, or if brought into the system by a cooperative agreement, then pursuant to the terms of the agreement.

✓ *Refuge Recreation Act of 1962.* This Act authorizes the Secretary of the Interior to administer refuges, hatcheries, and other conservation areas for recreational use, when such uses do not interfere with the areas' primary purposes. It authorizes construction and maintenance of recreational facilities and the acquisition of land for incidental fish and wildlife oriented recreational development or protection of natural resources. It also authorizes the charging of fees for public use.

✓ *National Wildlife Refuge System Volunteer and Community Partnership Act of 1998.* The purpose of this Act is to 1) encourage the use of volunteers to assist the Service in the management of refuges within the NWRS; 2) facilitate partnerships between the NWRS and non-Federal entities to promote public awareness of the resources of the NWRS and public participation in the conservation of those resources; and 3) encourage donations and other contributions by persons and organizations to the NWRS.

✓ *Fish and Wildlife Improvement Act of 1978.* This act was passed to improve 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.

✓ *National Environmental Policy Act of 1969 (NEPA).* The purposes of the NEPA are to: declare a national policy which will encourage productive and enjoyable harmony between man and his environment; promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; enrich the understanding of the ecological systems and natural resources important to the Nation; and establish a Council on Environmental Quality.

✓ *The Endangered Species Act of 1973, as amended.* This Act ensures that projects not affect the continued existence of any endangered or threatened species in the project area or result in destruction or adverse modification of their critical habitats.

✓ *Migratory Bird Conservation Act of 1929.* The Act established the Migratory Bird Conservation Commission which consists of the Secretaries of the Interior (chairman), Agriculture, and Transportation, two members from the House of Representatives, and an ex-officio member from the state in which a project is located. The Commission approves acquisition of land and water, or interests therein, and sets the priorities for acquisition of lands by the Secretary for sanctuaries or for other management purposes. Under this Act, to acquire lands, or interests therein, the state concerned must consent to such acquisition by legislation. Such legislation has been enacted by most states.

✓ *Emergency Wetlands Resources Act of 1986.* This Act recognizes the importance of wetlands and their role in providing public benefits.

✓ *Fish and Wildlife Act of 1956.* Under this Act, the Secretary of Interior is authorized to take such steps as may be required for the development, advancement, management, conservation, and protection of fish and wildlife resources including but not limited to research, development of existing facilities, and acquisition by purchase or exchange of land and water or interests therein. The Act also authorizes the Service to accept gifts of real or personal property for its benefit and use in performing its activities and services. Such gifts qualify under Federal income, estate, or gift tax laws as a gift to the United States.

✓ *Land and Water Conservation Fund Act of 1965.* This Act provides funding through receipts from the sale of surplus Federal land, appropriations from oil and gas receipts from the outer continental shelf, and other sources for land acquisition under several authorities. Appropriations from the Fund may be used for matching grants to states for outdoor recreation projects and for land acquisition by various Federal agencies, including the Service.

✓ *Refuge Revenue Sharing Act of 1935, as amended.* This act requires revenue sharing provisions to all fee-title ownerships that are administered solely or primarily by the Secretary through the Service.

✓ *Uniform Relocation and Assistance and Real Property Acquisition Policies Act of 1970, as amended.* This Act 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.

✓ *The Archeological Resources Protection Act of 1979.* Section 14 of the Archaeological Resources Protection Act of 1979 requires an inventory program of all Federal lands. This Act expands upon the Antiquities Act to protect all archeological sites more than 100 years old on Federal land, and to ensure that archeological investigations on Federal land are performed in the public interest by qualified persons.

✓ *The National Historic Preservation Act of 1966, as amended; Executive Order 11593 (Protection and Enhancement of the Cultural Environment); and Title 36, Code of Federal Regulations, Part 800 (Protection of Historic Properties).* Section 106 of the National Historic Preservation Act of 1966 requires Federal agencies to consider the effects of their undertaking on properties meeting criteria for the National Register of Historic Places. The regulations in 36 CFR Part 800 describe how Federal agencies are to identify historic properties, determine effect on significant historic properties, and mitigate adverse effects. Section 110 of the 1966 Act codifies the salient elements from E.O. 11593, "to ensure that historic preservation is fully integrated into ongoing programs and missions of Federal agencies." Section 110 also requires each Federal agency to establish a program leading to inventory of all historic properties on its lands.

✓ *Archaeological and Historic Preservation Act of 1974.* This Act amends the Reservoir Salvage Act of 1960 to expand its provisions to the preservation of historic and archaeological data in all Federal or Federally assisted or licensed construction projects that might otherwise be lost. This Act directs Federal agencies to notify the Secretary of the Interior whenever they find a Federal or Federally assisted, licensed or permitted project may cause loss or destruction of significant scientific, prehistoric or archaeological data. Funds may be appropriated, donated and/or transferred for the recovery, protection and preservation of such data.

✓ *The Native American Graves Protection and Repatriation Act of 1990.* Directs Federal agencies to protect Native American human remains and associated burial items located on or removed from Federal land.

✓ *Federal Farmland Protection Policy Act of 1981, as amended.* This Act is intended to "minimize the extent to which Federal programs contribute to the unnecessary and irreversible conversion of farmland to non-agricultural uses, and too assure that Federal programs are administered in a manner that, to the extent practicable, will be compatible with State, unit of local government, and private programs and policies to protect farmland."

✓ *Clean Water Act (Section 401 and 404).* Section 404 of the Act is intended to protect access to and quality of the nation's waters by preventing the unnecessary loss of wetlands and other sensitive aquatic areas. Section 401 of the Act requires water quality certification prior to the issuance of a 404 permit and for other activities discharging into a water body.

✓ *Rivers and Harbor Act (Section 10 of 1899).* Section 10 of this Act regulates the placement of fill in navigable waters of the United States.

✓ *Executive Order 11988.* E.O. 11988 directs Federal agencies to (1) avoid development in the floodplain unless it is the only practical alternative, (2) reduce the hazards and risks associated with floods, (3) minimize the impact of floods on human safety, health, and welfare, and (4) restore and preserve the natural and beneficial values of the floodplain.

✓ *Executive Order 11990.* E.O. 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). In compliance, the Service will send copies of the CCP/EA to State Planning Agencies for review.

✓ *Executive Order 12996* (Management and General Public Use of the National Wildlife Refuge System). E.O. 12996 provides directives to the Secretary of the Interior on compatible wildlife-dependent recreational activities (hunting, fishing, wildlife observation, photography, environmental education, and interpretation).

VIII. DECISION FRAMEWORK

In compliance with the National Environmental Policy Act of 1969, the Regional Director for the Great Lakes-Big Rivers Region of the Service will use this Environmental Assessment to select 1 of 5 alternatives (Chapter 2) and determine if the alternative selected will significantly impact the quality of the human environment. Following this decision and a 30-day public review, a final decision will be made by the Regional Director on whether to carry out the alternative selected.

CHAPTER 2 - DESCRIPTION OF ALTERNATIVES

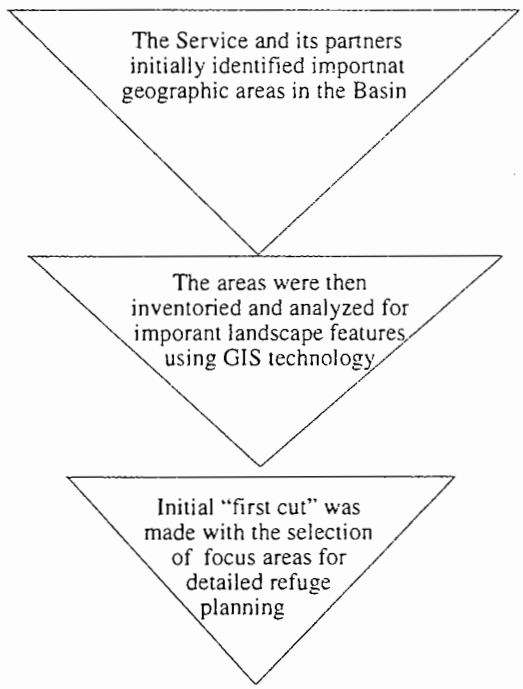
I. INTRODUCTION

The purpose of this chapter is to present the alternative formulation process and then describe four "Action" and one "No Action" alternatives with respect to the proposed new Refuge.

II. FORMULATION OF ALTERNATIVES

The Service formulated alternatives for the proposed Refuge in conjunction with its partners in both Illinois and Indiana. The No Action alternative reflects the current state of conservation activity (status quo) within the Basin. The Action alternatives would provide the opportunity for a coordinated effort among the citizens of the Basin and agencies and organizations working in the Basin to restore and preserve migratory birds, fisheries, and biological diversity.

The process of developing the Action alternatives involved input from partner organizations and the use of Geographic Information System (GIS) technology provided in part through the Indiana Gap Analysis project, the Illinois Natural History Survey, and the Illinois and Indiana Departments of Natural Resources. These data were used to identify a set of "focus areas" (Figure 8) which constitute subsets of the Basin from St. Joseph County, Indiana, to Iroquois County, Illinois.



It is important to understand that focus areas do not correspond directly to specific areas identified by the Service for acquisition. Rather, focus areas are the initial "first cut" in a process aimed at narrowing down potential Refuge areas within the Basin, ie. ie. ➪ Kankakee River Basin ➪ focus area ➪ individual refuge units. Focus areas typically involve greater than 30,000 acres in each of the Action alternatives. This is because focus areas represent refuge design at its broadest conceptualization. Identifying focus areas larger than the 30,000 acres gives the Service flexibility to address both ecological and social concerns in developing the Refuge, and helps to delineate a landscape where Service partners could work cooperatively to manage lands for the benefit of natural resources. The Service will continue to refine the site selection process based on biological and non-biological criteria as well as public input in order to identify potential sites for a new refuge.

Land acquisition would be under the authority of the Fish and Wildlife Act of 1956 and the Emergency Wetlands Resources Act of 1986 and would occur over approximately 20-40 years. Land acquisition would be by donation, exchange, trade for other Federal lands, conservation easements, and fee-title purchase from willing sellers.

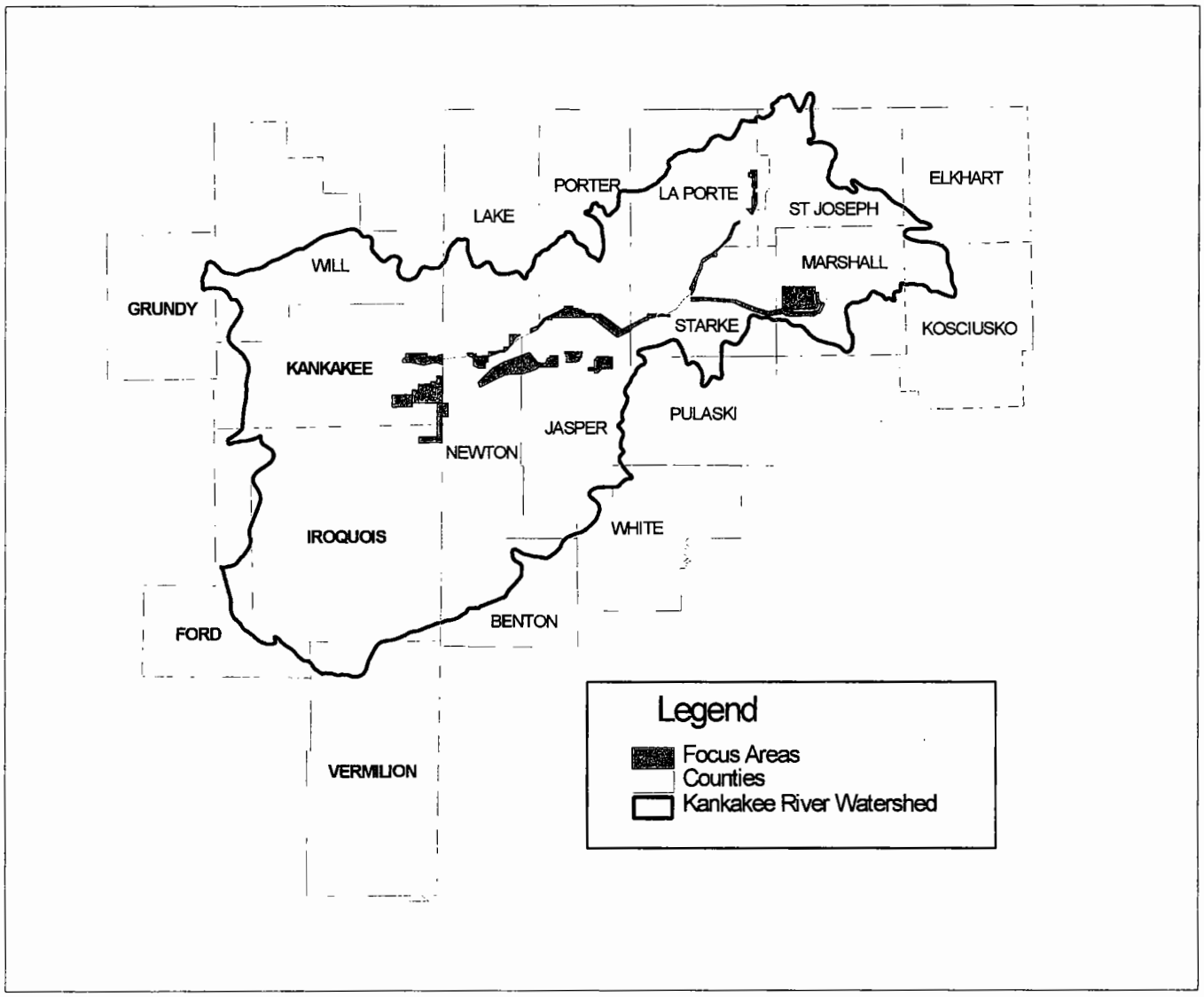


Figure 8 - Focus Areas for the four Action alternatives (alternatives 2-5). Note: focus areas are not Refuge boundaries. Refuge boundaries would conform to individual land tracts as they are purchased from willing sellers within the focus areas.

Management of the proposed Refuge would be consistent with Service policies concerning its National Wildlife Refuges and the aforementioned goals. The Action alternatives embrace the goals of protecting and restoring habitat in order to prevent additional species in the Basin from becoming listed under the Endangered Species Act; providing additional opportunities for wildlife-dependent recreation; improving water quality in the Basin; providing opportunities for environmental education; and where feasible, alleviating local flooding problems within the Basin. Common to all Action alternatives is the development of a Comprehensive Conservation Plan which will provide long-range guidance and management direction for the Refuge to accomplish its purpose, contribute to the mission of the National Wildlife Refuge System, and to meet other relevant mandates.

1. Identification of Focus Areas

1. Identification of Focus Areas

In order to begin the process of identifying the most important areas for the conservation of Service trust resources in the Basin, the Service formulated focus areas using an Expert Workshop approach (Johns and Soule 1995) and the best available data using GIS-aided reserve design methodology. For each Action alternative, the Service identified focus areas through the analysis of land cover, threatened, endangered and other species distribution, hydrography, wetlands, anthropogenic landscape features, and other data acquired through the Illinois DNR, Indiana DNR, The Nature Conservancy, Service, and Illinois Natural History Survey through the Gap Analysis projects in Indiana and Illinois, respectively.

The land use classes used in the focus area analysis were developed from comparatively coarse satellite data and have not been subjected to formal accuracy assessment. The reader is cautioned not to use the maps included in this report to evaluate individual parcels. The Service will not rely on these data for site-specific planning.

The process for identifying focus areas included:

1. Service meetings with partner agencies in late 1996 and 1997. In these meetings, the partner organizations broadly-defined geographic areas that met their ecological criteria for importance.

2. These geographic areas were transferred to United States Geological Survey (USGS) 7.5 minute topographic maps and then on-screen digitized into the GIS using USGS Digital Raster Graphics (DRG's) of the same 7.5 minute topographic sheets.

3. Important GIS data layers for analyses were collected for designing the proposed Refuge including: a "cross-walk" of land cover maps from the Indiana Gap Analysis project and the Illinois Natural History Survey (mostly 1992 Thematic Mapper (TM) satellite images); National Wetland Inventory (NWI) maps for the watershed; data from the Illinois and Indiana Heritage Programs (endangered, threatened, and rare communities and species); Managed Areas from the Indiana Gap Analysis project; transportation from USGS 1:100,000 Digital Line Graphs (DLG's); hydrography (rivers and streams) also from USGS 1:100,000 DLG's; and Meyer's map of the historic Grand Marsh.

4. Visual analysis of the data was conducted with respect to:

   A. The Kankakee River Corridor

   STEP 1 Evaluate an appropriate corridor based on the occurrence of historic forested wetland according to Meyer and on the expanse of existing forested wetlands based on NWI.

   STEP 2 Visually select and on-screen digitize lines along the Kankakee River mainstem emphasizing important habitat blocks and continuity of the riparian corridor.

B. Concentrations of Primary Ecosystems

STEP 1 Visually inspect the land cover data, NWI, and DRG's for concentrations of wetlands, grasslands, and probable savanna.

STEP 2 On-screen digitize areas around concentrations including adjacent potential restoration or management lands.

C. Corridors Among Managed Areas

STEP 1 Visually inspect potential corridors of natural vegetation among managed areas focusing on riparian corridors, blocks of habitat, and linear habitat features.

STEP 2 Evaluate opportunities to enlarge existing areas with similar ecosystem types, and buffer (safeguard) where appropriate.

STEP 3 On-screen digitize large blocks or continuities of habitat among managed areas emphasizing largest and most complete corridors and considering existing connectivity among managed areas.

D. Distribution of Threatened (T) and Endangered (E) Species

STEP 1 Visually evaluate distribution of T and E species and rare communities in relation to managed areas and partner priority areas.

STEP 2 Evaluate existing habitats for T and E species to see if there are gaps in existing managed areas or priority areas.

STEP 3 On-screen digitize important areas based on the location, type, and number of Heritage Data points.

E. Anthropogenic Features

STEP 1 Visually evaluate the location of roads, cities, and other developed features in relation to existing managed areas and priority areas.

STEP 2 Eliminate some areas from consideration based on proximity to developed areas, lack of feasibility for restoration because of developed features, or lack of connectivity based on developed features.

Additional analysis and refinement of focus areas will be completed during the CCP process. The CCP process will include a detailed evaluation of the focus areas, although sites outside the focus areas could be evaluated should they meet the criteria for achieving Refuge goals, and should willing sellers exist. Features critical to Service goals, such as the occurrence of wetlands, grassland, oak savanna, and threatened and endangered species will form the basis of the site selection process. GIS-based algorithms will generate a list of parcels that best achieve Refuge goals and objectives (Pressey, Johnson, and Wilson 1994). This site-selection process has the flexibility to provide both alternative sites and to project a new suite of sites as lands are acquired. The presence of willing sellers will ultimately determine any acquisition for the proposed new Refuge.

It should be noted that development of this Refuge is controlled by a number of factors. They include: land availability, land ownership, topography, climate, water availability, water quality and temperature, water rights, potential for competitive water use, soil - chemistry, permeability, compaction, texture, natural resource value - endangered, threatened, candidate species; special habitats, adjacent land use, proximity to supporting infrastructure, access - roads, bridges, etc., potential and severity of major climatic disturbances, local political, social and economic factors, regulations, environmental constraints, security, upland use, and pollution, to name a few.

III. ALTERNATIVE CONSIDERED BUT ELIMINATED FROM DETAILED STUDY

Many suggestions and comments were received during the public scoping process and a wide range of management options were identified. For example, numerous individuals stated that the Service should restore and preserve the former "grand marsh." Others argued that intensifying management of existing managed areas or expanding the Service's Partners for Fish and Wildlife program would meet Service objectives for the area. While each of these management options have merit, we did not recommended them for additional evaluation for the following reasons.

Restoration and preservation of the former 500,000 acre grand marsh was eliminated from consideration after careful review of land uses such as crop land and home sites, costs associated with restoring the land, and input received during meetings with the public, local officials, and landowners. Intensifying management on existing managed areas was not recommended for further evaluation because managed lands within the Basin are already undergoing intensive management to maintain productive habitat for wildlife. Although more intensive management could perhaps increase the amount and diversity of wildlife on existing managed lands, this alternative would not result in a net gain of habitat preserved and managed, substantially improve waters entering the Kankakee River, or contribute to the long-term recovery of many Service trust resources. Therefore, due to its limited potential, this alternative was removed from further consideration.

Energetic promotion of the Service's Partners for Fish and Wildlife program may indeed generate wetland restoration projects on private lands within the Basin, which is a primary objective of this project. However, no restoration of a functioning riparian ecosystem complex, including bottomland hardwood forests and associated uplands, could be obtained or secured for present and future generations. Parcels of land that would be enrolled in private lands agreements would largely be disjointed and small, limited to where historical wetland basins occurred, and limited by a 10 year agreement. Limited protection of existing natural resources within the Basin would be afforded. There would be no active management or plan for management of Service trust species or other natural areas in the Basin. Any potential for these lands to contribute to education, research, water-based and/or wildlife-dependent recreation would be limited to the private landowner of the properties enrolled in the agreement. The Basin's water quality would not be substantially improved by this piecemeal approach. Therefore due to its limited potential, this alternative was eliminated from further consideration also.

IV. DESCRIPTION OF ALTERNATIVES

Alternative 1 "No Action"

Under the No Action alternative, the Service would not develop a new National Wildlife Refuge in the Basin. The No Action alternative would continue the conservation status quo. The No Action alternative would not result in the complete cessation of habitat conservation and restoration in the Basin. The No Action alternative, however, would result in less coordination among the various conservation organizations. This inefficiency could have at least two possible consequences. The first is less effective conservation of biodiversity. The second is the need to manage a larger percentage of land in the watershed to achieve biodiversity conservation goals. In the meantime, opportunities to work at the landscape scale in the Kankakee watershed rapidly disappear. Most of the threats to the watershed have been realized over the past 150 years. However, a substantial amount of oak savanna was lost in the last 20 years when several thousand acres in the Indiana portion of the watershed were cleared for a now defunct ranching operation. The southeastern Kankakee County/northeastern Iroquois County area in Illinois is similarly vulnerable.

Alternative 2 - Wetlands

The wetlands alternative focuses on the protection and restoration of important wetland areas along the mainstem of the Kankakee River and its tributaries. Figure 9 indicates that both protection of existing resources and restoration would occur primarily within the riparian zone of the Kankakee and Yellow Rivers. This Action alternative would function to protect and restore forested, shrub-scrub, and emergent wetlands for the migratory bird and associated species that depend on them.

Alternative 2 would potentially link the Momence Wetlands Conservation Area in Illinois with LaSalle Fish and Wildlife Area, Grand Kankakee Marsh County Park, NIPSCO Savanna Wetlands, Kankakee Fish and Wildlife Area, and Kingsbury Fish and Wildlife Area in Indiana. It would also establish a corridor from the Menominee Wetland Conservation Area in Marshall County along the Yellow River to Kankakee Fish and Wildlife Area on the Kankakee River.

The reason for the wetland scenario in the Basin is clear: the Grand Kankakee Marsh was among the most important wetland ecosystems in the continental United States. It was important for numerous species of plants and animals including waterfowl and other wetland-dependent birds, herpetofauna, hydrophytic plants, and other biota. In addition, wetland functions such as flood water storage, ground water recharge, and water quality improvement have significant value to society.

The Grand Marsh, however, has been almost completely drained and the resulting hydrology will present numerous restoration challenges. Important considerations with respect to implementing alternative 2 include: restoring hydrology on refuge lands without affecting neighboring landowners; restoring wetlands that functionally and biologically represent pre-drained wetland types; restoring sufficient area (considering the Grand Marsh covered up to 1 million acres and the proposed Refuge would only total 30,000 acres) to return a functioning landscape; and restoring wetlands that provide multiple values important to refuge clients.

TABLE 2.1
Existing Land Use by Focus Area (in acres) in the Wetland Alternative

FOCUS AREA #	TOTAL	WETLAND	GRASSLANDS/ PASTURE	UPLAND FOREST	AGRICULTURE	URBAN
2	1434	497	41	186	710	0
3	3829	289	92	64	3376	8
4	988	40	10	30	889	19
5	431	108	20	22	281	0
6	2027	727	172	230	867	31
8	5807	2172	897	708	1995	35
11	1695	483	152	232	822	6
16	11856	969	387	2937	7498	65
18	4121	939	127	640	2401	14
19	7129	1491	291	609	4724	14
20	1420	379	20	191	830	0
21	9893	1967	180	1009	6726	11
22	421	175	16	61	169	0
TOTAL	50,382	10,236	1,736	6,919	31,288	203

Alternative 3 - Grassland

The grassland scenario focuses on the protection and restoration of important areas of grassland and oak savanna. Under this scenario, the Service would protect, restore, and enhance existing oak savanna and prairie habitat, degraded habitat, and likely work cooperatively with private landowners to manage some non-native grassland habitat. Figure 10 indicates the location of the focus areas for this alternative occur about equally in Illinois and Indiana. Leach and Ross, 1995, suggest an appropriate target for protection of oak savanna may be 2% to 3% of the land in each physiognomic province. The area of both the Central Till Plains Section (15,326,281 acres) and the smaller Grand Prairie Subsection (4,797,090 acres) were established using GIS and the digital U.S. Forest Service map of Ecological Units of the Eastern United States (Keys, et al. 1995). It is not entirely clear which of these corresponds with the physiognomic province suggested by Leach and Ross. However, if we use the smaller Grand Prairie Subsection, and generously estimate the amount of oak savanna potentially protected by the Refuge at about one-third of the 30,000 acre refuge total, only about 0.2% as a percentage of the Subsection is protected.

Alternative 3 has two main purposes: The first is to establish large blocks of contiguous grassland working with partner conservation organizations and private landowners. The second is to protect the last important remnants of the oak-savanna ecosystems. Protecting large blocks of savanna and grasslands with a focus on migratory grassland birds, which are declining faster even than forest interior species, and rare ecosystem conservation are the reasons for the grassland scenario.

selected as focus areas in the Upper Mississippi/Tallgrass Prairie Ecosystem Action Plan (EAP). These include: prairie wetland and associated habitats; tallgrass prairie and associated habitats; oak savanna and forest lands, and riparian woodland corridors and associated habitats. This alternative and the EAP also agree in terms of proposing a landscape approach to the management of oak savannas. The process by which the Hybrid alternative Focus Areas were selected involved informally scoring each Focus Area using criteria A - G listed below.

The criteria are loosely weighted with A receiving the most weight and H the least.

A = FEDERALLY ENDANGERED SPECIES HABITAT

B = AREA SENSITIVE MIGRATORY GRASSLAND BIRD HABITAT

C = FUNCTIONS TO COMPLETE KANKAKEE RIVER CORRIDOR

D = CONNECTIVITY WITH EXISTING MANAGED AREAS

E = SWEEP OF STATE LISTED SPECIES

F = RATIO OF EXISTING TO RESTORABLE HABITAT

G = ABSENCE OF INTERNAL FRAGMENTATION BY DEVELOPMENT

H = FIT WITH OTHER FOCUS AREAS FOR LANDSCAPE MANAGEMENT

The Hybrid alternative is the Service preferred alternative because it gives the Service the greatest opportunity to both address trust resources and contribute to the conservation of biodiversity in the watershed. Since the Hybrid alternative spans the proposal study area, it also gives the Service great flexibility to: 1) work with partners and cooperators to manage at the landscape scale, and 2) work with willing sellers to acquire refuge land.

All of the challenges listed for alternatives 2 through 4 apply to the Hybrid alternative. Other challenges include: determining a measure of vulnerability in order to prioritize among sites offered by willing sellers, managing dispersed units, managing disparate ecosystem types, and cooperating with landholding agencies in the watershed. The Service has begun to address those issues critical to implementing the Hybrid alternative.

TABLE 2.4
Existing Land Use by Focus Area (in acres) in the Hybrid Alternative

FOCUS AREA #	TOTAL	WETLAND	GRASSLAND/ PASTURE	UPLAND FOREST	AGRICULTURE	URBAN
2	1434	497	41	186	710	0
4	988	40	10	30	889	19
5	431	108	20	22	281	0
6	2027	727	172	230	867	31
7	2504	15	228	708	1550	3
8	5807	2172	897	708	1995	35
10	4368	52	495	1092	2724	5
13	10053	56	4903	1412	3572	110
15	6736	71	2172	217	4137	139
17	3574	822	326	488	1911	27
18	4121	939	127	640	2401	14
19	7129	1491	291	609	4724	14
20	1420	379	20	191	830	0
22	421	175	16	61	169	0
TOTAL	51,013	7,544	9,718	6,594	26,760	397

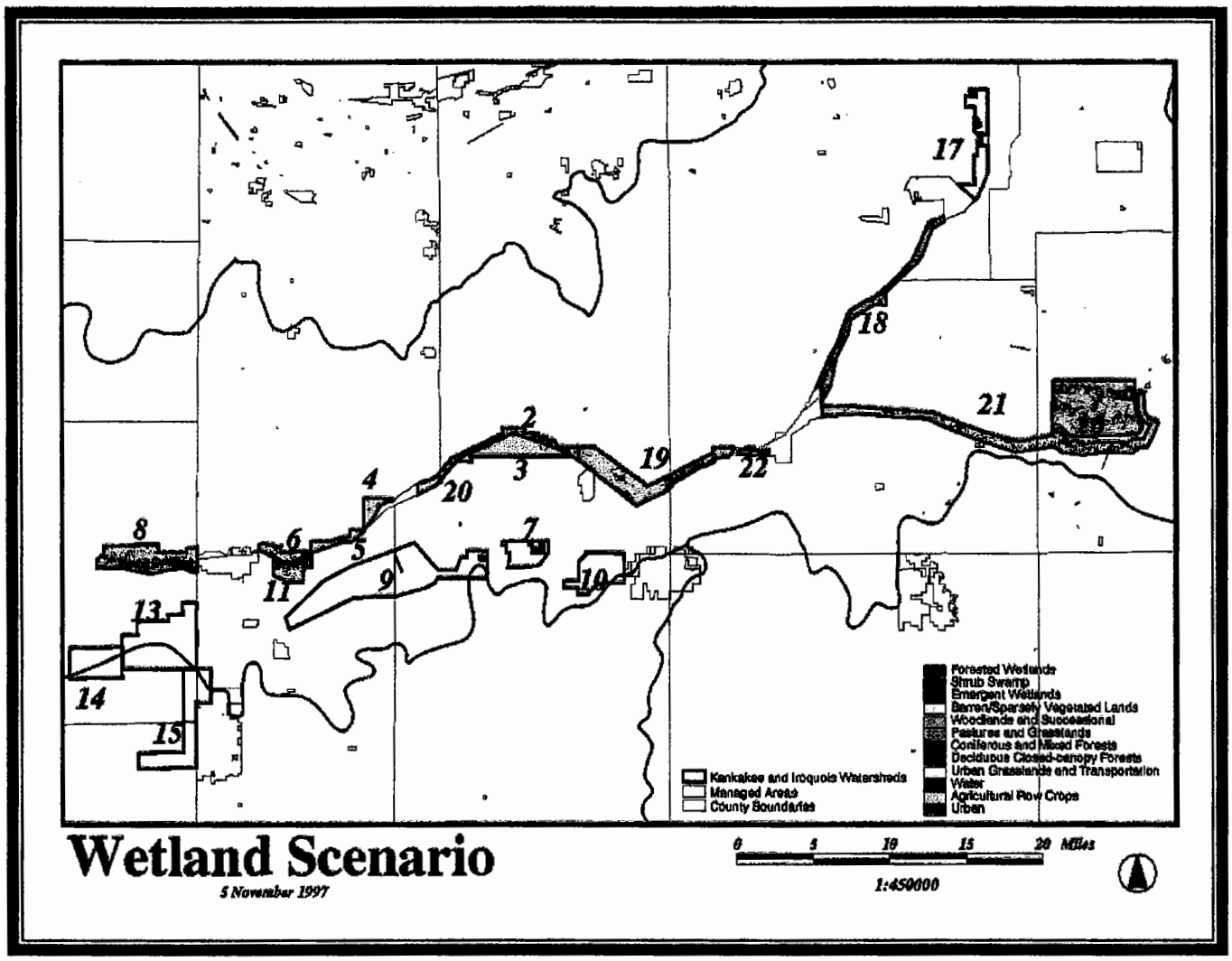


Figure 9 - Alternative 2

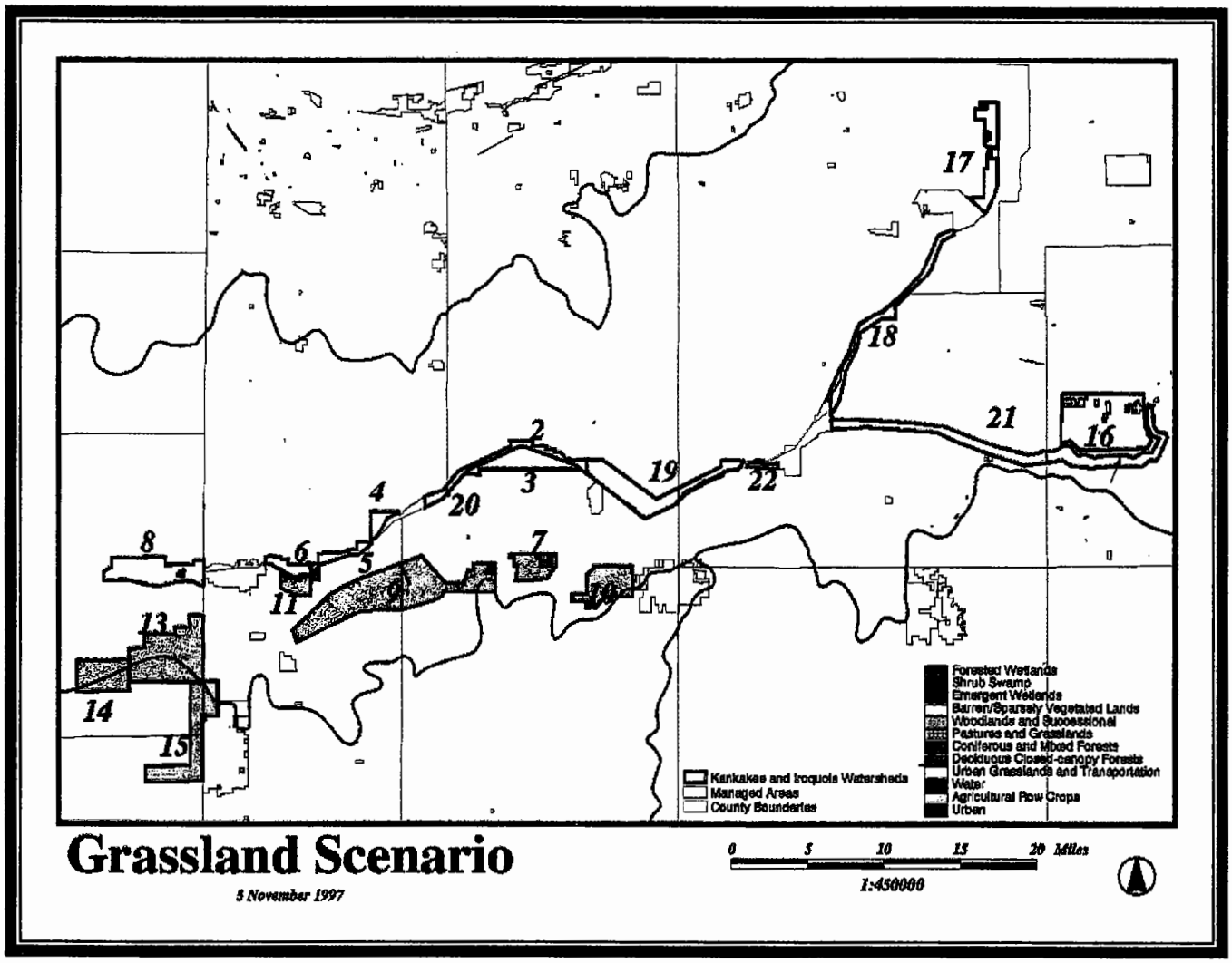


Figure 10 - Alternative 3

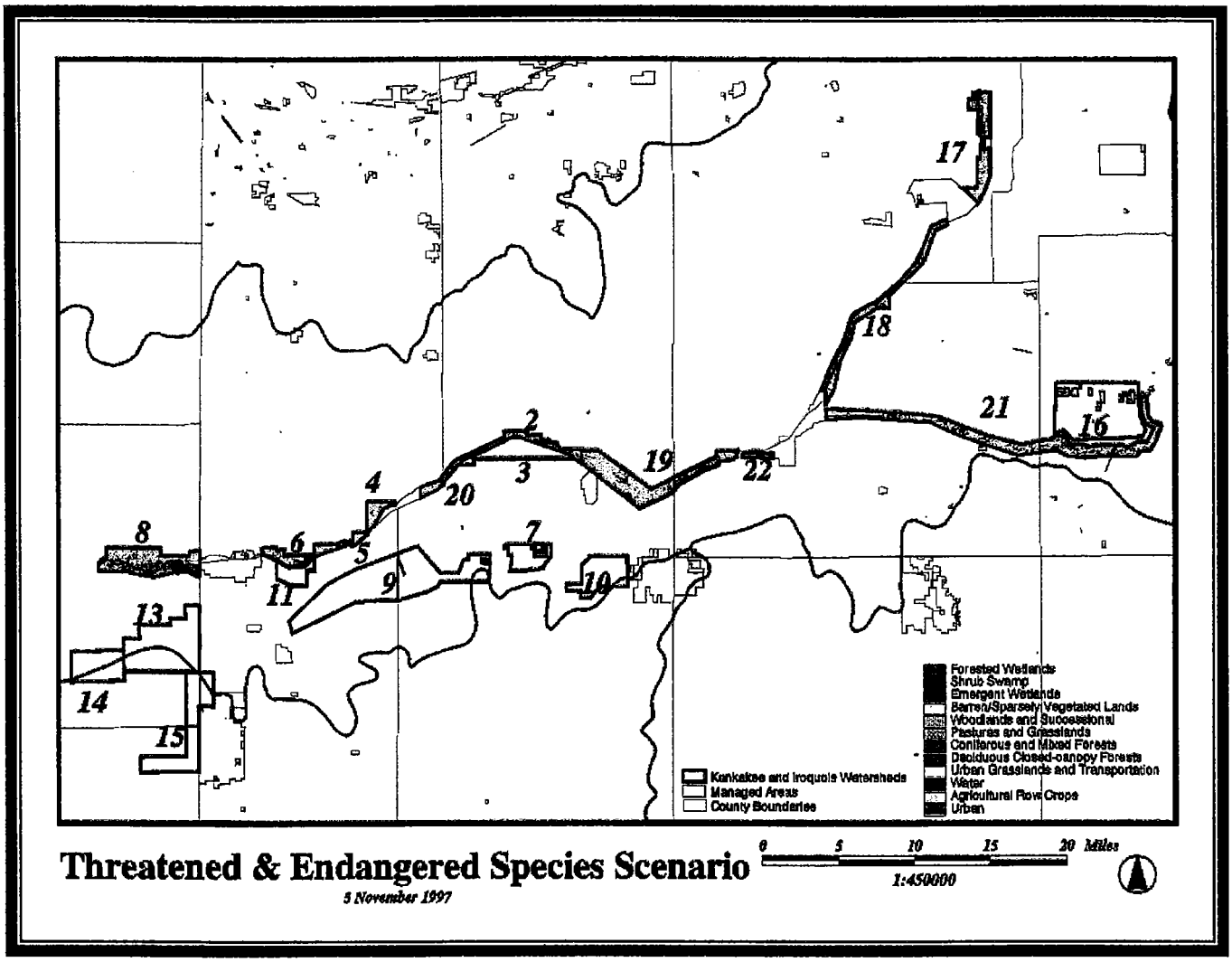


Figure 11 - Alternative 4

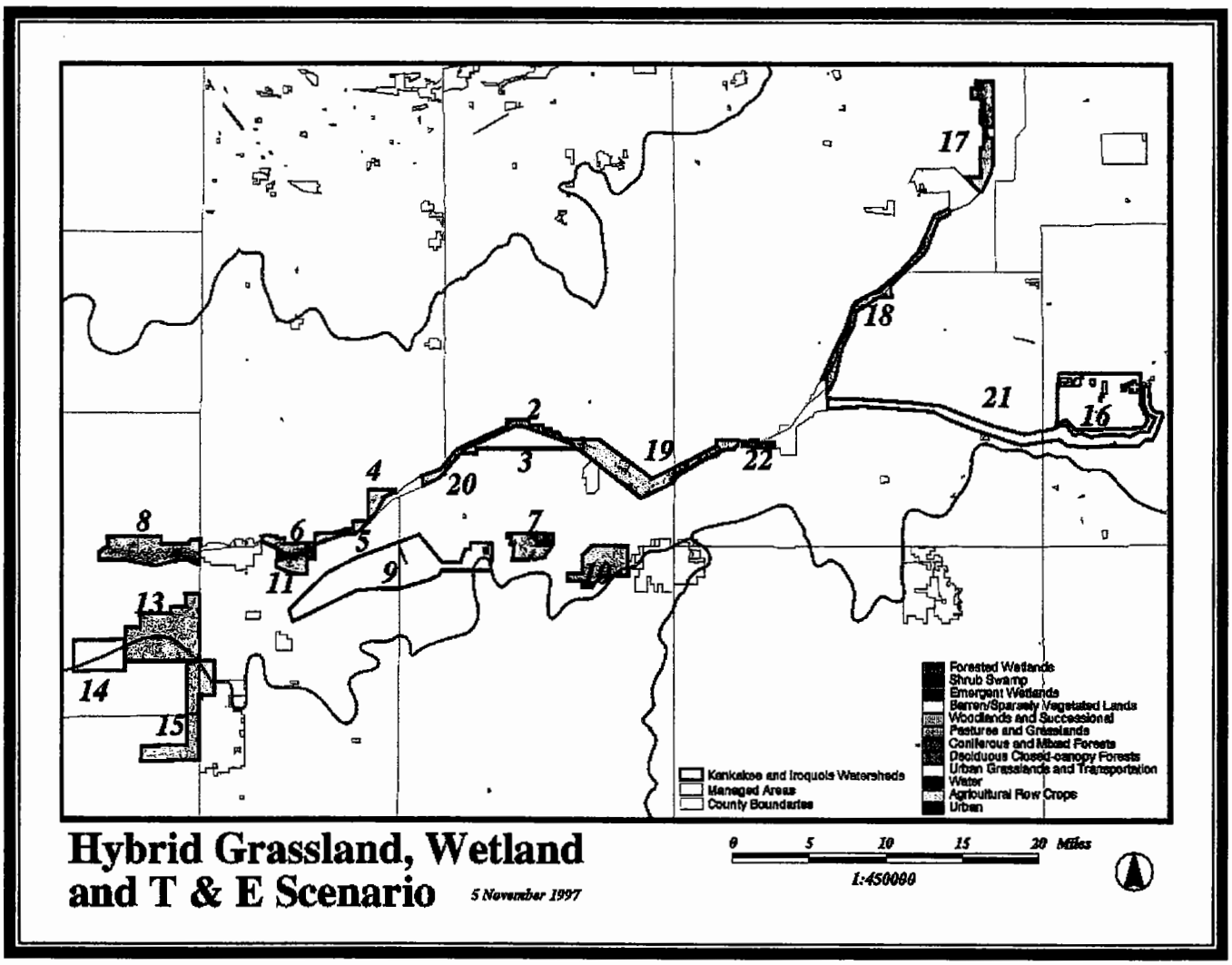


Figure 12 - Alternative 5

CHAPTER 3 - THE AFFECTED ENVIRONMENT

I. THE PHYSICAL ENVIRONMENT

1. Project Location and Description of the Area

The Kankakee River Basin covers an area about 3.3 million acres (Figure 1) including all or portions of Ford, Grundy, Iroquois, Kankakee, Vermillion, and Will counties in Illinois and Benton, Elkhart, Jasper, Kosciusko, Lake, LaPorte, Marshall, Newton, Porter, Pulaski, St. Joseph, Starke, and White counties in Indiana, and Berrien county in Michigan.

From its source near South Bend, Indiana, the Kankakee River flows for nearly 150 miles through Indiana to its mouth at the Illinois River near Channahon, Illinois. In Indiana it flows southwest through seven artificial channels until it reaches the Illinois-Indiana border. For the next 9.5 miles the river regains its natural character and meanders through a mature floodplain forest on both sides of the river with old meanders functionally intact. It flows across a sandy bottom until it reaches Momence where there is small dam and the river begins to flow over limestone bedrock. From Momence to Aroma Park the river is less meandering and flows over a mixture of substrates alternately sand, cobble and bedrock. At Aroma Park, the Kankakee River is joined by the Iroquois River and turns north again flowing over mixed substrates and bedrock until it reaches the dam at Kankakee. The 12 foot high dam at Kankakee creates a 4.7 mile pool referred to as the "six mile pool". The river flows from Kankakee to Wilmington where an 11 foot dam creates a 2 mile pool. The Kankakee merges with the DesPlaines River near Channahon to form the Illinois River. The Kankakee River's two principle tributaries are the Yellow River and Iroquois River (Bhowmik and Bonini, 1981; Ivens et al., 1981).

Prior to channelization, the river arrived at the state line after traveling 250 miles via 2,000 bends and meanders with a gradient of about 5 inches to the mile. Today, the channel has been deepened and the distance between the two points is 82 miles (Bhowmik and Bonini, 1981; Ivens et al., 1981). Historically, the winding water flowed over sand and gravel until it reached Momence where the substrate changed to limestone bedrock. In 1878, when the U.S. Army Corps of Engineers conducted the first of five studies on the Kankakee River, Major Jared A. Smith referred to this area as the "rock ledge" at Momence. Since that time the term "rock ledge" has lead to a serious misconception that has driven much of the debate over drainage of the "Grand Kankakee Swamp". Many have the impression that the "ledge" is a single obstruction like a dam. It is actually a 4 mile reach of river where the water is flowing over bedrock (see appendix IV for a Chronology of Important Events on the Kankakee River) .

The principal causes for the creation of the Grand Kankakee Marsh were continental glaciation and the Kankakee Torrent. These factors account for why most of the Grand Marsh formed in Indiana, the large expanse of sand dune and swale topography, and why the river past Momence develops a higher energy and much steeper descent: 25 feet over 14 miles from Momence to the confluence of the Iroquois, and then 103 feet over 33.5 miles to its mouth at the Illinois River (Bhowmik and Bonini, 1981; Ivens et al., 1981).

View of the Kankakee River looking east from near the Indiana/Illinois state line.

View of the Kankakee River looking west from near the Illinois/Indiana state line

2. Climate

The climate of the Kankakee Basin is temperate continental, marked by cold winters, warm and humid summers, and the lack of a pronounced dry season. The climate of the northern half of the Basin is influenced by its proximity to Lake Michigan. Lake-effect climatic conditions include warmer autumns, cooler springs, higher humidity, increased winter cloudiness, and greater amounts of snow than areas of comparable latitude (Beatty, 1990). In general, the lake produces a marine effect moderating the continental climate of northern Indiana and Illinois.

Total annual precipitation in the Indiana portion of the basin averages approximately 38 inches/year (Beatty 1990), with nearly 22 inches of this falling between mid-April and mid-October. Of particular note, lake-effect snows that affect the northeast part of the Basin can produce twice the annual snowfall of the southern and western areas of the Basin (Beatty 1990). In a year of average precipitation, it is estimated that 30 inches is lost to evaporation, yielding a water surplus in a normal year (Beatty 1990). This has importance for the availability of water and associated stream flow and recharge of wetlands within the Basin.

The average annual temperature within the Indiana portion of the Basin averages 50^0 F. The main valley of the Kankakee River has the shortest growing season in Indiana (150 days) primarily because of the low-lying terrain and sandy soils covered by organic material. These soils, because they gain and lose heat rapidly, are particularly susceptible to frost (Beatty 1990). Conversely, the northern portion of the Basin has a comparatively long growing season (170 days) because of its proximity to Lake Michigan.

3. Geology

The Kankakee River Basin consists of glacial deposits over paleozoic bedrock (Gross and Berg 1981). The landscape is attributable to events that took place during the latter part of the Wisconsin glaciation from about 24,000 - 10,000 years ago. Most relevant to current fish and wildlife resources are the occurrence of a glacial lake encompassing what is now the Kankakee River floodplain, and windblown sands that formed dunes along the southern margin of the existing Basin. About 14,000 years ago, drainage from the Lake Michigan, Saginaw, and Erie lobes discharged meltwater into the Kankakee Basin. This lake produced a broad flat flood-basin that is approximately 2 miles wide near the city of South Bend, Indiana and spreads to about 8 miles wide at the Indiana-Illinois State line (Beatty 1990). As the glacial lake receded, sand deposited in a belt that ranges from about 20 miles wide in Iroquois County, Illinois, to 30 miles wide in Starke County, Indiana, was exposed to primarily western winds that formed an extensive area of dunes. These lie mostly south of the present day Kankakee River in Newton, Jasper, Starke, and Marshall Counties in Indiana and Kankakee and Iroquois Counties in Illinois (Gross and Berg 1981). These dunes stand from 15 to 50 feet above the surrounding floodplain and are oriented north-south reflecting predominately westerly winds (Beatty 1990).

4. Soils

Soil is formed through the interaction of climate, living organisms, and landscape position with the glacial and bedrock parent material over time (Broderson 1991). Principal soils of interest for the proposed Refuge include: the Maumee-Gilford-Sebewa association on the lacustrine and outwash plains of the main Kankakee River valley that are nearly level, very-poorly drained soils formed under native grasses and mixed water-tolerant hardwoods; Genesee-Eel-Shoals, Tracy-Door-Lydick, and Oshtemo-Fox and Fox-Ockley-Westland associations located on alluvial and outwash deposits, and formed under mixed hardwood trees except on Door (prairie grasses) and Lydick (prairie grasses and trees); the Plainfield-Maumee-Oshtemo association located on *eolian* sands and formed under prairie grasses and black oak (*Quercus velutina*); and, Brookston-Odell-Corwin and Parr-Brookston associations which formed in thin loess over glacial till and Markham-Elliott-Pewamo which formed in clayey glacial till, all of which formed under prairie grasses (Beatty 1990).

Under current land use, soils in the Basin support predominately agricultural ecosystems. At least 3 elements, however, lower the suitability of large areas of soils within the Basin for agriculture. They are erosion, drought, and poor drainage. The most extensive of these is that many soils in the Basin have poor natural drainage and even in artificially-drained areas, wetness, ponding, and flooding can pose moderate-to-severe limitations (Beatty 1990). The continuing difficulties with large-scale agricultural production on one of the world's largest historic wetlands was the driving force behind the establishment of the Kankakee River Basin Commission and the study by SEG Engineers.

5. Water

Groundwater in the Kankakee basin is used primarily for domestic water supply with surface water used for agriculture and recreation. Groundwater in the Basin originates in 3 aquifers: the Valparaiso Outwash Aquifer, the Kankakee Aquifer, and the St. Joseph Aquifer. Surface water in the Basin originates in irrigation ditches near South Bend, Indiana which become the Kankakee River approximately 8 miles southwest.

Water has played the key role in the physical, biological, and socio-economic environments of the Basin. When the Wisconsin glaciation ended approximately 10,000 years ago, meltwater covered the Basin with large lakes and the erosive forces of the Kankakee Torrent contributed to the surficial geology of the Basin. Water continued to be the dominant factor driving the ecosystem until European settlement in the mid-19th century.

The Grand Marsh posed a formidable challenge to the settlement of the Indiana part of the Basin. As early as 1849, the Indiana General Assembly authorized projects to begin draining the area. By the early part of the 20th century, a system of ditches and levees supported a predominately agricultural landscape. Since that time, it has become essential to many Indiana farmers that the Kankakee River function as an agricultural drainage ditch. In Illinois, where the Kankakee River has not been channelized, the Kankakee exists in a near natural condition especially between the Indiana state line and Momence, Illinois, where the river meanders through natural winding channels, high-quality shrub swamps, and mature floodplain forests. Although the landscape is predominately agricultural, Illinois farmers are not nearly as dependent on the Kankakee River as their principal conduit for agricultural drainage as are many of their Indiana counterparts.

In Illinois, the Kankakee River, based on biological parameters, has among the best water quality of any river in the state. The water in the Kankakee has been variously classified as "excellent among Illinois streams", and a "Class B Stream (Highly Valued Aquatic Resource)", and included on a list of outstanding Illinois aquatic ecosystems (Kwak 1993). In Indiana, based on the Index of Biotic Integrity (IBI), 76% of stream miles surveyed fully or partially support aquatic life use, while 24% are not supportive. Low IBI values were primarily attributable to lack of habitat, and to a limited extent, low dissolved oxygen (IDEM, 1995).

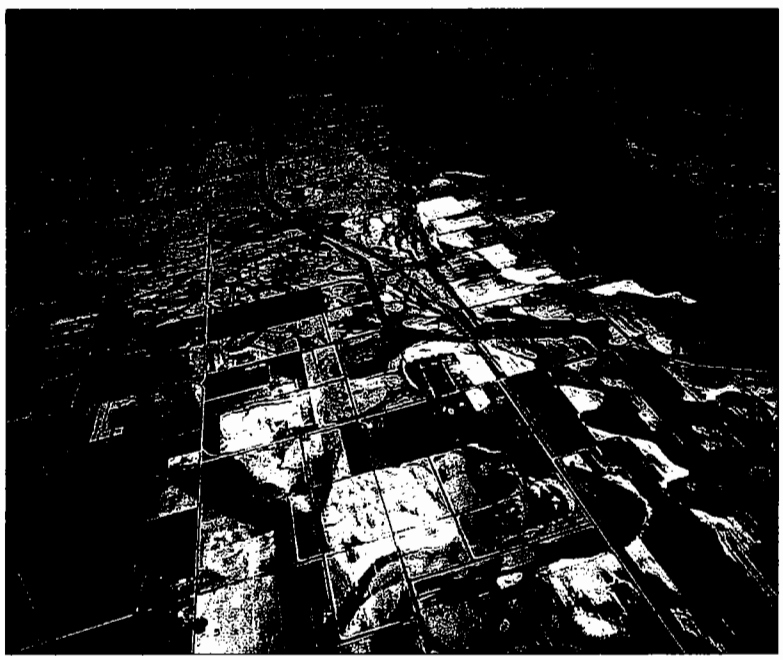
6. Sedimentation

The deposition of sediment in the Kankakee River has long been an issue with its users. Concern exists that materials carried downstream from the channelized portions of the river settle out when they reach the natural river in Illinois, causing flooding and limiting the overall recreational and ecological value of the river. Recent studies on sedimentation by the U.S. Geological Survey on the meandering portions between the state line and the Momence Wetlands and Six-Mile pool above the Kankakee dam found substantial amounts had accumulated in recent years. From 1980 to 1994, 133,600 cubic yards of sediment had accumulated along the Momence Wetlands. Between 1978 to 1980, 115,700 cubic yards had accumulated in Six-Mile pool and from 1980 to 1994, sediment in the pool grew by another 182,900 cubic yards.

7. Flooding

Currently the Kankakee River overflows its banks an average of every two years. These flooding events combine large volumes of water with unusually low peaks and extremely long durations. This is principally due to the large expanse of flat land that holds the water for extended periods of time. Data beginning in 1926 show that annual flood peaks are increasing due to intensified agricultural practices, diking and pumping, and urban growth (Kankakee River Basin Commission, 1989).

The frequent flooding in the Basin is the result of several factors, including 1) the loss of river capacity due to channelization, 2) increased runoff to the river and its major tributaries due to agricultural drainage and urban/rural development, 3) loss of wetlands to retain and slowly release flood waters, 4) erosion of topsoil due to inadequate land treatment practices, and 5) bank erosion along the river and its tributaries as a result of increased peak flows. Not only does the Kankakee River and its tributaries receive increasing amounts of runoff, increased deposition and build-up of sediments within the river and its tributaries are reducing the capacity to retain these waters within the river banks. Further, due to the flatness of the Basin, floodwaters have the potential to affect large acreages.



Modern-day flooding and sedimentation not only cause monetary damages to local property, they also destroy natural resources and degrade and/or restrict many recreational uses of the river.

Flooding along the Kankakee's main channel in Indiana impacts 106,150 acres, of which 86,060 are cropland. A 1976 study placed the extent of annual damage at $1,420,000, which in 1997 dollars is $4,250,000. With respect to tributaries, that same study found that flooded land amounted to 91,000 acres and produced damages estimated at $1,234,700, or $3,690,000 in 1997 dollars. Another study in Illinois found that flooding along the Illinois portion of the river produced similar damages. It was estimated that over 10 percent of the land within the Basin floods and annual damages along the Kankakee, Iroquois, and Sugar Creek could be as high as $1,240,000 (1997 dollars). Recent estimates of flood damages within the Basin indicate annual damages in excess of $14 million.

8. Archeological Resources

Numerous archeological sites are known to exist in the Kankakee River Basin. The following data indicate the known archeological sites within each of the counties that comprise most of the Basin: Iroquois - 204 sites, Kankakee - 486 sites, Will - 1,682 sites, Porter - 515 sites, St. Joseph - 342 sites, Lake - 443 sites, LaPorte - 247 sites, Starke - 113 sites, Newton - 180 sites, Jasper - 66 sites, and Marshal - 363 sites. The river and its tributaries offered native peoples excellent transportation and sites rich in essential resources.

II. THE BIOLOGICAL ENVIRONMENT

The Keystone Center, 1991, defines biological diversity as the variety of life and its processes including the variety of living organisms, the genetic differences among them, and the communities and ecosystems in which they occur. Biological diversity can be considered at a minimum of 4 levels: *genetic level, species level, ecosystem level, and landscape level.* In order to manage the biological resources of the Basin, it is necessary to work at the species, ecosystem, and landscape levels.

Because the Basin exists at the edge of the prairie biome, numerous species occur at the edge of their ranges there. The area remains important for those organisms inhabiting prairie-wetland and the transition zone between prairie and oak-hickory forest. Considerations of genetic diversity may be particularly important for these species, but for practical reasons, planning to actively conserve genetic diversity will constitute a minor component of Refuge development.

To limit the complexity of the discussion, we consider the various levels of biological diversity independently here. However, the levels of biological diversity are inextricably interrelated on the ground. Species are how we typically measure biological diversity and they historically represent the principal focus of wildlife managers.

1. Species Level Biological Diversity

A. Plant Species

The protection of plants by means of the proposed Refuge will focus on three categories of plants: 1) Federally listed (endangered, threatened, and candidate) plants or plants necessary to the viability of populations of Federally listed species; 2) those that biologists within the Indiana DNR Division of Nature Preserves (DNP) and Illinois DNR consider particularly vulnerable; and, 3) plants that would best be protected by the proposed Refuge's landscape approach.

B. Threatened and Endangered Species

Restoration of the wetland-prairie/oak savanna landscape would also benefit other historically important and ecologically significant species. Federally endangered, threatened, and candidate species within focus areas in the Basin include Mitchell's satyr butterfly and Indiana bat. The entire Basin holds more than 200 state-listed species including the western sand darter (*Etheostoma clarum),* northern leopard frog (*Rana pipiens),* eastern massasauga *(Sistrurus catenatus catenatus)*, Franklin's ground squirrel (*Spermophilus franklinii)*, and Kankakee mallow (*Iliamnaa remota)*. One important outcome of the proposed Refuge would be to avert possible Federal listing of some of the numerous Illinois and Indiana state-listed species occurring in the Basin. While not a primary goal of the Refuge, the recent successful reintroduction of the northern river otter (*Lutra canadensis)* by the Indiana DNR in a neighboring watershed suggests opportunities for the reintroduction of other extirpated species into a landscape of protected areas. Examples could include prairie chicken and bison (*Bison bison)*. The latter would reintroduce a large herbivore and an important component of the prairie/savanna ecosystem.

C. Invertebrate Species

The Kankakee River in Illinois supports a diverse mussel fauna (20 species) including 10 species that are listed under the Illinois, Indiana, or Federal Endangered Species Acts. The Federally endangered Higgin's eye (*Lampsilis higginsi)* and the state endangered rainbow (*Villosa iris)*, snuffbox (*Epioblasma triquetra),* and spectaclecase (*Cumberlandia monodonta)* do not have recent live records and may be extirpated from the drainage (Kwak 1993).

State-listed species extant in the "Kankakee River Resource Rich Area" in Illinois, which corresponds closely with Refuge focus areas include: slippershell (Alasmidonta viridis) (state threatened (ST)), spike (Elliptio dilatata) (ST), sheepnose (Plethobascus cyphyus) (state endangered (SE)), purple wartyback (Cyclonaias tuberculata) (ST), black sandshell (Ligumia recta) (ST), salamander mussel (Simpsonaias ambigua) (SE), and ellipse (Venustaconcha ellipsiformis) (Special Concern) (Francis Harty, Illinois Dept. of Natural Resources, 9 March 1997, facsimile communication; Illinois Natural History Survey Mollusk Collection Database 1999).

The Federally endangered Hine's emerald dragonfly does not likely occur in the Basin, but the area has not yet been adequately surveyed and suitable habitat for this species may exist (Tim Cashatt, Illinois State Museum, 29 July 1997, telephone conversation).

D. Fish Species

Fishing on the Kankakee River is a major recreational activity in northwestern Indiana and northeastern Illinois. The Kankakee River in Illinois is a premiere smallmouth bass stream and holds past state records for several recreational species. Ninety-nine species of fish in 19 families have been collected in the Kankakee River (Kwak 1993). In addition, the Illinois DNR lists 6 species in the Kankakee River Resource Rich Area as either state endangered or state threatened. They are: western sand darter, northern brook lamprey (*Ichthyomyzon fossor*), river redhorse (*Moxostoma carinatum*), pallid shiner (*Notropis amnis, Hybopsis amnis*), ironcolor shiner (*Notropis chalybaeus*), and weed shiner (*Notropis texanus*). The varied fish fauna of the Kankakee River has long been valued as a food and recreational resource by the people of the Basin.

E. Amphibians and Reptile Species

Herpetofauna are increasingly the concern of conservation biologists (Blaustein, Wake, and Sousa 1994). Nearly 15 years ago, Minton 1982, perceived declines of some species in Indiana including the cricket frog (*Acris crepitans*), the northern leopard frog, and the striped chorus frog (*Pseudacris triseriata triseriata*). Although we do not completely understand the apparent decline of certain amphibian populations, habitat loss and fragmentation may play an important role. Wetland protection and linking isolated wetlands into a landscape complex in the Basin could be important for the long-term survival of some amphibian species.

F. Bird Species

The restoration of wetland complexes containing large, interconnected habitat patches would provide habitat for a variety of area-sensitive (birds that have minimum area requirements) wetland-dependent

birds including the least bittern, American bittern, black tern, sedge wren, and prothonotary warbler which currently breed in the Basin. Numerous other wetland or successional habitat-dependent species including several on the list of Migratory Non-game Birds of Management Concern in the United States (1995 List) occur in the Basin (Office of Migratory Bird Mgt. 1995).

The 1995 List contains 122 species and documents habitat loss as the primary threat to 80% of those species (Office of Migratory Bird Mgt. 1995). Grassland species of management concern on the 1995 List that would benefit from prairie/savanna restoration and protection in the Kankakee Basin include: grasshopper sparrow, bobolink, Henslow's sparrow, field sparrow, eastern meadowlark, dickcissel, and upland sandpiper. The proposed Refuge's contribution to large scale prairie restoration in the Basin will provide necessary habitat particularly for area-sensitive non-game grassland birds. Herkert 1994 identified the following grassland species breeding in northeastern and east-central Illinois as area sensitive: grasshopper sparrow, Henslow's sparrow, bobolink, savannah sparrow, and eastern meadowlark.

The wetlands of the Kankakee remain a significant breeding area for waterfowl despite habitat loss and fragmentation. Dubowy and Hartman, 1995 studied waterfowl nesting in the Basin and found mallards, blue-winged teal, and wood ducks exhibited a nesting density of 0.8 pairs/wetland acre in natural and restored wetlands within the Basin. In addition, tens of thousands of migratory waterfowl depend on the wetlands of the Kankakee River Basin. Waterfowl hunting remains an important recreational activity in the area with a tradition going back to the days of the Grand Marsh.

The Basin currently supports up to 100% of the eastern population of greater sandhill cranes (*Grus canadensis tabida*) during migration. Sandhill cranes now use primarily 1 site, the Jasper-Pulaski Fish and Wildlife Area, to stage during migration. The realization of the proposed Refuge would provide additional protected habitat for this species. One objective of the Refuge is to spread out the population of birds to avoid potential loss to disease, catastrophic weather, or other stochastic events.

G. Mammal Species

The mammals of principal concern within the Basin are those historically associated with grassland ecosystems and, therefore, several occur at the edge of their ranges. Illinois has no mammals on the state list. The Federally endangered Indiana bat (*Myotis sodalis)*, and the following Indiana-listed species occur within the Basin: American badger (*Taxidea taxus*), bobcat (*Lynx rufus*), Franklin's ground squirrel (*Spermophilus franklinii*), northern river otter (*Lutra canadensis*), plains pocket gopher (*Geomys bursarius*), and western harvest mouse (*Reithrodontomys megalotis*).

2. Ecosystem Level Biological Diversity

Ecosystems are defined as the interacting parts of the physical and biological worlds (Ricklefs 1990). There are three ecosystems of primary importance with respect to the Kankakee River Basin: wetlands, savannas, and prairies. Historically, ecosystem level protection has occurred through regulatory programs such as Section 404 of the Clean Water Act, and by protecting habitat for refuges, state-protected areas, and preserves.

In the Kankakee River Basin, several examples of each ecosystem are protected in existing managed areas. Wetlands are an important component of most of the managed areas in the Basin. More than 1,000 acres of wet prairie and sedge meadows are protected at the Iroquois County State Conservation Area and the Beaver Lake State Nature Preserve and over 2,000 acres of high-to-fair quality oak savanna are protected among several state-owned areas in Indiana and Illinois. In addition, TNC's Fair Oaks Farm restoration project could result in restoration of approximately 7,200 acres of grasslands (TNC 1997). While state agencies and private organizations have made significant strides in ecosystem protection, for the most part, protected areas remain isolated, and ecosystems are unrelated to one another in the landscape.

A. Wetland Ecosystems

Wetlands have declined at an alarming rate. The State of Illinois has lost more than 85% of its pre-settlement wetlands and the State of Indiana has lost about 87% (Dahl 1990). Of the approximately 5.6 million acres of pre-settlement wetlands in Indiana, approximately 15% were found in the Grand Kankakee Marsh. Abundant, diverse, and functioning wetlands provide a broad range of benefits to society. The value of wetlands have been accepted by multi-disciplinary forums (National Wetlands Policy Forum 1988). Wetland ecologists classify these values into 3 categories: population, ecosystem, and global values. Population values consist of habitat for a wide variety of species and related recreation values. For example, about 35% of all endangered animal species require wetlands during their life cycles (National Wetlands Policy Forum 1988). Ecosystem values include: flood water storage, water quality, and sediment control. Global values may include maintenance of the biogeochemical cycles of nitrogen, carbon, and methane (which may be important in preservation of the ozone layer).

Wetlands are among the most productive areas on earth. These diverse systems 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 which 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 is often the most significant driving force in most wetland communities.

Another ecologically important aquatic habitat found along the Kankakee 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, and 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 that ranges from fast flowing chutes with high banks, to sluggish streams moving through marshy areas.

Water quality, quantity, velocity, timing, frequency, and duration are the primary determinants of a rivers floodplain structure and function. When a river floods under natural conditions, it alters 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 system as a fire is to a prairie.

During the annual spring flood, fish and other aquatic life are transported to inundated floodplain nursery and spawning habitats. As the water naturally recedes, it forces the spring's production into the web of larger fish, fish eating birds, and alike. It also allows the transfer and incorporation of organic materials, such as leaves and decaying branches found in the floodplain, into the river's base food webs.

The summer's dry cycle seasonally exposes mudflats where sediments dry and compact, organic material breaks down, and moist soil vegetation (annuals) begin to grow. The annual fall flood makes the summer's bounty available to migrant and resident wildlife and fish. It also provides fish and other aquatic life access to wintering areas that have adequate food supplies and relatively slow currents.

The construction of levees and channels has altered the natural structure and function of the river-floodplain relationship. The seasonal hydrologic pulsing that normally provides 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 levee and channel construction.

Historically important, the Kankakee River Basin remains significant in terms of existing wetland resources. Areas of protected wetlands in Illinois and Indiana include: the Momence Wetlands Nature Preserve and the Momence Wetlands Land and Water Reserve, Kankakee River State Park, and the Des Plaines Wildlife Conservation Area in Illinois; and, LaSalle, Kankakee, and Kingsbury, Jasper-Pulaski, and Willow Slough Fish and Wildlife Areas, and Potato Creek State Park in Indiana. The 500,000 to 1,000,000 acre wetland area that once existed in the Basin obviously affords the opportunity for landscape scale wetland restoration. The IDNR has funded a remote sensing study of the wetland restoration potential in the Basin similar to that conducted for the Indiana Gap Analysis project in the Eel River watershed (Yang et al. 1996). Wetland restoration efforts are currently underway in the Basin, most notably the Indiana Partners for Wildlife Habitat Restoration Project and the Indiana Grand Kankakee Marsh Restoration Project of the North American Waterfowl Management Plan.

B. Savanna Ecosystems

Savanna is defined as a variety of related plant communities found around the world consisting of open-grown trees, found scattered or in small groves, with a primarily grassy understory. Botanists typically use tree density to distinguish between prairie, oak savanna, and forest. In Indiana and Illinois, tree canopy cover from 10% to 80% can define oak savanna ecosystems. Natural processes important in the formation of Midwest oak savanna include: fire, climate, topography, soil, and large herbivores (Nuzzo 1986). In addition, savanna is typically a transitional community between forest and grassland where it occurs in the United States.

Midwest oak savannas are among the world's most threatened communities (Anderson, et al. 1993). Although what remains in the Kankakee Basin is among the most concentrated occurrence of northern black oak savanna in the nation, loss to development continues to be a serious threat. In addition to loss,

many remaining savannas are severely degraded primarily because of the absence of fire critical to the maintenance of this system. Prompt management and protection efforts are required to conserve what remains.

The southeastern Kankakee County/northeastern Iroquois County area in Illinois has the potential for large-scale management for oak savanna. Recent work by Banks et al. preliminarily confirms the existence of significant remnant savanna in the Indiana portion of the Basin. Landscape level management of sand savannas in this region is a priority for the Indiana DNR and the Indiana Field Office of TNC. The Midwest Oak Ecosystem Recovery Plan (Leach and Ross 1995) lists as goal 2: "establish a networked system of reserves that captures the full array of oak ecosystem species, communities, and processes, and that conserves viable populations of all plants and animals known to inhabit them." Other listed goals include the establishment of buffer areas and the development of stewardship and education networks.

C. Prairie Ecosystems

Prairie is a general term for several types of grass-dominated ecosystems. In Indiana, tall-grass prairie historically covered approximately 13% of the state and yet in the late 1960's, Lindsey found only 1 remnant large enough to allow him to consider prairie a landscape type (Lindsey, Schmesz and Nichols 1969). In 1978, the Illinois Natural Areas Inventory identified only 2,352 acres of high quality prairie scattered over 253 areas, with a full 73% occurring along railroads and in cemeteries (White 1981). Many small remnants exist in the study area, but will require intensive management to preserve their diversity. Even under careful stewardship, small, isolated "islands" exhibit the twin problems of the loss of some conservative species and the domination of opportunistic species (Noss and Harris 1986).

Betz, 1978, divides the prairies of Indiana into 3 major types: sand prairies and black oak savannas; black silt-loam prairies; and, dry gravel-hill prairies. Approximately 50% of the Indiana prairies were sand prairies and black oak savanna. White and Madany, 1981, classified prairie communities of Illinois into 6 subclasses: Prairie subclass, Sand Prairie subclass, Gravel Prairie subclass, Dolomite Prairie subclass, Hill Prairie subclass, and the Shrub Prairie subclass. The railroad prairie remnants identified by Bacone and Harty in the Kankakee Sand Area (contained mostly in Kankakee and Iroquois counties) consisted of predominately sand prairie and 1 gravel prairie site (Bacone and Harty 1981). Because particularly the black silt-loam prairie soils are agriculturally valuable, little of the eastern tall grass prairie remains anywhere.

Until 1997, when TNC completed the purchase of approximately 7,200 acres of the 19,760 acre Prudential farm, little opportunity existed to restore a large, functional prairie ecosystem. Prairie restoration and management has typically been conducted on a much smaller scale. TNC's property, along with Indiana DNR and Illinois DNR properties, provide the core around which additional prairie restoration and complementary management of other ecosystems can occur. These core areas provide the possibility for the restoration and management of prairie as part of a biologically diverse landscape.

3. Landscape Level Biological Diversity

Landscape is defined as a number of interacting stands or ecosystems repeated in similar form over a kilometer wide area (Forman and Godron 1986). For convenience, we can think of it as a regional view of biological diversity. Until recently, there has been very little work, particularly in the Midwest, to protect biological diversity at the landscape scale. In order for the proposed Refuge to exist as part of a functioning landscape, the Service will have to: 1) protect and restore ecosystems historically occurring in the landscape across a significant portion of the Basin, 2) arrange protected areas so that the arrangement of ecosystems mimics the natural organization, e.g., between the Kankakee River and riparian forest adjacent to wet prairie surrounding oak savanna, 3) work cooperatively with a broad array of partners to manage public and privately owned land in order to mimic natural processes, e.g., fire, flooding, succession, and providing connectivity to the matrix in which the refuge would occur.

Management at the landscape level goes well beyond the scope or authority of any one agency. To be successful, it will take a true partnership among government, conservation organizations, and the citizens of the Basin. A partnership to manage a landscape represents decades of cooperative effort, but may be the only way to both protect biodiversity and sustain economic development in the region.

III. THE SOCIOECONOMIC ENVIRONMENT

The socioeconomic environment of the Kankakee River Basin is discussed in detail in the appended *Economic Impact Assessment Of The Proposed Grand Kankakee Marsh National Wildlife Refuge* prepared by the Department Of Agricultural Economics At Purdue University.

CHAPTER 4 - ENVIRONMENTAL CONSEQUENCES

This chapter evaluates the potential environmental consequences or impacts of the No Action alternative and the four Action alternatives with regard to the opportunities and issues raised during the scoping process and as a result of the DEA review (see Chapter 1 "scoping and public involvement"). The No Action alternative, which assumes a status quo condition, is used as a yardstick by which to measure the impacts of the Action alternatives.

In evaluating the potential environmental consequences for the five alternatives, it must be noted that because of the willing seller only acquisition policy of Alternatives 2-5, there is no reliable way to predict when or where particular land parcels might be acquired. Based on this uncertainty, it is problematical at best to identify specific time schedules with locations for implementation of Refuge management programs and land use changes. In order to facilitate meaningful analysis, project acquisition and development was projected to take 30 years. In reality, it may take much longer. In the meantime, acquired areas would be developed and management programs would proceed according to the size and location of lands purchased.

I. POTENTIAL IMPACTS TO THE PHYSICAL ENVIRONMENT

Alternative 1 - No Action

Water Quality in the Kankakee River

Waters of the Kankakee and its tributaries would likely remain about the same with the No Action alternative, or could gradually improve as the technology, techniques and regulations evolve to address the problems associated with sedimentation, chemical runoff, and the discharge of urban and industrial waste. Sediment loads would remain fairly high as long as the river's bare, unprotected river banks continue to erode and farming continues on the valley's slopes. USDA soil conservation requirements currently minimize soil erosion on participating farms with highly erodible soil, but large amounts of sediment and farm chemicals continue to enter area waterways. Annual flooding would continue to cause erosion on affected bottomland farm ground. Additional clearing of bottomland forests unprotected by existing regulations would exacerbate this problem by reducing sites for floodwater retention and ground water recharge, and increasing the likelihood of stream bank erosion. In addition, population growth and the expansion of urban areas in the Basin, will subject increasing areas of soil to disturbance and development.

Compared to other "Major Land Resource Areas" of Indiana, the Kankakee Basin has a lower than average overall rate of erosion. Nationally, soil erosion has declined by about 42 percent between 1982 and 1997 (USDA.) . However, Indiana still loses between 50-100 million tons of soil per year and Illinois loses more soil by water erosion than any other state in the Nation, with the exception of Iowa (Natural Resource Conservation Service, 1995).

Under the No Action alternative, U.S. Department of Agriculture (USDA) programs, like the Conservation Reserve Program (CRP), designed to conserve soil resources, would continue. Other government programs such as "Rule 5" (327 IAC 15-5), administered by the Indiana Department of Environmental Management (IDEM) would have some positive impact on soil erosion caused by

development. Neither program would likely have a significant effect on erosion or the conversion of productive soils resulting from low density housing and other developments less than 5 acres.

IDEM selected the upper Basin for a study of ground water quality because of its high susceptibility to ground water contamination and because the Basin is characterized by intensive farming. The ground water in the study area contains elevated levels of nitrates and low level detections of pesticides, although contamination by nitrates was confined to only 11 of 27 sample sites and only 2 of the 11 exceeded 10 mg/l (IDEM 1993). Under the No Action alternative, we would expect the current trend of limited groundwater contamination to continue. Increased development in the Basin, however, may elevate the risk for ground water contamination since underground storage tank leaks, hazardous materials spills, and waste disposal activities are leading causes for ground water contamination in Indiana (IDEM 1993).

IDEM, 1995, characterizes the surface water quality in the Kankakee River as "generally good throughout". Metals and sewage-related problems accounted for most of the impairment identified in the 1,638 stream miles assessed in the Indiana portion of the basin. Kwak, 1993, reviewed several studies of water quality in the Illinois portion of the Kankakee and concluded the quality of the water and sediments in the River relatively unpolluted. The No Action alternative would likely result in some degradation of surface waters with increased development.

An emerging problem tied to the Kankakee watershed is hypoxia or reduced oxygen in the Gulf of Mexico. Studies over the last several years have identified 42 sub-basins of the Mississippi River that contribute nutrients, primarily nitrogen, to the Gulf via the Mississippi River. Data beginning in the 1900's indicate that nitrate concentrations in the Mississippi have increased by a factor of from 2 to 5. These increased levels of nutrients are believed to be a partial cause of the extensive area (5,500 sq.mi.) of low dissolved oxygen in the Gulf. The interagency working group studying the problem has identified the Illinois River Watershed in Indiana and Illinois (primarily the Kankakee drainage) as among the highest source areas for nitrogen in the Mississippi basin (Goolsby, et al. 1999). Although point sources are a significant factor within the Illinois River watershed, fertilizer applied to agricultural land and particularly nitrates entering rivers via tile-drained agricultural land appears to be an important source of contamination to the Gulf. Under the No Action alternative one would expect increased efforts to tile drain and farm the extensive areas of historic wetland within the basin to aggravate this national problem.

Beatty, 1990, reports that agricultural irrigation in Indiana is most extensive in northwest Indiana including the Kankakee River basin which in 1987 accounted for 33% of the state's irrigated land and 43% of the registered withdrawals for irrigation. The No Action alternative would result in continued withdrawal for irrigation. Moreover, the increasing population in a significant part of the Basin will demand more water over the coming decades. Continued degradation of the Kankakee River's water quality from sedimentation, chemical run-off, and miscellaneous dumping could jeopardize populations of several species of state-listed fresh water mussels.

Agricultural Land

In general, we would expect the No Action alternative to result in a decrease in farmland over time in the Basin primarily from increased human development, and secondarily as a result of landowners

withdrawing flood-prone, prior-converted and farmed wetlands from production. For example, in Kankakee and Iroquois Counties in Illinois, farmland dropped from 389,185 acres to 358,920 acres and 685,137 acres to 662,629 acres, respectively, between 1987 and 1992 (Bureau of Census 1992).

In the Indiana portion of the Kankakee Basin, every county except Pulaski (+ 0.85%) exhibited a decline in farmland in the 10 year period from 1982 to 1992. The declines ranged from a high of 11.64% in Porter County to 0.31% in Jasper County (Indiana Farm Bureau 1996). The average percent decline in farmland in 9 Indiana counties in the Basin during the period was 3.9%. Some percentage of farmland in both states would also likely be lost to land acquisition by conservation agencies, flood control efforts by various Federal, state, and local agencies, and other organizations working in the Basin. A more ominous threat to farmland is rapid and widespread urbanization of rural areas. According to a recent study just released by the Chicago-based Openlands Project, the Chicago metropolitan region is predicted to double in size over the next 30 years. It is estimated that the population will grow by 48% during the next 30 years, but that land development will increase by a whopping 165%. Moreover, the authors of the report contend that without concerted efforts to contain growth, urban sprawl threatens to reach north to Milwaukee, west to Dekalb, south to Kankakee, and east to South Bend, Indiana.

Drainage and Flood Control

Under the No Action alternative flooding frequency and duration would be expected to increase. Erosion from upland farmland and sediment deposition during bottomland flooding would necessitate maintenance of existing legal ditches on an as-needed basis by local Drainage Boards. Uncontrolled beaver populations and typical high sediment loads would continue to restrict the drainage capacity of bottomland ditches and streams, increasing wetness in some low-lying farm fields and reducing yields or forcing abandonment.

Population growth, sedimentation, runoff, and urban development are all expected to increase significantly in the Kankakee Basin. In Will county alone, the population is expected to more than double from 1990 to 2020. If a new regional airport is constructed near Peotone, urban development and commercial growth in this region is expected to increase even more, placing more demands on the Basin and its resources. Over time, these processes will increase flood peaks and subject more property to damage at higher monetary costs.

Alternatives 2-5

Water Quality in the Kankakee River

With these alternatives, we would expect water quality in the Kankakee River to improve, primarily because of the removal of approximately 10-15,000 acres of marginal farmland from agricultural production. Although this would occur over a relatively long time (at least 30 years), the ultimate result would be a substantial reduction in sediments and farm chemicals entering area waterways. Restoring and developing moist-soil and forested wetlands as well as certain uplands would increase the water filtration and ground water recharge capabilities within the River ecosystem. Stabilizing riverbanks would decrease the serious erosion problem occurring in the upper end of the project area.

Under these alternatives the Service would cooperate with appropriate agencies and individuals to identify off-site sources of contamination and formulate effective measures to reduce or eliminate many threats to the water quality of the Kankakee River and its tributaries. This could involve annual water quality monitoring by the Service to identify specific pollutants and their sources, or by facilitating the formation of a community-based "River Watch" or "Watershed Association" composed of students, community leaders, farmers, conservation groups and others to work together in addressing water quality issues and developing a comprehensive plan for restoring the natural health and beauty of the river.

Concerning the biotic integrity of the surface water, of the 45% of IDEM's stations in the Kankakee Basin that did not attain their biological uses, low scores were primarily attributable to poor habitat (IDEM 1995). The proposed Refuge would significantly improve riparian habitat along the Kankakee mainstem and on portions of various tributaries. In addition, wetland restoration would greatly improve the function of thousands of acres of wetland for wildlife.

Agricultural Land

The potential impacts to agriculture from the Action alternatives are discussed in detail in the appended Economic Assessment prepared by Purdue University.

Most of the farmland that the Service would likely be involved with would include those lands that are expensive to drain, too dry to farm profitably, highly erodible or otherwise not ideally suited for agriculture. These lands are those often targeted by USDA programs such as the Conservation Reserve and Wetland Reserve Programs and state and Federal private lands programs. Many of these programs offer landowners short-term contracts while keeping the land in private ownership. Any conversion of agricultural land to other uses by the Service would occur gradually as acquisition and habitat restoration dollars become available over time and as landowners emerge as willing participants and/or sellers.

Alternatives 2-5 would likely result in reduced acreage of agricultural land when existing cropland is converted to wetland or permanent upland cover. We estimate that approximately fifteen thousand (15,000) acres of rowcrop land could be acquired by the Service and restored over the next 30 years. Additional acres of hay and pasture land could also be acquired. In the long term, this restored land would serve to protect and rebuild soil under the native vegetation restored on it. 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.

Landowners in some areas of the Basin have expressed sincere concern for the impact that the restoration of wetlands would have on 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 Basin.

The Service is also aware of the concern expressed by some landowners and business people that the proposed Refuge could reduce the amount of farmland in a county below some sustainable threshold. As the focus areas indicate, the 30,000 acres of the proposed Refuge will stretch over parts of 8 counties.

In addition, since acquisition will occur over 30 or more years, communities will have a reasonable time period to adapt to the proposed land use changes. As previously stated, current development in the Basin is increasing, and its impact on farmland will likely be much greater than that of the proposed Refuge 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 proposed refuge would contribute to the maintenance of prime farmland soils because, as stated previously, refuge land would protect, preserve, and build soil. According to USDA statistics, prime farmland used as crop land increased in the Illinois portion of the basin between 1982 and 1992 (USDA see web http://}/ cgi-bin/kmusser/). The most serious and irreversible threat to prime farmland soils is development and urban sprawl. According to a recent study just released by the Chicago-based Openlands Project, the Chicago metropolitan region is predicted to double in size over the next 30 years. It is estimated that the population will grow by 48% during the next 30 years, but that land development will increase by a whopping 165%. Moreover, the authors of the report contend that without concerted efforts to contain growth, urban sprawl threatens to reach north to Milwaukee, west to Dekalb, south to Kankakee, and east to South Bend, Indiana. The Service feels the proposed refuge would contribute to the maintenance of prime farmland soils because as stated previously, refuge lands would protect, preserve, and re-build soils.

Drainage and Flood Control

Development of a National Wildlife Refuge (alternatives 2-5) would have little or no impact on existing drainage systems as they affect private land. Protection, restoration, and management activities associated with any of the action alternatives could not legally contribute to flooding on private property, or impede drainage so as to adversely impact private property. The Service would not cause any artificial increase of the natural level, width, or flow of waters without ensuring that the impact would be limited to lands in which it has acquired an appropriate interest from a willing seller.

In April 1999 the Service and the Corps of Engineers signed an agreement (appendix III) to work cooperatively on their respective initiatives in the Basin. Development of a new national wildlife refuge in the Basin would not impact flood control efforts of the Corps of Engineers. The potential for Service wetland restoration projects to affect neighboring landowners would be minimized by completing hydrologic studies for each unit to determine optimum siting and design. The Service would comply with all Federal and state regulations (e.g., Indiana's 1945 Flood Control Act) to assure its actions do not adversely impact others. Likewise, the Service cannot legally alter established drainage patterns if that action adversely impacts other property owners. If Service activities create a water problem for any private landowner, the problem must be corrected at Service expense.

Prior to any wetland development involving dikes or levees in the floodplain, a hydrologic study would be completed. The analysis would identify potential impacts related to the degree of or duration of flooding based on the addition of structures such as a dike in the floodplain. The hydrologic study would provide the information necessary to apply to the Indiana Department of Natural Resources, Division of Water, for a permit to construct in the floodplain. This permit application procedure is required according to the 1945 Flood Control Act of the State of Indiana.

II. POTENTIAL IMPACTS TO THE BIOLOGICAL ENVIRONMENT

Alternative 1 - No Action

Biological Diversity and Abundance

Under this alternative we anticipate that biological diversity as well as the quantity and quality of wetlands, bottomland forests, and oak savanna would continue to decline in the project area. The Basin has immense existing and converted wetland resources dispersed over more than 3 million acres. Under alternative 1, some wetland restoration and preservation could continue by other Federal programs such as the Wetland Reserve Program and by state and local efforts. However, wetland restoration and preservation would not likely be coordinated across state lines, nor would it have a focus on Service trust resources that the Action alternatives provide. The result would be less effective and possibly less efficient protection of Service trust resources in the Basin.

Areas of bottomland forest not considered wetlands under the Swampbuster provisions of the Food Security Act could eventually be cleared and put into agricultural production. The many water quality and wildlife habitat benefits associated with these areas would be lost. Timber harvest decisions on unmanaged woodlands would likely be based primarily on maximizing short-term income. Continued high-grading would further reduce tree species diversity, and the heavy mast component (oaks) of the forest community would remain low. Few areas of mature bottomland forest would exist. Emergent, scrub-shrub and open water wetlands would continue to receive limited protection afforded by present regulatory processes. The latest report from the Service indicates that while wetland loss has slowed considerably since the Swampbuster provisions of the 1985 Farm Bill, we continue to lose approximately 117,000 acres of wetland per year. The report estimates that 79 percent of that loss in the lower 48 states is caused by agriculture (USFWS 1995)

Alternative 1 would result in no direct change in migratory bird production or use since there would not be an appreciable increase in nesting, resting, or feeding habitats in the proposed project area, nor would the quality of existing habitats improve appreciably. Recent efforts by TNC will undoubtedly have a positive impact as will continued efforts by both the Illinois and Indiana DNR's. In the long-term, local wetland and grassland-dependent migratory bird populations will likely decline as existing habitats degrade and predation, artificially heightened by fragmented landscapes, continues to take its toll on nesting females and their young.

With less coordination among the conservation organizations, the No Action alternative would probably result in less efficient conservation of biological diversity. In the meantime, opportunities to work at the landscape scale in the Basin would rapidly disappear. Most of the threats to the Basin have been realized over the past 150 years. However, a substantial amount of oak savanna was lost in the last 20 years when several thousand acres in the Indiana portion of the Basin were cleared for a now defunct ranching operation. The southeastern Kankakee County/northeastern Iroquois County area in Illinois is similarly vulnerable. As urban sprawl continues unchecked in the Basin, opportunities are dwindling to increase the effective size of existing natural areas, to provide connectivity, and to restore degraded ecosystems.

Restoration and preservation of Federally and state-listed species would continue under existing laws and regulations in alternative 1. This alternative might not, however, focus Service restoration and habitat management activities to benefit both Federally and state-listed species.

Alternatives 2-5

Biological Diversity and Abundance

Implementation of alternatives 2-5 would result in the restoration and preservation of biological diversity in the Basin, although each in varying degrees.

Alternative 2 primarily focuses on the protection of wetlands along the Kankakee River mainstem, the Yellow River, and in the cluster of existing and potentially restorable wetlands in Marshall County around the Menominee Wetlands Management Area. The biological impact of this alternative, if implemented, would be to reconstruct a wetland corridor from the Momence Wetlands in Illinois to the Menominee wetlands in Indiana along the Kankakee and Yellow Rivers. If implemented, this alternative could preserve high quality existing wetlands and restore many historic riparian and non-riparian wetlands that provide important habitat for fish, amphibians, wetland dependent reptiles, and some wetland dependent mammals. Wetlands that fall within the focus areas identified for this alternative would primarily be riparian wetlands and include palustrine forested wetlands, palustrine emergent wetlands, palustrine scrub-shrub wetlands, and possibly riverine wetlands, if restoration of historic river meanders is feasible without impacting others in the Basin. Alternative 2 would lead to increased wetland-dependent migratory bird production and use in the Basin by increasing the quantity and quality of nesting, resting, and feeding habitats. Alternative 2 would be of particular importance to area-sensitive wetland birds such as the American bittern, which require large blocks of habitat.

Alternative 3 would focus on restoration and protection of grasslands and remnant oak savannas in the Basin. These efforts would occur, for the most part, south of the Kankakee River and toward the western end of the Basin. This alternative would have the most impact on those species dependent on large grassland ecosystems and on oak savanna, namely grassland-dependent migratory birds. Alternative 3 could involve comparatively large increases in native grassland habitat in the Kankakee River Basin. Although some preservation of existing habitat would occur, particularly existing oak savanna, this alternative would also involve substantial restoration of native grasslands. Careful reconstruction of the native prairie would help perpetuate the existence and diversity of rare native grassland ecosystems. Re-establishing large blocks of grassland habitat should benefit numerous grassland-dependent migratory birds, some grassland-adapted mammals, invertebrates, and some reptile and amphibian species.

Alternative 4 would primarily focus on protecting and restoring habitat for the two Federally endangered species within the Basin, as well as for a suite of state endangered species. Since both Federally endangered species, the Indiana bat and the Mitchell's satyr butterfly are wetland-dependent species, this alternative shares many of the same areas and goals as alternative 2. Alternative 4, however, focuses more on the riparian corridor for the Indiana bat and on specific areas and management prescriptions for the Mitchell's satyr. It lacks emphasis on the very large habitat blocks found in Alternative 2. Although this alternative would likely produce many of the same positive impacts to the environment as alternative 2, it would be most beneficial to those organisms sharing habitat requirements with the two Federally endangered species. Some existing wetland would be modified to more closely meet the needs

of the Federally endangered or other species selected for more intensive management. We feel that habitat restoration from marginal farmland or partially functioning wetlands would far outweigh modifications to existing functional habitat.

Implementation of Alternative 5 would contribute to the preservation of the aquatic environment by restoring and preserving additional wetland, grassland, and savanna habitats in the Basin. Riparian protection and wetland restoration coupled with Best Management Practices (BMP) in the Basin could help limit sedimentation and its negative impacts to aquatic organisms. In addition, since many fish depend on the floodplain for foraging and spawning, the restoration and preservation of riparian wetlands and the natural processes that sustain them could be important for the long-term viability of fish populations in the Kankakee.

Amphibians and wetland-dependent reptile species would possibly benefit more from the wetland alternative that emphasizes larger wetland blocks. Nevertheless, some state-listed species that would likely benefit from Alternative 5 include: the blue spotted salamander (Ambystoma laterale) (Special Concern (SSC) - IN) , northern leopard frog (SSC - IN), eastern massasauga (SE - IL, SE - IN), Blanding's turtle (Emydoidea blandingii) (SE - IN, ST - IL), ornate box turtle (Terrapene ornata) (SE - IN), and Kirtland's snake (Clonophis kirtlandii) (SE - IN, ST - IL)."

Wetland-associated migratory bird species expected to benefit from the alternative 5 include the: sandhill crane (SE - IN, ST - IL), American bittern (SE - IL, SE - IN), red-shouldered hawk (Buteo lineatus) (ST - IL, SSC - IN), golden-winged warbler (Vermivora chrysoptera) (SE - IN), least bittern (SE - IN, ST - IL), black tern (SE - IN, IL), marsh wren (Cistothorus palustris) (SE - IN), king rail (Rallus elegans) (SE - IN, IL), black-crowned night heron (Nycticorax nycticorax) (SE - IN, IL), yellow-headed blackbird (Xanthocephalus xanthocephalus) (SE - IN, IL), Virginia rail (Rallus limicola) (SE - IN), sedge wren (SE - IN), yellow-billed cuckoo (Coccyzus americanus), great-crested flycatcher (Myiarchus crinitus), Acadian flycatcher (Empidonax virescens), prothonotary warbler, yellow-throated warbler (Dendroica dominica), mallard (Anas platyrhynchos), and wood duck (Aix sponsa). Alternative 5 also targets the protection and management of several grassland species of concern. These include species from the Service's Fish and Wildlife Resource Conservation Priorities document, the Service's 1995 Species of Management Concern List, and those identified through the Ohio River Valley Ecosystem Team, Partner's in Flight Working Group, and the Illinois and Indiana Departments of Natural Resources. They include Henslow's sparrow (SE - IN, IL), upland sandpiper (SE - IN, IL), short-eared owl (Asio flammeus) (SE - IL, SE - IN), northern harrier (Circus cyaneus) (SE - IL, SE - IN), western meadowlark (Sturnella neglecta) (SSC - IN), field sparrow, dickcissel, orchard oriole (Icterus spurius), bobolink, and grasshopper sparrow. Herkert et al. (1993) identified additional species of management concern using Breeding Bird Survey data from 1966 to 1991 to estimate population trends for some Illinois grassland birds including bobolinks (-92.6%), western meadowlark (-86.1%), grasshopper sparrow (-85.4%), savannah sparrow (-63.0%), eastern meadowlark (-61.0%), field sparrow (-57.9%), and northern bobwhite (-56.8%)."

Of these declining and management-concern species, northern harrier, upland sandpiper, bobolink, savannah sparrow, and Henslow's sparrow are classified as having high sensitivity to habitat fragmentation (highly area sensitive) and eastern meadowlark, western meadowlark, and grasshopper sparrow are classified as having moderate sensitivity to habitat fragmentation (Herkert, et al. 1993). Alternative 5 includes focus areas where the restoration of large, native grassland blocks (250 acres and

larger), and the management of the surrounding landscape (pasture and other non-forested habitat) will establish a favorable landscape for the management of area-sensitive grassland birds. Those components of Alternative 5 that will protect and restore habitat for grassland nesting migratory birds will likely also provide suitable habitat for grassland mammals, reptiles and amphibians whose distribution coincides with the Grand Prairie natural region. Moreover, Alternative 5 would attempt to restore the links between the historic wetland, prairie, and oak savanna ecosystems.

The Service would also identify and target oak savanna within the Basin for restoration and preservation. This effort will involve protection of the unique vegetation structure and floristic assemblages of oak savannas, as well as their habitat value for migratory birds. Anderson, et al., 1993, provide an extensive list of birds believed to have occurred in Illinois savannas. The list of migratory birds for which savanna appears important habitat includes Baltimore oriole, summer tanager, eastern wood peewee, great-crested flycatcher, American robin, and whip-poor-will, with red-headed woodpecker possibly a savanna-dependent species in Illinois (Jeff Brawn, Illinois Natural History Survey, facsimile communication 29 July 1997).

Alternative 5 will target protection of the two Federally endangered species within the Basin, the Indiana bat and the Mitchell's satyr butterfly, while also "sweeping" certain state-listed species. The Service evaluated the focus areas under the endangered species alternative (which is encompassed by Alternative 5) to see how well these sites "sweep" state listed species occurring in the study area. In our analysis, sweep is defined as the occurrence of at least one location from the Heritage Database for a state-listed species inside the focus area boundary. We assume that if land containing a state- listed species were protected under the proposed Refuge, then that state-listed species would receive a measure of protection. The following are state-listed species swept by the proposed refuge focus areas:

Great Blue Heron (*Ardea herodias*), Slim-Spike Three Awn Grass (*Aristida intermedia*), Rushlike Aster (*Aster junciformis*), Western Silvery Aster (*Aster sericeus*), Marsh Wren, Sweet Fern (*Comptonia peregrina*), Hemlock Parsley (*Conioselinum chinense*), Small White Lady's-Slipper (*Cypripedium candidum*), Tufted Hairgrass (*Deschampsia cespitosa*), Clinton Woodfern (*Dryopteris clintoniana*), Baltimore oriole (*Euphydryas phaeton*), Plains Pocket Gopher, Great St. John's-Wort (*Hypericum pyramidatum*), Northern Brook Lamprey, Ground Juniper (*Juniperus communis*), Deep-Rooted Clubmoss (*Lycopodium tristachyum/Lymnaea stagnalis*), Bobcat (*Lynx rufus*), Climbing Hempweed (*mikania scandens*), Tall Millet-Grass (*Milium effusum*), Cutleaf Water-Milfoil (*Myriophyllum pinnatum*), Ironcolor Shiner, Weed Shiner, Yellow-Fringed Orchid (*Plantanthera ciliaris*), Prairie White-Fringed Orchid (*Plantanthera leucophaea*), Small Purple-Fringed Orchid (*Plantanthera psycodes*), Virginia Rail, Northern Leopard Frog (*Sabatia campanulata*), Hall's Bullrush (*Scirpus hallii*), Weak Bullrush (*Scirpus purshianus*), Eastern Massasauga Rattlesnake, American snowbell (*Styrax americana*), Prairie Fame-Flower (*Talinum rugospermum*), American Badger (*Taxidea taxus*), Ornate Box Turtle, Forked Bulecurl (*Trichostema dichotomum*), Marsh Arrow-Grass (*Triglochin palustre*), Hairy Valerian (*Valeriana edulis*), Primrose-Leaf Violet (*Viola primulifolia*), and White Camas (*Zigadenus elegans var.glaucus*).

III. POTENTIAL IMPACTS TO THE SOCIO-ECONOMIC ENVIRONMENT

The potential socio-economic impacts of both the No Action alternative and the four Action Alternatives are discussed in the appended *Economic Impact Assessment of the Proposed Grand Kankakee Marsh National Wildlife Refuge* prepared for the Service by the Department of Agricultural Economics at Purdue University.. Following is a brief summary of their findings.

The report focuses on direct, indirect and induced economic impacts arising from changes in land use that would accompany the proposed Refuge. The report considers only changes in expenditures and economic activities in the economic study area associated with Refuge development. Reallocation of existing expenditures is not considered. For purposes of comparing "with Refuge" and "without Refuge" scenarios, the analysis assumes that in the absence of the proposed Refuge, the characteristics of the economic study region would be unchanged and that the level of economic activity in the study region would remain constant. The analysis also assumes that development of the Refuge would have three broad stages of impacts over the 30-year period. The initial stage (years 1-5) would involve facility construction and modest land acquisition and restoration. In the second stage of the project (years 6-15) the cumulative amount of land acquired by the Service for the Refuge would increase, as would employment by the Service . However, during this second stage the local economic impacts derived from recreational activities taking place in the Refuge are expected to be modest. During the third stage of the project (years 16-30) economic impacts from recreational activities are projected to increase as the Refuge becomes fully established and the economic study area develops economic infrastructure to capture expenditures in the study area.

Analysis is conducted for a Baseline Scenario and two alternative scenarios that differ with respect to assumptions regarding visitation rates, the value of agricultural land, and the share of recreational expenditures captured in the local economy. Results from the Baseline Scenario indicate that Refuge development would result in increased personal incomes and employment over 30 years. Economic output would increase under alternatives 3 and 5, but would decline under alternatives 2 and 4.

Refuge impacts on economic output is projected to increase initially due to expenditures by the Service. Subsequent impacts reflect reductions in agricultural output - as land is taken out of production - and increases in recreational activities. Based on a real discount rate of 3.6%, the projected aggregate impacts of the proposed Refuge can be summarized as follows:

- Over the 30-year time horizon considered in this study, the proposed Refuge would result in changes in economic output ranging from a loss of $1.23 million (alternative 4) to a gain of $6.60 million (alternative 5).

- The proposed Refuge is estimated to increase personal income in the study area under all management alternatives. The estimated changes in personal income range from $8.58 million (alternative 4) to $10.44 million (alternative 5).

- The proposed Refuge is projected to result in an increase in employment in the study area. The estimated change in average annual employment ranges from 17.0 jobs (alternative 4) to 27.9 jobs (alternative 2).

- Differences in outcomes for the four management alternatives examined in this report reflect differences in the amount of agricultural land projected to be acquired and differences in the types and amounts of recreational activity supported by the management alternatives. Overall, alternative 5 would result in relatively less agricultural land being acquired. Alternative 5 would also allow more recreational activity than other alternatives considered.

IV. GENERAL IMPACT ANALYSIS

A. Unavoidable Adverse Impacts

Under Alternatives 2-5, 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. Some loss of cultural resources could occur by restoring former wetlands. Greater public use may result in increased littering, noise, and vehicle traffic.

B. Short-Term Use Versus Long-Term Productivity

The local, short-term uses of the environment under alternatives 2-5 include habitat restoration and enhancement. Alternatives 2-5 could also include development of public use facilities. The resulting long-term affect of these alternatives include 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, the local public will gain long-term opportunities for wildlife-dependent recreation and education.

C. Irreversible and Irretrievable Commitments of Resources

Funding and personnel commitments by the Service or other organizations under Alternatives 2-5 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 or demolished on site.

D. Service Land Acquisition and Funding

Under all Action alternatives, the Service would use a combination of voluntary agreements, easements, and land acquisition to achieve its habitat restoration and preservation objectives for this Refuge. All land acquisition by the Service would be on a willing buyer/willing seller basis only.

Land acquisition by the Service could involve approximately 30,000 acres over the next 30 years. These acquisitions could involve conservation easements, cooperative agreements, fee-title purchases, leases, or a combination of all methods, depending on the site and circumstances. All lands acquired by the Service would be administered and managed by the National Wildlife Refuge System, Grand Kankakee Marsh National Wildlife Refuge. Tracts in which less than fee-title agreements are negotiated would remain in private ownership. All restoration and preservation would be carried out on a tract-by-tract

basis as participants and fiscal resources become available over a 30 year time period (willing buyer/willing seller basis).

Funding for land acquisition would be from the Migratory Bird Conservation Fund and the Land and Water Conservation Fund. It must be noted that it is Service policy to acquire the minimum interest necessary to reach project goals and objectives. Full consideration would be given to extended use reservations, exchanges, or other alternatives that would lessen the impact on the landowners and the community. Acquisition of lands would be from willing sellers only and only lands in which a realty interest is acquired would become part of the proposed Refuge. If the acquisition of only a portion of a property would leave the landowner with an uneconomic remnant, the Service would offer to acquire the uneconomic remnant along with the portion of the property needed for the project. Written offers to willing sellers will be based on a professional appraisal of the property using recent sales of comparable properties in the area. Landowners will have the final decision on whether to accept or reject a Service offer.

Acquisition procedures of other agencies and private conservation organizations often follow the aforementioned procedures, although their standards may differ from the Service's. Some groups may have more latitude as to the price offered for a particular tract of land. The Service, by law, must pay market value for lands it purchases. Since acquisition under Alternatives 2-5 would be from willing sellers who would be paid market value, acquisition procedures would have little or no impact on landowners within the project area that choose not to sell.

The following table discuses some of the types of acquisition the Service can use. A more detailed description of each mechanism follows.

Fee Title -	the acquisition of all land ownership rights
Conservation Easements -	the acquisition of part of the surface land ownership rights. Such easements are usually perpetual.
Jurisdictional Transfer -	the transfer of surface management from one Federal agency to another.
Cooperative Agreement -	short term agreements with landowners to accomplish specific management objectives.
Lease -	short term or long term "rental" of land for management. This usually includes periodic payments to the landowner.
Donation -	gift of land or interest in land without monetary reimbursement.

Service Acquisition Mechanisms

Conservation Easements - involve the acquisition of certain rights that can be of value for the purpose of achieving fish and wildlife habitat objectives (usually prohibiting or encouraging certain practices, e.g., the right to drain a wetland or delay haying or harvest). Easements become part of the title to the property and are usually permanent. If a landowner sells his or her property, the easement continues as part of the title.

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

Cooperative Agreements - are negotiated between the Service and other government agencies, conservation groups, or individuals. An agreement usually specifies a particular management action or activity the landowner will do, or not do, on his or her property. For example, a simple agreement would be for the landowner to agree to delay hayland mowing until after a certain date to allow ground nesting birds to hatch their young. More comprehensive agreements are possible for such things as wetland or upland restoration, or public access. Agreements are strictly voluntary on the part of the landowner and are not legally binding. As long as a landowner abides by the terms of the agreement, this protection can be effective in meeting certain refuge objectives. Because these agreements are voluntary and can be modified by either party, there is no complete assurance the terms of the agreement will always be met.

Fee-simple acquisition - involves acquisition of most or all of the rights to a persons land. There is a total transfer of property with the formal conveyance of a title to the Federal government. While fee acquisition involves most of the rights to a property, certain rights may be withheld or not purchased (water rights, mineral rights, use reservations).

E. Property Taxes and Refuge Revenue Sharing Payments and Apportionment

Under all Action alternatives, the Service would make refuge revenue sharing payments to the counties where the fee-title acquisition occurred.

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

Payments to the counties are calculated based on 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) 3/4 of 1 percent of the appraised value. In both Illinois and Indiana, 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 every five years to reflect current market values.

In November and December of 1994, the Service canvassed all 141 counties in the 8 state area of Region 3 where refuge revenue sharing payments are made on National Wildlife Refuge System lands. The counties were asked to estimate the real estate taxes on these lands had they remained in private ownership. In Indiana, 2 of the 3 counties that receive refuge revenue sharing payments from the Service responded to the survey. In Illinois, 8 of the 18 counties surveyed responded. Based on their estimates, the refuge revenue sharing payment at full entitlement for these 2 states is 164 percent (Indiana) and 99 percent (Illinois) of what taxes would be if the lands had remained in private ownership.

According to the Refuge Revenue Sharing Act which authorizes the Service to make these payments, "Each county which receives payments....shall distribute, under guidelines established by the Secretary, such payments on a proportional basis to those units of local government (including, but not limited to, school districts and the county itself in appropriate cases) which have incurred the loss or reduction in real property tax revenues by reason of existence of such area." In essence, the Act directs the counties or lowest unit of government that collects and distribute taxes to distribute refuge revenue sharing payments in the same proportion as it would for tax monies received.

F. Uneconomic Remnants

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

G. Relocation Benefits

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

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

H. Private Property Rights adjacent to Refuge Lands

Service or other agency control of access, land use practices, water management practices, hunting, fishing, and general use next to any tracts acquired under Alternatives 2-5 is limited only to those lands in which the Service has acquired that ownership interest. Any landowners adjacent to lands acquired by the Service retain all the rights, privileges, and responsibilities of private land ownership, including the right of access, hunting, vehicle use, control of trespass, right to sell to any party, and to pay taxes.

I. Cultural Resources

Refuge development and land acquisition alone would have no effect on archeological resources, but could have an adverse effect on standing structures. The Service seldom acquires structures with the intent to maintain and preserve them, and neglect as well as demolition is an adverse effect. Archeological resources receive increased protection from unconsidered destruction because of the several Federal laws that apply to property owned and administered by the Federal Government. The Service could, however, affect some archeological resources when it develops Refuge lands for wildlife habitat, administrative facilities, public use areas, and when it cleans up old farmsteads.

Alternative 1 would likely have long-term, negative effects on cultural resources of the area as development of sites continues. Alternatives 2-5 would have a generally positive impact on the preservation of cultural resources since the Service recognizes the need to protect these sites whenever possible, and is governed by national legislation. However, some loss of sites could still occur on lands acquired by the Service depending on location and extent of future development. Any development (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. In the case of significant structures, the Service will consider how the historic property can be retained and used for Refuge purposes.

A description of undertakings for all Refuge lands would be provided by the future Refuge Manager to the Regional Historic Preservation Officer who will analyze the undertaking for potential effects on historic properties. The Regional Historic Preservation Officer will enter into consultation with state Historic Preservation Officers and other parties as appropriate. No undertakings will proceed until the Section 106 process is complete. Also, the Refuge Manager will, with the assistance of the Service's Regional Historic Preservation Officer, develop a program for conducting Section 110 inventory surveys, and will attempt to obtain funding for those surveys. The Refuge Manager will similarly involve the Service's Regional Historic Preservation Officer in other historic preservation and cultural resource issues on the Refuge, in accordance with applicable laws, regulations, and Service policy.

J. Maintenance of Roads and Existing Right-Of-Ways

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

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

K. Environmental Justice

Environmental justice refers to the principle that all citizens and communities are entitled to: (a) equal protection from environmental and occupational health or safety hazards, (b) equal access to natural resources, and (c) equal participation in the environmental and natural resource policy formulation process.

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

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

Conservation of fish and wildlife and their habitats also provides opportunities for Americans to encounter their natural national heritage. The role of the national wildlife refuge system has evolved beyond protecting waterfowl to providing recreational and educational experiences as well. National wildlife refuges enrich people in a great variety of ways and these benefits should be equitably distributed among all segments of society.

Although many social or experiential benefits of refuges are not easily quantified, it can be demonstrated that recreational visits to national wildlife refuges generate substantial economic activity. In 1997, the Service initiated a multi-phase study to determine the impact of national wildlife refuges on their surrounding local economies. Eco-tourism refers to the relatively recent phenomenon where approximately 30,000,000 people visit refuges annually. Eco-tourism is one way to derive economic benefits from the conservation of fish and wildlife habitat. Non-resident refuge visitors pay for food, lodging, fuel, and other purchases from local businesses to pursue their recreational experience, thereby generating substantial local economic activity.

L. Other Planning Efforts

Many people expressed concern that the Service needs to work with the Army Corps of Engineers as they proceed with their flood control feasibility study. On April 16, 1999, the Service and U.S. Army Corps of Engineers signed an interagency partnership agreement to work together on refuge planning and flood control through ecosystem restoration activities within the Basin. The agreement will help the agencies consolidate resources focused on finding ways to reduce flood damage to property and natural resources, preserve ecosystem structure and function, and the protect prime farmland soils in the Basin. The Corps and the Service agree that sharing staff and information will better serve the needs of local communities and agricultural interests. Besides being fiscally smart, the combined resources of both agencies will help eliminate the duplication of effort in each agencies respective planning processes.

The upcoming Refuge Comprehensive Conservation Plan and the Corps Feasibility Study will proceed on a parallel track to help identify appropriate management strategies for each respective effort.

M. Mosquitos

Some people have expressed concern that development of a Refuge 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 which leads 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:

1. The disease causing organism (pathogen) must be present in the area.
2. There must be a host animal that carries the pathogen.
3. The specific species of mosquito capable of transmitting the pathogen must be present.
4. Habitat conditions that support reproduction of the problem species of mosquito must be present.

Many of the diseases spread by mosquitoes have been eliminated in Indiana. Malaria is a good example. In the 1920's and 1930's the Wabash River Valley was a notorious area for malaria. However, the last serious outbreak of malaria occurred near Terre Haute in the 1950's. 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.

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GLOSSARY OF TERMS

Biological Diversity - The variety of life forms and processes, including the complete natural complex of species, communities, genes, and ecological functions.

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).

Comprehensive Conservation Plan (CCP) - The purpose of a CCP is to provide long-range guidance and management direction for a Refuge to accomplish its purpose, contribute to the mission of the National Wildlife Refuge System, and to meet other relevant mandates. It provides Refuge employees and managers with clear goals and strategies to help meet the Service's mission and fulfill commitments made to the American people.

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.

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

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.

Eutrophication - The intentional or unintentional enrichment of water.

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.

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.

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 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.

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.

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.

Sedimentation - The settling-out or deposition of suspended materials.

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.

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.

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.

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.

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.

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.

APPENDIX I

Economic Impact Assessment

PURDUE UNIVERSITY

DEPARTMENT OF
AGRICULTURAL ECONOMICS

December 16, 1998

Forest Clark
U.S. Fish and Wildlife Service
620 South Walker Street
Bloomington, IN 47403

Dear Forest:

The attached comments serve as a response to public comments forwarded to us regarding the Economic Impact Assessment for the Proposed Grand Kankakee Marsh National Wildlife Refuge. Please contact me if you require further assistance.

Sincerely,

Gerald E. Shively

1145 KRANNERT BUILDING • WEST LAFAYETTE, IN 47907-1145

Third, if one were to assume that land used to establish the proposed refuge would have instead been developed by new businesses and industries that could not locate elsewhere within the study area, then establishment of the refuge could indeed adversely impact local economic growth. This assumption, however, does not seem realistic given the various land types that have been targeted for the proposed refuge. The assumption that underlies the analysis is that the land most appropriate for restoration would be that least suitable for commercial development.

Issue 3: *Estimated value of agricultural output and income.*

Concerns have been raised regarding the estimates used to value agricultural land to be taken out of production. In particular, it has been suggested that (1) using the value of corn production as an estimate of agricultural land understates the contribution of specialty crops in the regional agricultural economy, and (2) agricultural incomes in the area are likely to rise over time due to advancements in agricultural technology.

Regarding the first concern, it is true that a number of specialty crops are produced in the region. These include mint, seed corn, seed beans, tomato, popcorn, amylose corn, waxy corn, and other vegetables and fruits. Estimates suggest the total acreage represented by these crops is 1-5 per cent of total crop area in the region. Many of these crops have economic value on a per acre basis that greatly exceeds that of corn.

The economic impact assessment assumed that area taken out of production would be corn production for two primary reasons. One, the acreage represented by corn, soybeans, wheat, and hay represents 97 percent of the region's cropland (table II-6, page 13). As corn constitutes the largest share of area, it was assumed land that would come out of crop production would be corn. Two, the economic impact assessment relied upon the assumption that land taken out of agricultural use would be sold to the Federal Government by willing sellers. The assumption used in the economic assessment is that owners would sell land from which they earned the lowest return, i.e. their least productive land. High-value land, well suited to production of specialty crops, need not be sold. Furthermore, if farms currently used for specialty crop production were sold to the federal government to become part of the proposed refuge, it is assumed that producers would move production of the specialty crop to other land within the Kankakee watershed area. Under this assumption, the opportunity cost of the converted land remains that of its lower-value use, namely corn production.

The price estimate for corn used in the analysis is $2.25 per bushel, the 1994 average corn price in Indiana. The 10-year average corn price for Indiana for the 1987-1996 period was $2.26 per bushel. For comparison, the current USDA forecast of the 1998 price of corn is $2.05 per bushel.

Yield estimates used in the economic assessment are based on 1994 corn yields for corn acres harvested, based on an average for the 10 Indiana counties in the watershed area (table IV-1, page 29). In the baseline analysis and sensitivity analysis B, yields were adjusted downward to reflect the flooding propensity of the land targeted for the proposed refuge. It was assumed that over a five-year period flooding would reduce corn yields by 20 per cent on average. Sensitivity analysis A assumed no loss in production due to flooding.

PURDUE UNIVERSITY

DEPARTMENT OF
AGRICULTURAL ECONOMICS

July 15, 1998

William Hartwig, Regional Director
U.S. Fish and Wildlife Service
Bishop Henry Whipple Federal Building
1 Federal Drive
Fort Snelling, MN 55111-4056

Attn: Tom Magnuson

Dear Mr. Hartwig:

The attached comments serve as a response to public comments forwarded to us regarding the Economic Impact Assessment for the Proposed Grand Kankakee Marsh National Wildlife Refuge. Please contact us if you require further assistance.

Sincerely,

Kevin T. McNamara

Gerald E. Shively

cc: Dave Hudak, USFWS Bloomington Field Office

1145 KRANNERT BUILDING • WEST LAFAYETTE, IN 47907-1145

Response to public comments on Economic Impact Assessment for the Proposed Grand Kankakee Marsh National Wildlife Refuge

Issue 1: *Assumptions and overall results of the economic study.*

The Economic Impact Assessment provides a baseline estimate of potential impacts of the proposed refuge under a range of scenarios. Considering the 30-year time horizon and the level of uncertainty regarding several aspects of potential recreation demand and economic impact, it seems unwise to rely on any *single* forecast of potential impacts of a project of this type. For this reason, the economic analysis provides a benchmark assessment, as well as two sensitivity analyses based on modifications of the most important assumptions driving the analysis. These findings suggest a range of potential impacts, both in aggregate and over time. Analysis shows that the aggregate change in economic output associated with establishment of the refuge could fall into a broad range. For the complete 30-year time horizon considered in the analysis this range extends from a drop in economic output of 69.1 million (scenario A, wetland option) to an increase in economic output of 69.6 million (scenario B, hybrid option) (see Table V-4, undiscounted figures). Estimates of the aggregate change in personal income associated with establishment of the refuge range from a reduction of 3.2 million (scenario A, wetland option) to an increase of 39.8 million (scenario B, hybrid option). For comparison, total personal income in the 13-county region was $21 billion in 1990. This suggests the estimated aggregate impacts of the proposed refuge would be small in relation to the overall economy of the study area.

Issue 2: *Impacts of future economic development in the region.*

Documenting historical growth and incorporating projected patterns of future growth for the region was beyond the scope of the analysis. Furthermore, projections of future growth patterns would likely raise questions regarding the assumptions used in deriving those projections. The analysis relies on an assumption that is standard for studies of this type, and employs a "no change" scenario as the "without refuge" comparison.

Future economic growth in the Kankakee regional economy could influence the total economic impacts associated with creation of the proposed refuge in at least three ways.

First, to the extent the regional economy experiences future growth in the retail and service sectors, the local economy might be better equipped to capture expenditures made by out-of-region visitors to the refuge. In this case, the actual expenditure capture share could be larger than we assume (see Section D, pages 48-49). A larger expenditure capture share would increase the economic impacts associated with recreational use of the proposed refuge.

Second, to the extent regional economic development leads to larger incomes within the study region, local demand for recreational activity (which tends to rise with per-capita incomes) could be higher than we have estimated. Again, this would tend to increase the economic impacts (output, incomes, and employment) associated with recreational use of the proposed refuge.

Economic Impact Assessment of the Proposed Grand Kankakee Marsh National Wildlife Refuge in Indiana and Illinois

Submitted to:

U.S. Fish and Wildlife Service

February 1998

by

Gerald Shively, Ph.D.
Kevin McNamara, Ph.D.

with

Steve McCoy and Brenda Mills

Department of Agricultural Economics
Purdue University
1145 Krannert Building
West Lafayette, Indiana 47907

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Executive Summary

Establishment of the proposed Grand Kankakee Marsh National Wildlife Refuge would involve federal purchase, easement, or lease of up to 30,000 acres of land in a 13-county area of northwestern Indiana and northeastern Illinois*. Approximately one-half of the land to be acquired would be farmland. Parcels would be acquired from willing sellers over a period of approximately 30 years.

This economic impact assessment investigates four alternative plans for refuge development that have been identified by the U.S. Fish and Wildlife Service. These management plans are a Wetland Alternative, a Grassland Alternative, a Threatened and Endangered Species Alternative, and a Hybrid Alternative. Potential economic impacts of these management alternatives are examined in this report. This report does not identify exact areas that would be acquired by the U.S. Fish and Wildlife Service, nor does it discuss the potential impacts of the proposed refuge on specific areas or counties.

This report focuses on direct, indirect and induced economic impacts arising from changes in land use that would accompany the proposed refuge. The report considers only changes in expenditures and economic activities in the economic study area associated with refuge development. Reallocation of existing expenditures is not considered. For purposes of comparing "with refuge" and "without refuge" scenarios, the analysis assumes that in the absence of the

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* The 13 counties are: Jasper, Kosciusko, Lake, La Porte, Marshall, Newton, Porter, Pulaski, St. Joseph and Starke in Indiana; and Iroquois, Kankakee and Will in Illinois. Four of these counties – Kosciusko, Pulaski, St. Joseph and Will – have no land targeted for acquisition under any of the management alternatives.

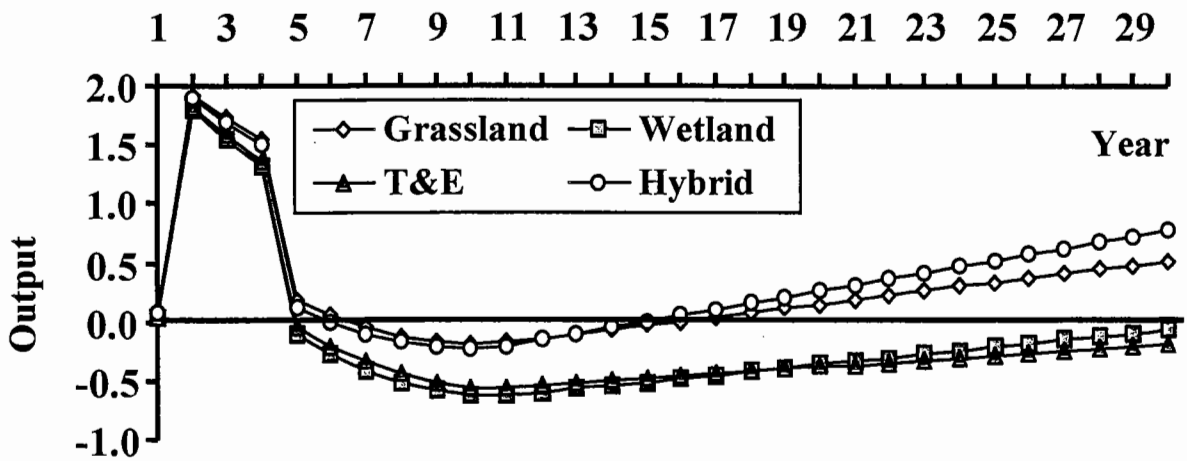
proposed refuge, the characteristics of the economic study region would be unchanged and that the level of economic activity in the study region would remain constant.

This analysis assumes that establishment of the proposed refuge would have three broad stages of impact over the 30-year period. The initial stage (years 1-5) would involve facility construction and modest land acquisition and restoration. In the second stage of the project (years 6-15) the cumulative amount of land acquired by FWS for the refuge would increase, as would employment by FWS. However, during this second stage the local economic impacts derived from recreational activities taking place in the refuge are expected to be modest. During the third stage of the project (years 16-30) economic impacts from recreational activities are projected to increase as the refuge becomes fully established and the economic study area develops economic infrastructure to capture expenditures in the study area.

Analysis is conducted for a Baseline Scenario and two alternative scenarios that differ with respect to assumptions regarding visitation rates, the value of agricultural land, and the share of recreational expenditures captured in the local economy. Results from the Baseline Scenario indicate that refuge establishment would result in an increase in net personal income and employment over 30 years. Net economic output would increase under the Hybrid and Grassland Management Alternatives but would decline under the Wetland and Threatened and Endangered Species Alternatives.

Projected refuge impacts on economic output in the study area are illustrated in Figure 1. As the figure indicates, economic output is projected to increase initially due to expenditures by FWS. Subsequent impacts reflect reductions in agricultural output — as land is taken out of production — and increases in recreational activities. The largest changes in economic output occur in the Hybrid and Grassland Alternatives.

Figure 1. Projected Refuge Impact on Output in Study Area, Baseline Scenario



Projected impacts of the proposed refuge on personal income in the study area are illustrated in Figure 2. Under baseline assumptions, the proposed refuge is expected to increase personal income in the study area under all scenarios. The largest changes in personal income are again associated with the Hybrid and Grassland Management Alternatives.

Figure 2. Projected Refuge Impact on Personal Income in Study Area, Baseline Scenario

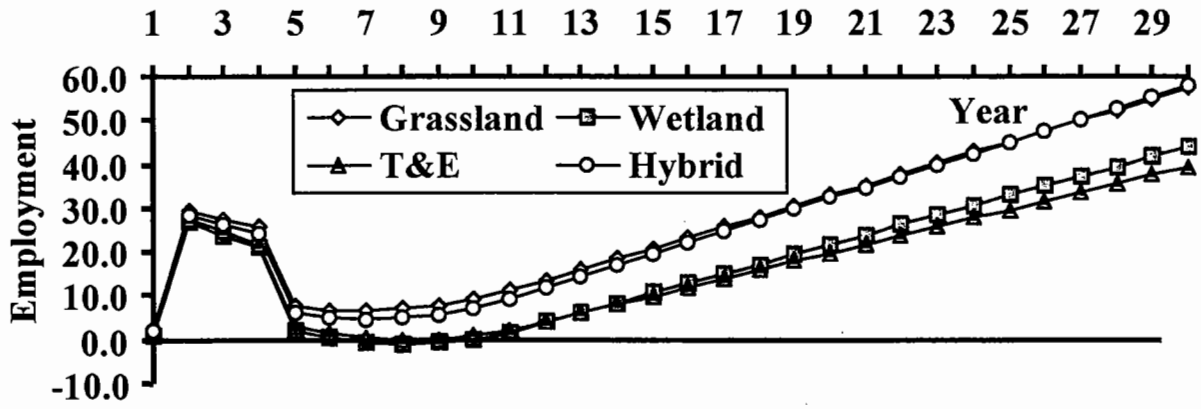
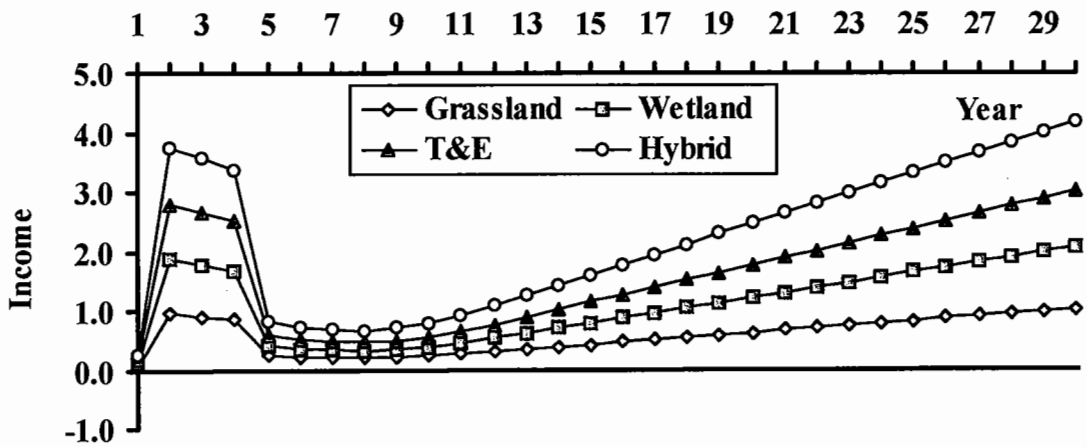


Figure 3 illustrates projected refuge impacts on employment under the Baseline Scenario. Under baseline assumptions, the proposed refuge is expected to increase employment in the study area under all scenarios. The largest change in employment is associated with the Hybrid Management Alternative.

Figure 3. Projected Refuge Impact on Employment in Study Area, Baseline Scenario



Data illustrated in Figures 1-3, which are based on findings from the analysis of the Baseline Scenario, are discussed in detail in the main report. Based on a real discount rate of 3.6%, the projected aggregate impacts of the proposed refuge can be summarized as follows:

- Over the 30-year time horizon considered in this study, the proposed refuge would result in changes in economic output ranging from a loss of $1.23 million (in the Threatened and Endangered Species Alternative) to a gain of $6.60 million (in the Hybrid Alternative).

- The proposed refuge is estimated to increase personal income in the study area under all management alternatives. The estimated changes in personal income range from $8.58 million (in the Threatened and Endangered Species Alternative) to $10.44 million (in the Hybrid Alternative).

- The proposed refuge is projected to result in an increase in employment in the study area. The estimated change in average annual employment ranges from 17.0 jobs (in the Threatened and Endangered Species Alternative) to 27.9 jobs (in the Grassland Alternative).

- Differences in outcomes for the four management alternatives examined in this report reflect differences in the amount of agricultural land projected to be acquired and differences in the types and amounts of recreational activity supported by the management alternatives. Overall, the Hybrid Management Alternative would result in relatively less agricultural land being acquired. The Hybrid Alternative would also allow more recreational activity than other alternatives considered.

Key parameters influencing the magnitude of projected changes illustrated in Figures 1-3 are (1) the potential number of visitors to the refuge, (2) the productivity of acquired land, and (3) the

extent to which expenditures by refuge visitors are captured within the regional economy. To gauge the sensitivity of the results to changes in these assumptions, analysis was also conducted using two alternative scenarios. Compared with the Baseline Scenario, Scenario A assumed lower recreational visitation rates, higher productivity on acquired agricultural land, and a lower rate of expenditure capture by the local economy. Compared with the Baseline Scenario, Scenario B assumed higher recreational visitation rates, the same degree of productivity on acquired agricultural land, and a higher rate of expenditure capture by the local economy. Results for these alternative scenarios are discussed in detail in the main report. In summary, results for Scenario A indicate a reduction in output and employment for all management alternatives, and a reduction in personal income in two out of four management alternatives. Impacts on output and employment are greatest in the Wetland and T&E Alternatives. An increase in personal income is projected for the Grassland and Hybrid Alternatives. Results for Scenario B indicate an increase in employment and personal income in all management scenarios, and an increase in output for the Grassland and Hybrid Alternatives. Impacts are projected to be greatest under the Hybrid Alternative.

It is important to note that this report draws attention to, but does not specifically address three potentially important aspects of the proposed refuge that have received local attention. These are (1) impacts on the property tax bases of communities in the watershed; (2) potential impacts on flooding or flood control on farms adjacent to the refuge; and (3) potential impacts on downstream surface water quality.

If established, the refuge would result in changes in land use and land ownership. These changes would be accompanied by changes in property tax bases of communities in the economic study area. The federal government has a policy of making compensating payments to local communities based on both the amount of acreage occupied by a national wildlife refuge and the

underlying value of occupied land. Lack of information regarding the exact location of land that may be acquired for the proposed refuge precluded an assessment in this study of the specific local impacts of the proposed refuge on property tax receipts. Likewise, lack of detailed hydrological information precluded an assessment of potential economic impacts due to flooding or improved flood control in the area. In general, state and federal laws restrict the FWS from engaging in activities that would negatively impact adjacent landowners. Section 404 of the federal Clean Water Act requires hydrological studies and permits to be issued whenever wetland restorations are undertaken. Finally, although improvements in downstream water quality through protection of existing wetlands and restoration of drained wetlands are possible as a result of the refuge, these have not been considered in this report.

Economic Impact Assessment of the Proposed Grand Kankakee National Wildlife Refuge in Indiana and Illinois

I. Introduction

A. Purpose of report

This report presents results from an economic analysis of the potential regional economic impact of the proposed Grand Kankakee Marsh National Wildlife Refuge (GKMNWR). Establishment of the proposed refuge would involve federal purchase, lease, or easement of approximately 30,000 acres of land in five to ten contiguous segments within a 13-county area of northwestern Indiana and northeastern Illinois. The 30,000 acres targeted for acquisition would be drawn from a total watershed area of over 3.3 million acres. Land acquisition is projected to take place over an approximate 30-year time period. Land would be acquired only from willing sellers and would be managed by the U.S. Fish and Wildlife Service (FWS). Management goals would include protecting and enhancing fish and wildlife habitat as well as providing recreational opportunities for local residents and non-resident visitors.

This report assesses a series of four alternative plans for refuge development that have been identified by the FWS. The possible economic consequences associated with each management alternative are examined. The report represents a *limited* economic study. It is limited in three ways. One, it is limited in coverage. It focuses only on the 13-county region that would be directly affected by refuge establishment. For purposes of this report this 13-county region will be referred to as the *economic study area.* The economic study area includes all

counties that contain some proportion of land that lies within the Kankakee watershed. This study does not examine potential impacts on properties or businesses outside the economic study area. Two, the study is limited in scope. It focuses on economic impacts related to land use changes within the economic study area. It also includes estimates of the economic impact of direct spending by the FWS on construction and maintenance of refuge facilities. However, the study does not include an assessment of actions that would mitigate the impact of the proposed refuge on the economic study area. Neither does it attempt to predict and assess the potential responses of residents to the economic changes discussed. Three, the report is limited by requirements of measurement. The report focuses on direct, indirect, and induced economic impacts that could be quantified easily. Other impacts might arise that are less easily quantified than those examined here. Section VI of this report draws attention to some of these other impacts but due to lack of reliable information on their potential economic impacts the report does not explicitly incorporate them into the analysis. Although these impacts fall outside the parameters of the formal analysis, they could have important effects on the economy of the economic study area that are not quantified in this study.

All economic impacts described in this study are estimated on the basis of land use changes and expenditures that have been identified as *possible* by the FWS. Actual land allocation would depend, at least in part, on congressional budget allocations. This report assumes that the refuge would reach its maximum projected size of 30,000 acres in 30 years. A slower pace of land acquisition is likely. Prospective land use changes and expenditures have been used to estimate changes in agricultural, recreational and other activities. Both consumptive

and non-consumptive recreational uses are examined in this report. Estimated levels of recreational use have been combined with estimates of expenditure patterns of potential refuge visitors and operation and maintenance expenditures by the FWS to construct a profile of changes in the scope and composition of the economy of the economic study area as a result of the proposed refuge. Data on economic changes are used in conjunction with the IMPLAN model to estimate overall economic impacts in the regional economy of the economic study area. IMPLAN is a county-level input-output model of the U.S. economy that was developed by the U.S. Forest Service. This model is widely used by researchers and planners to estimate the regional impacts of changes in economic conditions. It is important to point out that this report does not pinpoint exact areas that would be considered for acquisition by the FWS, nor does it forecast the potential impacts of the proposed refuge on specific areas or counties. The IMPLAN model uses a database calibrated to 1994 values. Therefore, unless otherwise noted, all monetary measures reported in this document are expressed in 1994 dollars.

This report discusses four management alternatives identified by the FWS. These management alternatives are compared in terms of their potential economic impacts on the economic study area over a 30-year time period. All economic sectors represented by the regional economy are examined in this study. However, two sectors – agriculture and recreation – are the primary focus of the report. Secondary impacts on related businesses also are examined. Due to the long time horizon associated with refuge development, impacts would be expected to occur gradually. The underlying and simplifying assumption used in this analysis is

that without the refuge, the economy of the study area would remain unchanged from its present form.

Methods used in this study were chosen to provide a realistic appraisal of consequences of alternative actions. The study relies on secondary data. Field visits were undertaken by the authors, but the study did not collect any primary data in the watershed. In this study, extreme estimates of "best case" or "worst case" alternatives have been avoided. It is important to point out that parameters used in this analysis are uncertain. The condition of the general economy over the next 30 years, the timing and pattern of land acquisitions, the level of recreational activity, and potential local responses to the proposed refuge are all uncertain. For this reason, results from this study should not be regarded as a prediction of what will invariably happen if the proposed refuge is established. Instead, the projections contained in this report should be viewed as information to inform, guide and improve public debate surrounding the refuge proposal. A complete investigation of all alternatives and consequences was beyond the scope of the study.

B. Setting of the project and the report

The U.S. Fish and Wildlife Service (FWS) currently manages a system of more than 500 National Wildlife Refuges and wildlife areas nationwide (FWS 1997). These areas consist of over 93 million acres of land. Wildlife refuges exist in all 50 states. This includes two National Wildlife Refuges in Indiana and seven National Wildlife Refuges in Illinois. Wildlife conservation, enhancement, and management are the primary goals of the refuge system.

Recreation and education are also important aspects of the National Wildlife Refuge system, and many refuges contain visitor centers. In 1996 approximately 30 million people visited National Wildlife Refuges.

Due to its unique habitat and setting, the Grand Kankakee Marsh is considered a desirable location for a wildlife refuge. Before European settlement, the Grand Kankakee Marsh covered more than 500,000 acres of land in northern Indiana and Illinois. It is purported to have been one of the most productive wildlife habitats on this continent. It was especially important as a breeding ground and a staging area for waterfowl migration. By the early part of this century, large portions of the Kankakee River had been channelized, the marsh had been virtually drained, and former wetlands had been converted to agricultural production. An interesting description of the early history of the Kankakee River and the draining of the marsh is provided in *The Lacrosse Centennial* (1963). Despite the changes that have occurred in its makeup, the fact that the area was once marshland is apparent. Flood protection is one of the most pressing concerns for farmers operating within the watershed. Spring flooding in 1996 destroyed more than 13,000 acres of crops in Starke County alone (USDA 1996). According to accounts by local farmers, fields are frequently flooded and pumping has become a necessary cost of preparing fields for spring planting. Estimates made by the authors during field visits in the area suggest that the electricity costs alone for pumping fields in the spring are $10-15 per acre. Costs of constructing and maintaining dikes and drainage channels are substantial also.

The Kankakee watershed remains an important source of fish and wildlife habitat. Several areas in the watershed are currently managed as wildlife habitat by state, local, and

private interests. Most of the recreational activities that are examined in the following discussions – such as hunting, fishing, or bird watching – already take place within the watershed.

The FWS, in conjunction with other public and private conservation groups, is seeking to protect and restore approximately 100,000 acres of wildlife habitat in the watershed (FWS 1996). This constitutes three percent of the watershed and approximately two percent of the 13-county area. The FWS would seek to restore and preserve approximately 30,000 acres through a combination of voluntary partnerships, easements, and land acquisition. Federal funding would be provided by a combination of the Land and Water Conservation Fund and the Migratory Bird Fund. The FWS proposal calls for using a combination of voluntary partnerships, easements, and land acquisition to restore and preserve approximately 30,000 acres of land in the Kankakee River watershed. The FWS goal is to connect and expand existing patches of habitat to provide protected areas and movement corridors for FWS Trust Resources, including migratory birds and threatened and endangered species. Some of the land identified in focus areas is currently used for agricultural row crop production and would require restoration. As highlighted above, much of this agricultural land is vulnerable to seasonal flooding. Some of the land identified in focus areas is currently unused or used as pasture or woodland.

The acquisition of land for the proposed refuge would be a gradual process. It is expected that land acquisition for the proposed refuge would span at least 30 years. This long horizon, combined with the fact that land would be acquired only from willing sellers means that it is difficult for the FWS to formulate a comprehensive management plan in advance. The

difficulty inherent in developing a management plan in advance necessarily limits the scope of this study for predicting the potential economic impacts of the proposed refuge. For this reason, many of the findings from this study rely on assumptions about land acquisition and land use that reflect not only the predictions of the FWS, but also the experiences that have been observed at other refuges or in similar settings.

C. Organization of this study and report

A logical sequence of steps was followed in estimating the economic impacts of the proposed refuge. The steps undertaken in the analysis are listed in Figure I-1. This sequence of steps was carried out chronologically. That is, the results from Step 1 were used as input into Step 2, and so forth. It is important to note that each step in the analysis required a unique set of data and a series of simplifying assumptions. These data and assumptions are described and discussed in detail in subsequent parts of the report. Given a different set of data, and a different set of simplifying assumptions, the same steps could be followed, but results would likely change. To address this issue, this report first recounts results from a Baseline Scenario using best estimates of key parameters. A sensitivity analysis is then conducted using alternative assumptions regarding levels of recreation, values of agricultural production, and rates of expenditure capture in the regional economy. The sensitivity analysis consists of two sets of model results.

This report has seven parts. Part II describes the economy of the economic study area and discusses important regional economic trends that are likely to influence the economy of the economic study area in the near future. Part III outlines land use changes that would result from

refuge establishment. Part III focuses on steps one and two of the economic impact assessment and describes and outlines the characteristics of each management alternative. This includes descriptions of patterns of land acquisition, land conversion, and land management. Part IV reports the sources of data, the methods, and the assumptions used in the analysis. Part V reports the main findings of the study and compares the potential impacts of the proposed refuge under each management alternative. Part V also reports results from the sensitivity analysis. Part VI highlights important changes and influences that are likely to occur as a result of refuge development, but which could not be quantified for use in this study. Part VII summarizes the results of the economic impact assessment and raises questions for further consideration and study.

Figure I-1. Flow of steps for estimating economic changes

Step 1

Estimate land use changes associated with refuge development
(by management alternative).

⇓

Step 2

Estimate the increase in amount of land available for recreation
and the decrease in amount of land available for agriculture
(by management alternative).

⇓

Step 3

Estimate baseline number of refuge visitors
(by management alternative and usage category).

⇓

Step 4

Estimate expenditures associated with
refuge visitors and direct expenditures by FWS.

⇓

Step 5

Use IMPLAN to generate baseline measures of the likely economic changes
arising from an increase in recreation and a decrease
in farming, taking into account regional interactions and multiplier effects.

⇓

Step 6

Use IMPLAN to conduct a sensitivity analysis using alternative
assumptions regarding levels of recreation, value of agricultural production,
and rates of expenditure capture in the regional economy.

II. Kankakee Watershed Area

A. Location

Establishment of the proposed Grand Kankakee Marsh National Wildlife Refuge would involve the acquisition and restoration of up to 30,000 acres of land near the Kankakee River in northwestern Illinois and northeastern Indiana. This area, and its relationship to the Chicago Metropolitan Area, is illustrated in Figure II-1. The area lies within the boundaries of ten Indiana counties and three Illinois counties. These counties are listed in Table II-1. The area is an irregularly-shaped swath of land, defined by the Kankakee River watershed. It begins at the Michigan border of St. Joseph County, Indiana, and occupies most of that county. It also occupies large portions of La Porte, Marshall and Starke Counties in Indiana. A small portion of the watershed extends eastward into Kosciusko County, Indiana. It also includes the southern portions of Lake and Porter Counties, and the northern portions of the Indiana counties of Jasper and Newton. In Illinois, it covers most of Kankakee and Iroquois Counties and includes smaller portions of southern Will County.

Figure II-1. Map of Indiana and Illinois indicating location of economic study area

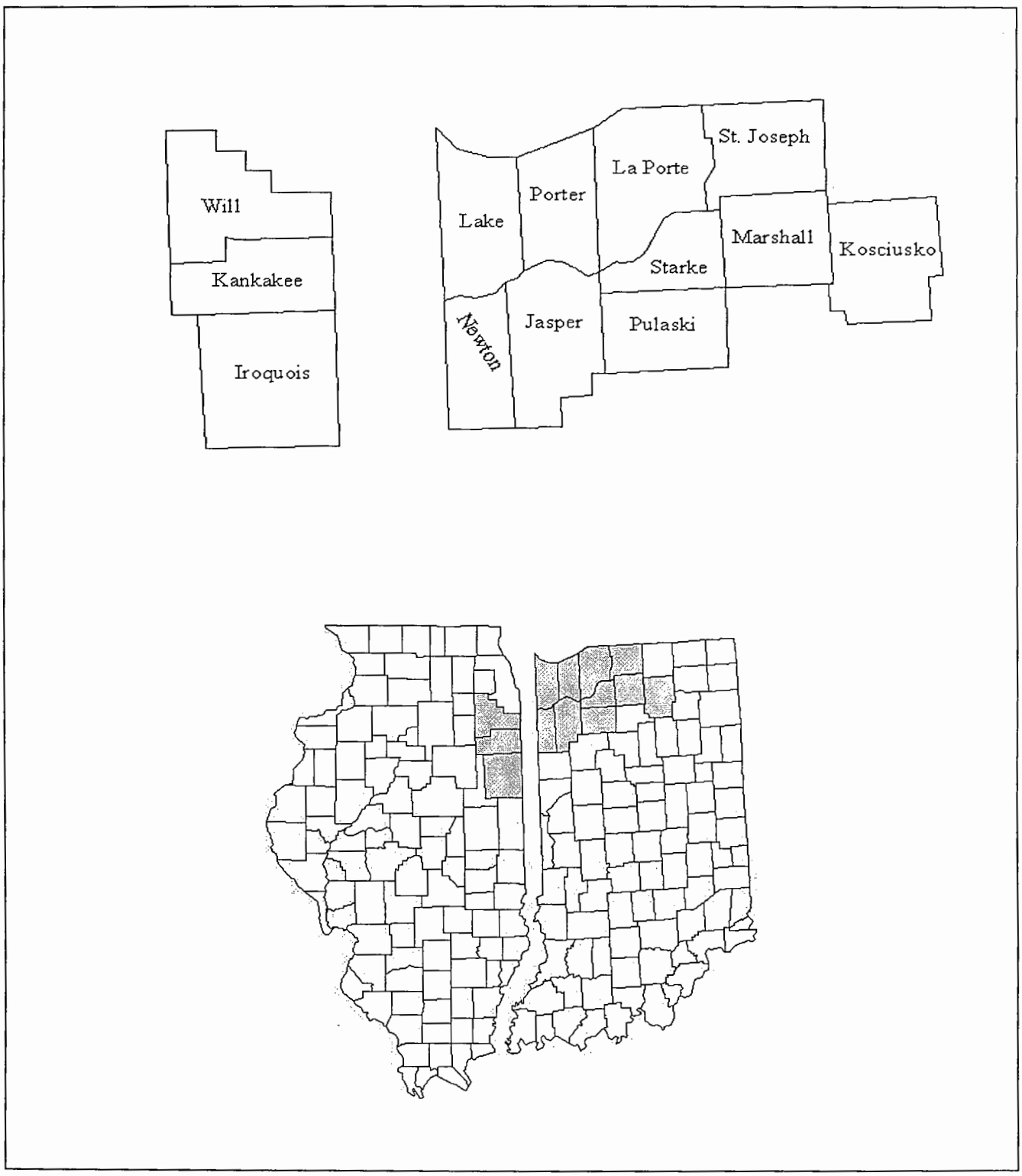


Table II-1. Counties contained in the economic study area

Indiana	Illinois
Jasper	Iroquois
Kosciusko	Kankakee
Lake	Will
La Porte	
Marshall	
Newton	
Porter	
Pulaski	
St. Joseph	
Starke	

B. Grand Kankakee Area

The 13-county area considered in this report consists of 7,300 square miles or approximately 4.7 million acres. Of this amount, approximately 3.3 million acres falls within the boundary of the Kankakee watershed. The original Grand Kankakee Marsh covered an area of more than 500,000 acres along the Kankakee River. The economic study area considered in this analysis is the entire 13-county region. Roughly two-thirds of this area falls within Indiana and one-third falls within Illinois. In this report, the economic study area is taken to include the entire area and economy of thirteen Indiana and Illinois counties listed in Table II-1. These counties each contain at least some part of the Kankakee River watershed. As pointed out previously, the Kankakee River watershed covers a large portion of some counties and only a small portion of

others. The proposed refuge is expected to occupy 30,000 acres at multiple sites in this thirteen-county area. The area that would potentially contain the refuge constitutes less than one percent of the total acreage of the economic study area.

The economic study area lies immediately south of the Chicago Metropolitan Area. Within an approximate 100-mile radius of the watershed, there are a number of large and small population centers. An urban corridor exists north and just outside of the watershed where Interstate 80 connects Chicago, Gary, Michigan City, South Bend and Elkhart. These cities along the northern edge of the economic study area exert a strong influence on the regional economy and would play a key role in providing visitors to the proposed refuge. Other urban centers that lie within 200 miles of the economic study area are Ft. Wayne and Detroit (to the east), Logansport, Lafayette, Champaign-Urbana, and Indianapolis (to the south), and Peoria (to the west).

Lake and Will Counties, both part of the Chicago Metropolitan Statistical Area, are the most populous counties in the economic study area. Lake County has the highest population density, with 970 people per square mile. All of the counties in the northern tier of the economic study area have larger populations and higher population densities than those of the southern tier. Iroquois County, with 28 people per square mile, is the most sparsely populated county in the economic study area. Pulaski County, with 30 people per square mile, is the second most sparsely populated county. As of 1995, the average population density in the economic study area as a whole was 236 people per square mile.

In 1995 the economic study area population was approximately 1.7 million (Table II-2). This population represents a seven-percent increase over the 1985 population. Over the same time period the Indiana and Illinois populations grew by six percent and four percent, respectively. Thus, over the last decade, the counties of the economic study area experienced somewhat faster population growth than their respective states. At 20 percent, population growth in Will County was the most rapid of the 13 counties. Much of the growth in population in the area has been attributed to urban encroachment from the Chicago area. Only two counties in the economic study area – Lake and Iroquois – experienced a decline in population during this time. Appendix Table A.1 contains area and population figures by county.

Table II-2. Acreage and population in the economic study area

Area (Sq. mi.)	Area (Acres)	1985 Population	1995 Population	% Growth 1985-1995
7,288	4,690,741	1,609,385	1,716,995	6.7

Source: BEA: REIS

C. Structure of employment

Table II-3 summarizes the employment of the economic study area by sector. Total employment in the economic study area increased by nearly one-fourth between 1974 and 1994. As the data in Table II-3 illustrate, three sectors – services, retail and manufacturing – dominate the local economy. Together they account for nearly two-thirds of total employment. These sectors are key to the economic study area's past and future economic growth. The service sector alone accounts for more than one-fourth of total employment in the economic study area. The number

of people employed in this sector doubled between 1974 and 1994. Retail and manufacturing each employ 18 percent of economic study area workers. The retail sector's growth has been more modest than that of the service sector. Retail and service are both low-wage sectors. Manufacturing's share of employment decreased by a third over the two decades. The highest growth sector was agricultural services/forestry/fishing. Employment in this sector nearly tripled between 1974 and 1994, but still represented less than one-percent of total employment in the region. Farm employment decreased by more than one-third during the period 1974-1994, a trend that is consistent with national trends.

Lake County employed more than one-fourth of all workers in the economic study area in 1994. Its share of employment has been decreasing, however. In 1974, over a third of area jobs were located in Lake County. Will County, also part of the Chicago Metropolitan Area, employed 18 percent of economic study area workers in 1994. Its share of employment increased from 13 percent in 1974. St. Joseph County, where South Bend is located, employed another 18 percent of economic study area workers. Its share of economic study area employment remained steady between 1974 and 1994.

Porter County experienced the highest growth in total number employed. Employment there increased by 72 percent between 1974 and 1994. Will County employment grew by over half during this period, as did employment in Marshall County. One county – Lake – experienced a decrease in employment between 1974 and 1994. During this time it lost three percent of its jobs. Starke and Newton were the only other counties to experience less than double-digit growth during this time.

Marshall and Kosciusko counties, side-by-side in the southeastern end of the economic study area, are dominated by the manufacturing sector. Manufacturing claimed over a third of all employees in 1994 in both counties. Manufacturing was also the largest employer in Newton and Pulaski, counties, supplying about one-fourth of all jobs. Retail was the largest employer in Jasper and Starke Counties. Both are largely rural counties with major interstate highways running through them. The northern tier counties in Indiana and all three Illinois counties were dominated by the service sector. Appendix Table A.2 contains 1994 employment figures by county.

Table II-3. Employment by economic sector

	1974	**1984**	**1994**	**% Change 1974-1994**
Total Employment	657,906	658,063	812,898	24
% Farm	3.6	3.0	1.8	-39
% Ag. Svc., For., Fish.	0.3	0.6	0.9	277
% Mining	0.2	0.1	0.1	-16
% Construction	5.1	4.9	6.6	61
% Manufacturing	32.0	23.1	17.9	-31
% Transp. & Pub. Util.	5.5	5.3	5.4	20
% Wholesale Trade	3.2	3.8	4.3	65
% Retail Trade	15.9	17.9	18.3	42
% Fin., Ins., Real Est.	5.7	5.6	5.4	17
% Services	16.6	23.0	27.5	105
% Government	12.0	12.6	11.8	22

Source: BEA: REIS

D. Structure and distribution of income

Income figures for the economic study area are presented in Table II-4. The 1994 per capita income of the economic study area ($20,027) was lower than the state averages for Indiana ($20,273) and Illinois ($23,611) (Income per capita for the U.S. as a whole in 1994 was $21,696). In terms of earnings, the largest economic sectors in the area are manufacturing and services. Although the service sector employs more people, manufacturing still supplies more earnings. The retail sector, which is responsible for approximately one-fifth of the jobs in the economic study area, provides only 10 percent of earnings.

Counties are ranked by 1994 per-capita income in Table II-5. Leading counties were Porter County, Indiana ($21,845) and Will County, Illinois ($21,165). Starke County, Indiana had the lowest per capita income ($14,439). Appendix Table A.3 contains 1994 income figures by county.

Table II-4. Income levels for the economic study area, 1994

Type of Income	($000)	% of total Earnings
Total Personal Income	34,150,356	--
Per Capita Income	$20,027	--
Total Earnings	21,573,988	--
Farm	312,115	1
Ag. Svc., Forestry., Fish.	123,753	1
Mining	24,859	0
Construction	1,790,802	8
Manufacturing	6,280,098	29
Transp. & Pub. Util.	1,576,145	7
Wholesale Trade	1,176,691	5
Retail Trade	2,057,139	10
Fin., Ins., Real Est.	801,176	4
Services	4,933,197	23
Government	2,498,013	12

Source: BEA: REIS

Table II-5. Income rankings for counties in the economic study area, 1994

County	Per capita Income (1994)
Porter, IN	$21,845
Will, IL	$21,165
St. Joseph, IN	$20,584
Kosciusko, IN	$20,571
Iroquois, IL	$19,626
Lake, IN	$19,504
Kankakee, IL	$18,939
Marshall, IN	$18,738
La Porte, IN	$18,583
Pulaski, IN	$17,329
Jasper, IN	$16,789
Newton, IN	$16,537
Starke, IN	$14,439

Source: BEA: REIS

E. Agriculture

Historically, agriculture has been an important part of the regional economy of northern Indiana and Illinois. Agriculture remains vibrant and important in the area. Corn and soybeans are the largest crops in terms of acres harvested. Despite the importance of agriculture, however, both the number of farms and the acreage devoted to farming have decreased in the economic study

area during the past decade (Table II-6). At the same time, average farm size increased. This pattern is consistent with national trends toward concentration in the agricultural sector. At the same time area in farmland decreased, harvested cropland increased. Harvested corn acreage increased by nearly one-fourth between 1987 and 1992. Overall, farming is directly responsible for two percent of jobs and one percent of earnings in the economic study area. Appendix Tables A.4 and A.5 contain agricultural figures by county.

Table II-6. Characteristics of the agricultural sector in the economic study area

	1987	1992	% Change 1987-92
Number of Farms	11,873	10,268	-13
Land in Farms (acres)	3,552,190	3,431,195	-3
Avg. Farm Size (acres)	299	334	12
Value of Products Sold (nominal $000's)	1,043,504	1,142,602	9
Harvested Cropland (acres)	2,619,381	2,924,417	12
Corn (acres)	1,287,358	1,599,331	24
Soybeans (acres)	1,108,922	1,130,647	2
Wheat (acres)	60,578	33,710	-44
Hay (acres)	85,008	75,089	-12

Source: Census of Agriculture

F. Summary

Most of the economic trends in the economic study area are consistent with state and national trends. However, the area is typical neither for Indiana nor for Illinois. It combines highly urban

areas – dominated by Chicago – and largely rural counties. The population of the economic study area has grown at a slightly faster rate than the population of either Indiana or Illinois, and per capita incomes have remained below those of surrounding counties. The northern tier counties tend to have higher population densities and higher per capita incomes than counties in the southern portion of the watershed. The service sector is the dominant source of jobs in the area, but the manufacturing sector still supplies the largest share of earnings. The agricultural sector is becoming more concentrated in the area, and the area devoted to farming is decreasing.

In summary, the economy in the economic study area is very diverse. It is difficult to draw conclusions about the conditions in any one county based on the summary statistics for the whole area. The counties in and adjacent to the Chicago Metropolitan Area will experience continued growth pressure in the form of suburban and semi-urban expansion. Maintaining and attracting employment will continue to be a high priority in the more remote, rural Indiana counties. How the proposed refuge might affect a given county depends, in part, on the response of a local community to the refuge and to refuge visitors.

III. Description of Proposed Refuge and Management Alternatives

The assessment of economic impacts provided in this study relies on a series of land acquisition and management alternatives defined by FWS staff. Using these management alternatives a series of profiles of land use "with" and "without" the refuge was created. This exercise constitutes Steps 1 and 2 of the analysis as outlined in Figure I-1. The pictures that emerge from a comparison of these profiles of land use are the basis for estimating changes in economic activities, expenditures, business activities, employment, and personal incomes within the watershed.

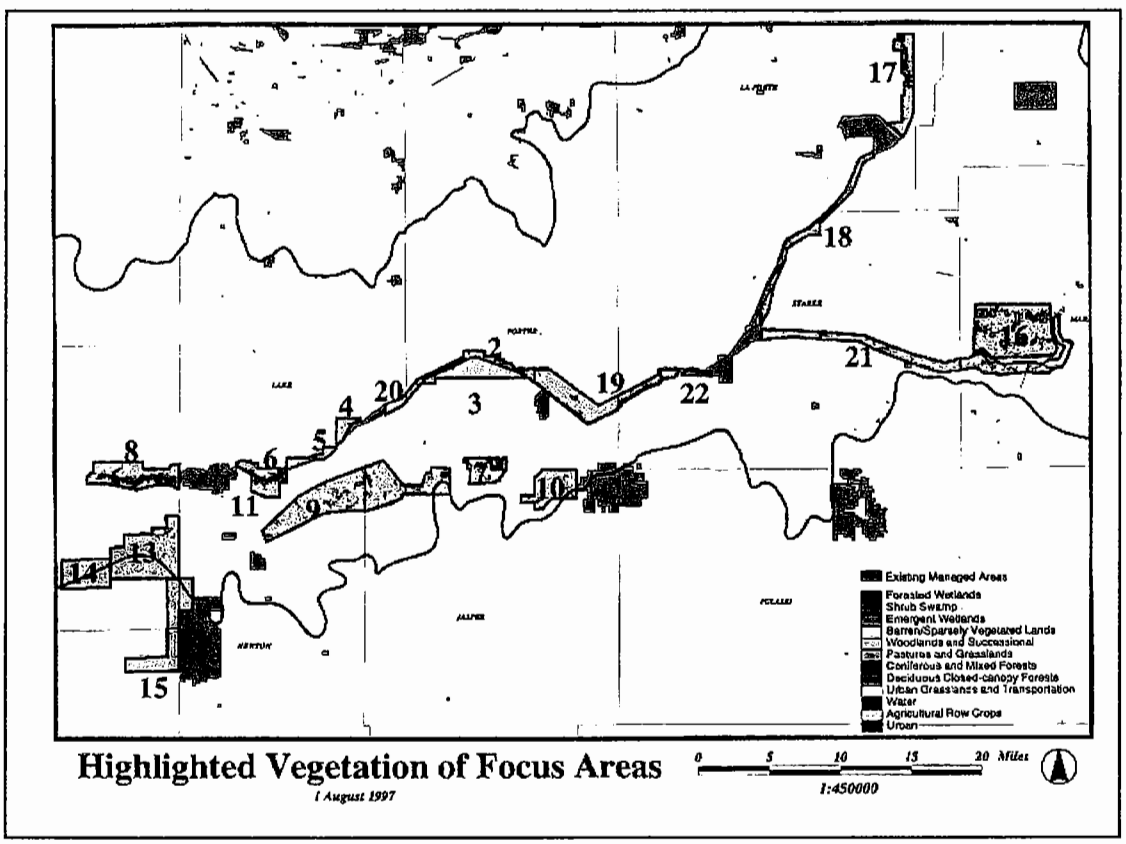
It is important to note that some changes in land use have already been occurring in the area and are likely to continue even in the absence of refuge development. For example, the downward trend in area devoted to agricultural row crops (identified in section III.E) will likely continue because of urban and suburban growth. For this reason, impacts (such as decrease of farmland) that are attributed to refuge development in this study could occur even if the proposed refuge is not established.

Land-use changes used in this analysis were identified by the FWS Bloomington Field Office, using GIS-based gap analysis and other data. Gap analysis is a U.S. Geological Survey, Biological Resources Division program conducted at the state level and designed to answer questions about the protection of biological diversity and habitat. The refuge design analysis began with satellite images of vegetation and land characteristics in the Kankakee watershed. These satellite images were used to develop a profile of 12 *land cover classifications* contained

in the Kankakee watershed. These land cover classifications are listed and briefly described in Table III-1. The table also contains information on the likely existing use of this land and the possible recreational activities that the land would support.

Using this set of land cover classifications and a set of specific management goals and targets, the FWS identified a series of 20 focus areas for possible land acquisition (see GKMNWR Environmental Assessment). In addition the FWS gleaned information from public meetings, written and verbal comments and input from conservation partners. These focus areas, which are illustrated in Figure III-1, consist of contiguous parcels of land of a given cover type that would be considered for land acquisition. However, not all land identified as focus area would be acquired under the proposed refuge plan. Furthermore, not all land identified as focus area is agricultural.

Figure III-1. Focus areas within which land acquisition might occur



The ability of the FWS to acquire any specific parcel is uncertain. Specific acquisition of parcels would depend on the existence of willing sellers, FWS budgetary approval, previous patterns of land acquisition, continued analysis of specific parcels and the evolution of management goals within the FWS. To address FWS priorities and the uncertainty surrounding potential land acquisition and management, a series of four management alternatives were outlined by FWS staff. These management alternatives are intended to provide management clarity, and hence narrow the focus for the development of the proposed refuge. The four alternatives are identified as W*etland Alternative*, G*rassland Alternative*, T*hreatened and Endangered Species Alternative*, and H*ybrid Alternative*. The FWS staff identified 30-60,000 acres per management alternative as focus areas. These areas exceed the 30,000 acres that constitute the total area targeted for acquisition. For the purposes of this economic analysis, the total area identified as focus area was reduced proportionately. Thus the results of this analysis reflect the impact of acquiring 30,000 acres that possess the characteristics of the entire focus area. Scaling was done in such a way that the relative shares of land in each land classification category are the same as in the focus area as a whole. Similarly, the 30,000 acres used in this analysis are distributed among counties in the same proportion as in the aggregated focus areas.

The *Wetland Alternative* focuses on protecting and restoring wetlands, with the goal of expanding habitat for migratory waterfowl and other fish and wildlife. The *Grassland Alternative* focuses on restoring land to native grassland, pasture, and savanna with the goal of expanding tallgrass prairie and compatible adjacent land. Prairie is the rarest major habitat type in Indiana, comprising less than one percent of the surface area of the state. Tallgrass prairie

constitutes important nesting and breeding habitat for numerous bird species, as well as habitat for other terrestrial vertebrates. The *Threatened and Endangered Species Alternative* focuses on protecting and restoring both wetlands and woodlands for the purpose of protecting and enhancing a number of state and federally-listed threatened and endangered species. Under this management alternative, land acquisition and land management would be especially sensitive to the habitat needs of threatened and endangered species. The *Hybrid Alternative* combines these management goals. It would focus on acquiring existing wetlands, woodlands, and grassland as well as restoring existing agricultural and pastureland to these categories.

Each management alternative reflects a different conservation goal and emphasizes a different constellation of focus areas. The focus areas and management alternatives were developed on the basis of biological and ecological criteria, and were chosen without regard to economic conditions or county or state boundaries. For the purposes of the impact analysis it was necessary to aggregate focus area information to the county level. Aggregate changes in land use – in terms of the share of projected total area for acquisition – for each management alternative are listed in Table III-2. Projected changes in row-crop acreage for each county are listed in Table III-3. Each management alternative targets slightly different focus areas within the watershed. As a result, the geographical distribution of land acquisition would depend upon the goals of land management. As the table indicates, the implication of refuge development for a county differs according to the management alternative under consideration. The FWS, when deciding the allocation of land for each alternative, did not take political borders into account. Their concern was with natural landforms and the needs of wildlife. Four counties – Kosciusko,

Pulaski, St. Joseph and Will – are not projected to have land acquisition in any management alternative. These counties are included in the study because they are still part of the economic area within which the Kankakee watershed lies, and because it is possible that the FWS could identify acquisition sites in one or more of these counties at a later date. Some amount of land acquisition has been projected for each of the remaining counties in the economic study area. The actual amount of land to be acquired would depend on the land needs attendant with a particular management goal and the presence of willing sellers.

Table III-1. Land use categories

Land use category	Description
Forested wetlands	Wetlands with trees, often along rivers or streams
Shrub swamp	Wetlands with shrubs like willows or buttonbush, often in areas too wet for trees.
Emergent wetlands	Wetlands or marshes dominated by grasslike plants such as cattails.
Barren/sparsely vegetated land	Category corresponding to non-vegetated land including recently plowed agricultural fields, disturbed areas for building sites, etc.
Woodlands and successional forest	Areas where trees are either spaced far apart or trees are very young – in the economic study area this could be savanna or old fields.
Pastures and grassland	Any area dominated by grass. Could be hay, pasture or native grasses.
Coniferous and mixed forests	Closed canopy upland forest with an evergreen component
Deciduous closed-canopy forests	Closed canopy upland forest without an evergreen component
Urban grasslands and transportation	Lawns, city parks, sports fields, schools and highway corridors
Water	Streams, rivers, lakes, and ponds
Agricultural row crops	Any row-cropped ground (typically corn and/or soybeans)
Urban	Cities and subdivisions

Source: FWS Bloomington field office

Table III-2. Share of land acquisitions by county by management alternative (%)

County	Wetland Alternative	Grassland Alternative	T & E Alternative	Hybrid Alternative
Jasper	8	30	1	13
Kosciusko	0	0	0	0
Lake	8	0	11	8
La Porte	7	0	18	13
Marshall	32	0	13	0
Newton	3	27	0	6
Porter	15	0	20	14
Pulaski	0	0	0	0
St. Joseph	0	0	0	0
Starke	16	0	22	5
Iroquois	0	8	0	7
Kankakee	12	35	16	34
Will	0	0	0	0
% total	**100%**	**100%**	**100%**	**100%**
Total acres purchased	**30,000**	**30,000**	**30,000**	**30,000**

Source: FWS Bloomington field office.

Each management alternative is described in greater detail below. For each, the current configuration of land use (without the refuge) is described. Then the management target, the projected land-use configuration with the refuge, and the economic climates of component

counties to be affected are discussed. Estimates of affected row crop acreage are based on non-accuracy assessed classification of Landsat Thematic Mapper™ images taken between November 1, 1990 and May 10, 1993.

Table III-3. Projected reduction in row crop acreage

County	Land in Farms (1992)	Harvested Cropland (1992)	Wetland Alternative	Grassland Alternative	T & E Alternative	Hybrid Alternative
Jasper	301,962	251,579	-1,987	-5,440	-29	-2,428
Kosciusko	251,603	192,885	0	0	0	0
Lake	144,305	112,190	-1,456	0	-1,990	-1,408
La Porte	267,695	225,617	-1,054	0	-2,961	-2,096
Marshall	219,402	174,005	-5,909	0	-2,334	0
Newton	206,885	180,048	-479	-4,838	0	-1,177
Porter	142,482	121,941	-2,979	0	-4,072	-2,882
Pulaski	242,777	204,381	0	0	0	0
St. Joseph	172,348	143,636	0	0	0	0
Starke	134,960	105,299	-3,030	0	-4,141	-793
Iroquois	662,629	597,863	0	-1,490	0	-1,298
Kankakee	358,920	326,603	-1,157	3,779	-1,582	-3,452
Will	325,227	288,370	0	0	0	0
Area Total	**3,431,195**	**2,924,417**	**-18,050**	**-15,547**	**-17,108**	**-15,536**

Source: FWS Bloomington field office and Census of Agriculture

A. Wetland Alternative

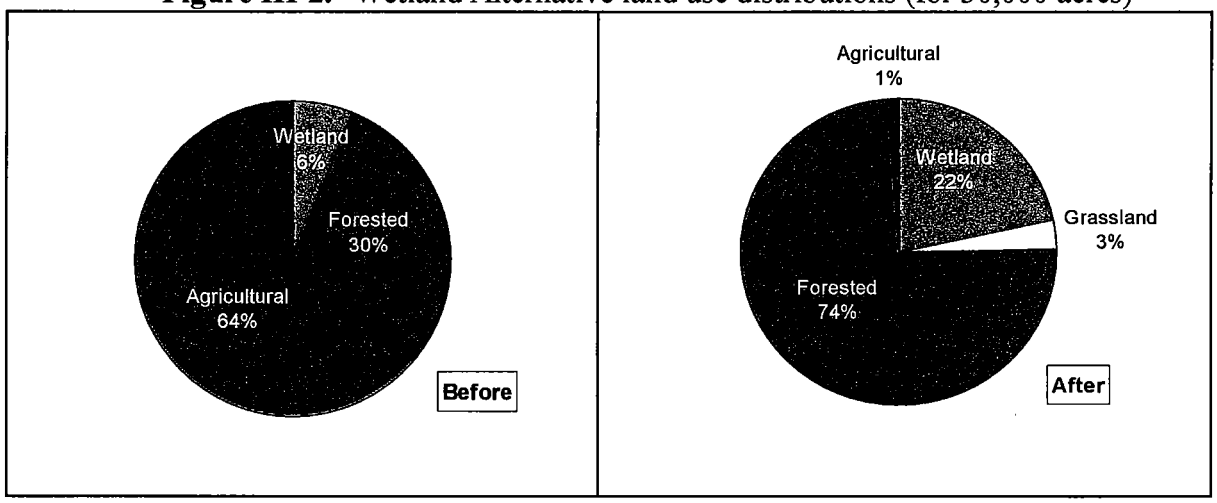
The Wetland Alternative targets 19,147 acres of agricultural land and 10,853 acres of other land in eight counties. The goal of this alternative is to protect, expand, and restore natural wetlands

for the increase of waterfowl, shorebirds, wading birds, furbearers, native fish species, and endangered species. The Wetland Alternative assumes that over 60 percent of all land targeted for acquisition would be agricultural row-crop land, primarily on flood-prone hydric soils. Approximately two-thirds of this targeted row-crop acreage would be restored to forested wetlands. The remainder would be restored to emergent wetlands and successional woodlands. For most of the focus areas, the conversion rate would be 80 percent forested wetland and 20 percent emergent wetland. Successional woodlands would account for approximately 10 percent of all land restored. Recreational activities associated with this management alternative include goose and duck hunting, fishing, bird watching, photography, canoeing, and nature study.

The eight counties that would be directly affected by land use changes are Jasper, Kankakee, Lake, La Porte, Marshall, Newton, Porter and Starke counties. These counties would be affected at widely differing rates. Lake, La Porte, and Porter counties are in the northern tier of the economic study area. All have large, dense populations, though Lake County's is by far the largest and densest population in the economic study area. Porter County has the highest per capita income in the economic study area. Starke County, just to the southeast, has the lowest per capita income in the economic study area. The majority of employment in Starke County is in the retail sector. Starke and Marshall counties share a common border in the southeastern part of the economic study area. Employment in Marshall and Newton Counties is dominated by the manufacturing sector. More than a third of the jobs in those counties are manufacturing jobs. Lake, La Porte and Porter counties rely on the service sector for one fourth of their jobs. Jasper, Marshall and Porter counties experienced double-digit growth in employment between 1990 and

1994, while employment in Lake and Newton counties grew by only one percent. Porter County experienced double-digit growth in population between 1985 and 1995 while Lake County's population decreased by two percent.

Figure III-2. Wetland Alternative land use distributions (for 30,000 acres)



B. Grassland Alternative

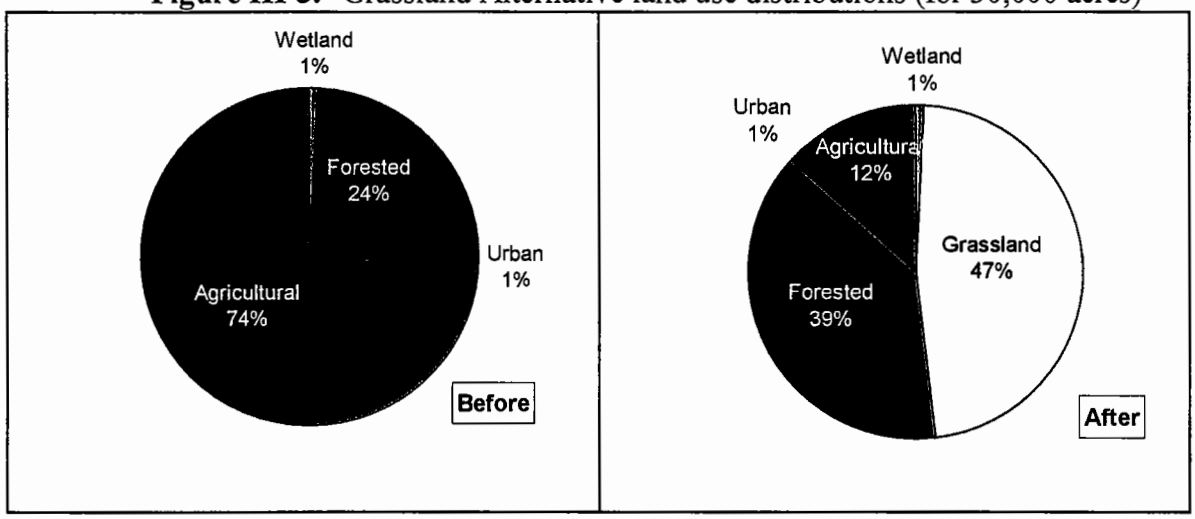
The Grassland Alternative targets approximately 21,986 acres of agricultural land and 8,104 acres of other land in Iroquois, Jasper, Kankakee and Newton counties. Of the total amount of agricultural land targeted, 71 percent would be agricultural row crop and the remaining 29 percent would be pasture. The Grassland Alternative assumes that this land would be acquired and restored to grassland and savanna, possibly with some pasture as buffer, and would be managed as wildlife habitat. The goal of the Grassland Alternative would be to restore tallgrass prairie that is important breeding habitat for numerous species of birds.

This study assumes that approximately 75 percent of acquired land would be restored to native grassland and pasture. The remaining 25 percent would be restored to savanna. It is further assumed that 20 percent of land restored to native grassland and pasture would be available as pasture for agricultural grazing, and would be leased by the FWS from farmers, rather than purchased. Recreational activities associated with this management alternative would include deer, duck, goose, and upland small game hunting; bird watching; photography; hiking; and nature study.

Four counties would be directly involved in land acquisition under this management alternative: Iroquois, Kankakee, Jasper, and Newton. These counties are located in the southwestern portion of the economic study area. Iroquois County, in Illinois, is a rural farming county. It has the lowest population density of the thirteen counties in the economic study area, and is one of two counties in the economic study area that experienced a population decline between 1985 and 1995. Iroquois County has the largest number of farms of the counties in the economic study area, and has more acreage devoted to farming. Fourteen percent of employment in Iroquois County is farm employment. Per capita income in Iroquois County is slightly below the economic study area average. Kankakee County lies just north of Iroquois County. It has three times the population of Iroquois County and four times its population density. Three percent of the county's employment is in the agricultural sector. In both counties, the service sector is the dominant employer. Manufacturing is the primary source of jobs in Newton County, Indiana, located directly across the state line from Iroquois. Newton County, like Iroquois County, is sparsely populated. Eleven percent of its employment is in the farming sector. Newton

County has the second lowest per capita income in the economic study area. Jasper County, just to the east of Newton County, has the third lowest per capita income in the economic study area. It is also sparsely populated. Employment is dominated by the retail sector. Interstate 65 bisects the county from north to south.

Figure III-3. Grassland Alternative land use distributions (for 30,000 acres)



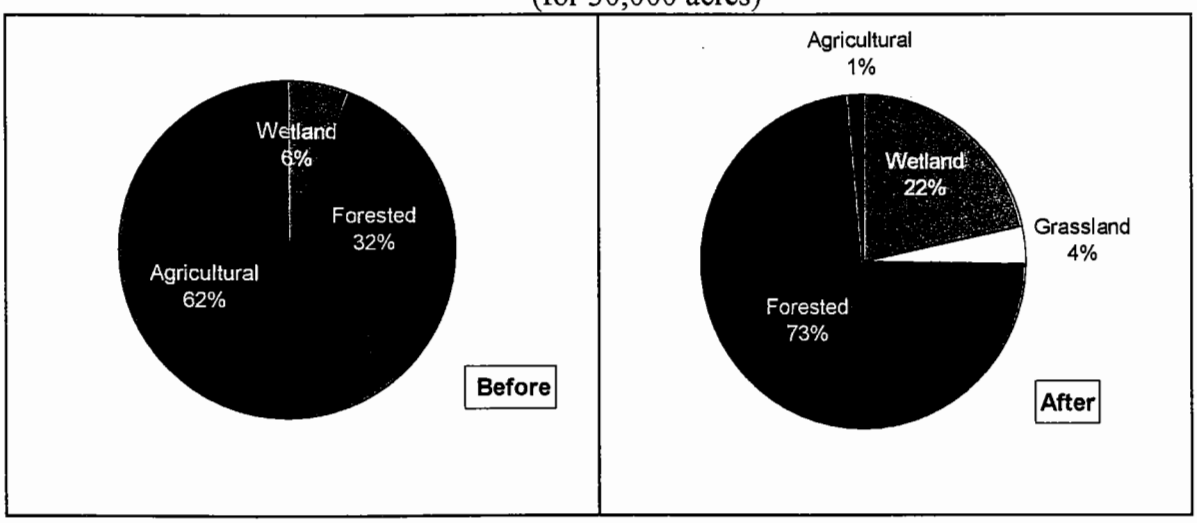
C. Threatened and Endangered Species Alternative

The Threatened and Endangered Species Alternative targets 17,108 acres of agricultural row crop, 1,397 acres of pasture, and 11,496 acres of other land in seven counties for acquisition. The management target for this alternative is protecting threatened and endangered species. Land currently used for row-crop production would be restored to forested wetland, emergent wetland, successional woodland and shrub swamp. As in the Wetland Alternative, most restoration (approximately 50 percent) would focus on forested wetland. Another fourth of the land would be restored to emergent wetland. Focus areas of nearly 500 acres each, in La Porte County,

would be targeted for shrub swamp and successional woodland. Another 500-acre area in Kankakee County would be restored to savanna. Under this management alternative access to restored land would likely be more restrictive in order to afford maximum protection to threatened and endangered species. For this reason, consumptive recreational activities such as hunting would be somewhat restricted, and secondary agricultural uses, such as grazing, would be largely absent.

This management alternative involves land in seven of the eight counties discussed in the Wetland Alternative: Jasper, Kankakee, Lake, La Porte, Marshall, Porter and Starke.

Figure III-4. Threatened and Endangered Species Alternative land use distributions (for 30,000 acres)



D. Hybrid Alternative

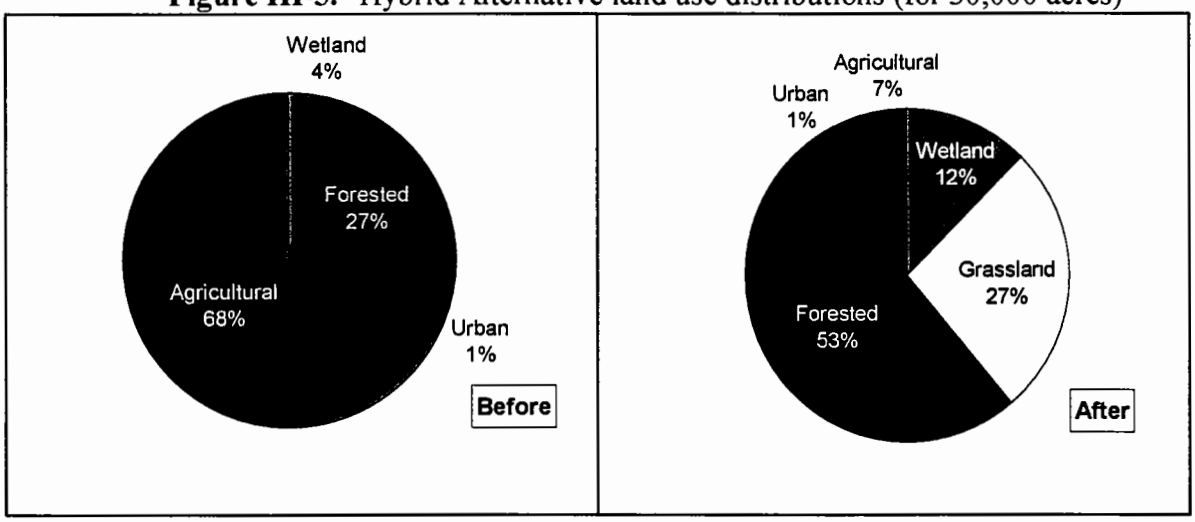
The Hybrid Alternative targets nearly 20,427 acres of agricultural land, including 15,536 acres of row crops and 4,891 acres of pasture in eight counties. Agricultural land represents 68 percent of the land targeted for restoration and preservation. Agricultural land likely to be targeted would

be mostly flood-prone. This alternative combines management goals. The Hybrid Alternative assumes that land currently in row crop production would be restored to a wide range of categories including forested wetlands, pasture and grasslands, savanna, emergent wetlands and shrub swamp. Approximately one third of the row crop acreage would be restored to forested wetlands and another third to pasture and grasslands. Savanna and emergent wetlands would comprise most of the last third. One 500-acre plot in La Porte County would be restored to shrub swamp.

The Hybrid Alternative would allow for the most varied use of refuge property. As much as 2,000 acres could be available for grazing. The mixture of wetland, grassland, and forested areas would support nearly all categories of recreational use, including goose and duck hunting, deer hunting, fishing, bird watching, photography, hiking, canoeing, and nature study.

The Hybrid Alternative directly involves eight counties: Iroquois, Jasper, Kankakee, Lake, La Porte, Newton, Porter and Starke. All of these counties have been discussed in previous management alternatives.

Figure III-5. Hybrid Alternative land use distributions (for 30,000 acres)



E. Timing of land acquisition

Based on the most reliable budget projections available from the FWS, the assumption used in this analysis is that complete acquisition of 30,000 acres would occur over 30 years. An additional assumption is that land would be acquired at a constant rate of 1,000 acres per year, in each of 30 years. For this analysis, economic impacts are assessed over this 30-year time period. Clearly, however, once established, impacts from the proposed refuge would extend beyond this initial 30-year period.

No attempt is made to distinguish the sequence of land acquisitions, either by type or location. In other words, the assumption used in the analysis is that in each year a portion of land is acquired that is representative of the total land targeted for acquisition, and that the types of impacts generated by this acquisition pattern are the same in each year. However, the *magnitude* of impacts associated with land-use changes are assumed to differ according to whether they occur early or late in the 30-year time line of acquisition. This subject is discussed in detail in section IV.A below.

F. Summary

Because the four management alternatives focus on different goals, the implications for the economic study area vary with each. The Wetland Alternative would acquire land in eight counties, but would acquire less agricultural land than the Grassland Alternative. Overall, less than one percent of acquired land would be available for continued agricultural use in the form of pasture, however. This alternative would lead to an increase in recreational activities. Expanded wetlands would attract waterfowl hunters, bird watchers, photographers and canoers, among others.

The Grassland Alternative targets more agricultural land than the other alternatives, but also allows for the greatest continued use of agricultural land, in the form of pasturing on approximately 12 percent of the land. The Grassland Alternative involves land acquisition in only four counties. This alternative is likely to support a wide-range of recreational uses.

The Threatened and Endangered Species Alternative targets land in eight counties. It targets the fewest acres of row crops of any alternative under consideration. At the same time, however, it would be the most restrictive alternative for consumptive recreational activities and would restrict secondary agricultural uses to less than 1 percent of the land.

The Hybrid Alternative directly affects eight counties. It combines management goals, and would therefore allow for some of each use. As much as 2,000 acres of land could be available for grazing. Wetland and grassland areas would support a wide range of wildlife and recreational activities such as hunting, bird watching, photography, hiking, canoeing, and nature study.

IV. Impact Analysis, Data, and Methods

A. Overview of Economic Impact Analysis

Part V of this report presents results from the economic impact analysis. As a preview to the presentation of these results, this part of the report outlines the framework used to identify and quantify economic outcomes associated with changes in the regional economy of the study site. Here the methods, data, procedures, and assumptions used in estimating the economic impact of the proposed refuge are presented. In terms of the sequence of steps outlined in Figure I-1, this part of the report addresses Steps 3-5.

This section presents an overview of the economic impact analysis. Section B contains estimates of direct expenditures by the FWS on refuge development, operation, and maintenance. Section C presents estimates of the number of refuge visitors under each management alternative. Section D presents estimates of expenditure patterns for these visitors. Section E describes the IMPLAN model.

The goal of the economic impact analysis is to account for and measure the economic impacts arising from land use changes in the study site. An important requirement for this analysis is accounting for the interrelationships among businesses in the Grand Kankakee area. This is accomplished using an input-output model. Input-output analysis is discussed in more detail in the following pages. A general overview of the types of interrelationships considered in this study is illustrated by the following stylized example. Assume that a farmer within the watershed currently plants corn on his farm. Suppose he decides to voluntarily sell his land to the FWS and that it then becomes part of the proposed refuge. What is the potential impact of

this change in land use on the regional economy? This land sale has two impacts: first, land is taken out of agricultural production. This leads to a series of related economic changes in the regional economy. Second, the former farmland becomes refuge and thereby provides local and outside visitors a range of recreational opportunities. These recreational opportunities draw local residents and non-residents to the refuge. These individuals create new patterns of economic activity that, over time, replace some of the old patterns of economic activity that were associated with agricultural production. The kinds of economic changes that result from this change in land use depend on the nature of the changes and the ways in which local communities and businesses respond to changes in economic conditions.

To continue the example, suppose that when the farmer's land was planted in corn, the farmer purchased seed from a local supplier. If the supplier purchased seed from a local seed producer, and if a local business packaged the seeds, then the reduction in agricultural acreage will lead to a reduction in sales for the input supplier, the local seed producer, and the seed packager. These decreases can be traced further. The reduction in incomes for the input supplier, the seed grower, and the packager means that each of these individuals spends less money in the local economy. Such income effects would extend through the local economy to the grocery store, the gasoline station, the banker, and the insurance agent. Each impact gives rise to another set of economic changes. For example, if the reduction in agricultural activities results in less banking activity, the local banker will adjust his spending in response to reductions in his income. With each step away from the farmer, however, the magnitude of economic changes diminishes.

To measure the chain of economic events that results from the initial change in land use, economic multipliers are used. A multiplier is defined as a number that represents the total level of activity resulting from a unit of initial activity in the economy. There are several categories of multipliers. This study uses total income and total employment multipliers. A total income multiplier measures the degree to which an initial economic change leads to income changes in the local economy. In the same way, a total employment multiplier measures the degree to which an initial economic change leads to changes in the level of employment in the local economy.

As the example illustrates, a shift in land use from agriculture to refuge entails reductions in agricultural activities and – through multiplier effects – reductions in economic activities for related enterprises. At the same time, expenditures to establish the refuge and expenditures by refuge visitors generate increases in other economic categories. Many aspects of the proposed refuge could be expected to increase economic activity in the study region. For example, the refuge staff would spend money in the local economy; construction of a visitors' center would generate jobs and incomes for local construction firms; and hunters, fishers, bird watchers, and others who visit the refuge would require food, lodging, and other necessities.

The approach used to estimate the total economic change resulting from the establishment of the proposed refuge is input-output analysis. Input-output analysis is a method for tracing the interrelationships among economic activities. The input-output framework traces back all the inputs used in the production of the final good, and keeps track of the proportion that are local in order to elicit the total impact of changes to the local economy. Input-output analysis

estimates three different measures of economic impacts: direct, indirect, and induced. In this study direct effects include financial decreases due to land taken out of agricultural production and economic gains resulting from expenditures by recreation visitors. Indirect effects include changes in the purchasing power of individuals due to these direct economic changes. Induced effects are the changes in consumer spending that result from the direct and indirect effects on incomes.

B. Measuring impacts on agriculture in the economic study area

Economic impacts of the proposed refuge on agricultural activity are calculated as follows. First, changes in the amount of agricultural land are used to estimate changes in the annual value of agricultural production using historical data on yields and prices in the region. Then, based on those changes, the indirect and induced impacts of the proposed refuge are estimated using total income and employment multipliers for agricultural production in the regional economy.

Potential changes in the amount of land used in agriculture were provided by the FWS as outlined in Part III of this report. The possible reduction in area devoted to agricultural row crop ranges from 15,536 acres in the Hybrid Alternative to 18,050 acres in the Wetland Alternative. The expected increase in area devoted to pasture ranges from 175 acres in the Wetland Alternative to 3,540 acres in the Grassland Alternative. Smaller reductions in agricultural row crop acreage are possible. Estimates of land use with and without the refuge, by county and management alternative are provided in Appendix B.

For purposes of valuing agricultural production, this study relied on yield and price data

from the 1994-95 *Indiana Agricultural Statistics* (IASS 1995). Although some land near the Kankakee River is used for high-value crops, such as seed corn or mint, the vast majority of row-crop land in the economic study area is used for either corn or soybean production. For valuation purposes, this study assumes that all row-crop land taken out of production would have been used for corn production. Corn yields from 1994 for each of the 10 Indiana counties in the study are used to estimate the productivity of land. These figures, which are based on figures from the annual census of Indiana agriculture, are reported in column one of Table IV-1. In terms of rainfall and production in northern Indiana, 1994 was a normal year. Yields for the 10 counties were averaged, providing an estimate of expected yield on row-crop land of 142.1 bushels of corn per acre. This figure was then adjusted for the Baseline Scenario to reflect the widespread occurrence of flooding on fields along the river. The assumption used in the Baseline Scenario is that crop loss occurs in every fifth year. In other words, the expected yield is assumed to be 80 percent of 142.1 bushels per acre or 113.7 bushels per acre. Sensitivity analysis A examines the outcomes when yields are valued at 100 percent of the 10-year average. Sensitivity analysis B uses the same yield figures as the Baseline Scenario.

For both the Baseline Scenario and Scenarios A and B used in the sensitivity analysis, corn yields were valued at the 1994 average corn price in Indiana of $ 2.25 per bushel. The Indiana state-wide average corn price over the 10-year period 1986-87 to 1995-96 was $2.26 per bushel.

In the case of pasture, this study assumes that all affected pastureland would be associated with hay production. Hay yields from each of the 10 Indiana counties in the study are

reported in column two of Table IV-1. The average of these figures is 4.0 tons per acre. However, in recognition of the low-quality pasture expected in the area adjacent to the Kankakee River, a figure of 50 percent of this yield was used to calculate the expected yield of pastureland. The average price of (non-alfalfa) hay in 1994 was $ 69.50 per ton. The Indiana state-wide average price for the 10-year period ending in 1995-96 was $57.30 per ton. The per-acre values of agricultural production used in the Baseline Scenario and Scenarios A and B used in the sensitivity analysis are reported in Table IV-2.

Table IV-1. Corn and hay yields for 10 Indiana counties in economic study area, 1994

County	Corn (b/acre)	Hay (tons/acre)
St. Joseph	141.4	4.1
Starke	135.0	3.6
Pulaski	135.8	3.8
Porter	147.6	3.7
Newton	146.2	4.2
Marshall	139.3	4.4
La Porte	143.8	4.3
Lake	140.9	3.7
Kosciusko	140.1	3.9
Jasper	150.8	4.2
Average	142.1	4.0

Source: IASS 1995

Table IV-2. Assumed annual values of corn crops and pasture land

	Baseline		Scenario A		Scenario B	
	Corn (bushels)	Hay (tons)	Corn (bushels)	Hay (tons)	Corn (bushels)	Hay (tons)
Yield (units/acre)	113.7	2.0	142.1	2.0	113.7	2.0
Price (per unit)	2.25	69.5	2.25	69.5	2.25	69.5
Value (price/acre)	256	139	320	139	256	139

Source: Computed by authors based on IASS 1995

C. FWS development and operation expenditures

The FWS has identified three categories of direct expenditures that will take place in the economic study area. These are (1) construction expenditures (including expenditures for a refuge visitor center and roads); (2) operation and maintenance expenditures (including salaries for refuge employees or contract labor); and (3) expenditures for levee and dike construction on the refuge. This section identifies the magnitude of these expenditures and their timing.

1. Construction expenditures

The cost of constructing a visitor center at a National Wildlife Refuge varies considerably depending on its size, intended uses, and location. The newest visitor center, located at the Walnut Creek National Wildlife Refuge in Iowa cost approximately $10 million to build in 1995. A new visitor center at the Minnesota Valley National Wildlife Refuge cost $6.6 million. Smaller centers, such as those at the Muscatatuck National Wildlife Refuge in Indiana, or the Seney National Wildlife Refuge in Michigan cost between $1 and $2 million. Construction of a visitor center generally relies on local construction firms, contractors, and workers. For this reason, constructing a visitor center can lead to a temporary increase in local economic activity. For this study, the cost of constructing a visitor center was estimated by the FWS Bloomington staff to be $3 million (in 1997 dollars). It is assumed that this cost would be incurred in equal shares in years 2, 3, and 4 of refuge establishment. It is likely that, if established, the refuge would consist of multiple parcels of non-contiguous land. It is therefore possible that several smaller visitors facilities could be constructed in separate locations.

2. Operation and maintenance expenditures

Expenditures for operation and maintenance of the proposed refuge are estimated based on observed expenditures at the Sherburne National Wildlife Refuge (NWR) in Minnesota. In 1997 the budget for this facility was approximately $506,000, of which approximately $476,000 was identified as operation and maintenance. A representative operation and maintenance budget from the Sherburne NWR is presented in Table IV-3. As the table indicates, approximately 90 percent the operation and maintenance expenses at Sherburne NWR could be attributed to salaries.

In addition to the operation and maintenance budget, FWS staff estimated that approximately $300,000 would be allocated every three years for special projects, maintenance, or purchases of goods and services. For purposes of the analysis, this amount ($100,000 per year) was identified as outside contracts for goods and services.

Table IV-3. Estimated annual budget for Sherburne NWR (1997 dollars)

Program area	Annual Expenditure (1997 $)	Budget category
Salaries (8 people)	$400,000	Salary
General operations	$16,000	Contract goods and services
Maintenance	$30,000	Contract goods and services
Visitor services	$12,000	Salary
Volunteer Administration	$3,000	Salary
Fire Management	$10,000	Salary
Various Expenditures	$5,000	Salary
Total	**$476,000**	**All**

Source: UFFSW Bloomington Field Staff

3. Levee and dike construction expenditures

The final category of direct FWS expenditures is payments to "Partners for Wildlife." Approximately $30,000 per year was identified as the likely amount to be allocated for construction of dikes and levees on refuge property. This amount would be likely spent on contracted services provided by local firms.

4. Summary of direct FWS expenditure

Table IV-4 presents the estimated total FWS direct expenditures in the proposed refuge area (in 1994 dollars). The figures in the table reflect the expenditures outlined above, as well as an adjustment to account for the likely magnitude of expenditures in the early years of the project. For example, it is assumed that in year 1 expenditures on salary, operation and maintenance, and levee construction would be 25 percent of the budgeted level. In years 2, 3, and 4 it is assumed that the expenditures would rise to 50 percent of the budgeted level. In years 5-30 it is assumed that expenditures would occur at 100 percent of the budgeted level. As previously indicated, major facility construction is estimated to occur at equal levels in years 2, 3, and 4.

Table IV-4. Estimated direct FWS expenditures for proposed refuge (1994 dollars)

	Expenditure Category			
Years	**FWS Salary**	**Operations and Maintenance**	**Levee Construction**	**Facilities Construction**
1	98,805	33,548	6,893	0
2	197,610	67,095	13,787	919,118
3	197,610	67,095	13,787	919,118
4	197,610	67,095	13,787	919,118
5-30	395,221	134,191	27,574	0
Total	**10,967,381**	**3,723,799**	**765,178**	**2,757,354**

D. Estimates of recreational expenditures due to the proposed refuge

Visitors are expected to be drawn to the proposed Grand Kankakee Marsh National Wildlife Refuge for both consumptive and non-consumptive uses of refuge resources. Consumptive uses are those in which refuge resources (such as wildlife) are directly used. As a result, resources are not available to other visitors. Consumptive uses considered in this study include goose and duck hunting, deer hunting, fishing, and trapping. It is anticipated that a main attraction of the proposed refuge would be waterfowl hunting. The Kankakee watershed is already an important area for migratory waterfowl. As an unbroken corridor of avian habitat is developed, this area should attract more waterfowl. Goose and duck hunting already occur in the area, for the most part on private land. Fishing also has the potential to draw visitors.

Non-consumptive uses are those that can be shared, in the sense that one person's enjoyment of the resource does not prevent enjoyment by others. Non-consumptive uses considered in this study include bird watching, photography, nature study, canoeing, hiking. Based on national trends that indicate increases in non-consumptive recreational activities and decreases in consumptive recreational activities (Wiedner and Kerlinger 1990), it is assumed in this study that the majority of refuge-oriented activities would be non-consumptive.

An example of the potential economic impacts arising from non-consumptive activities can be taken from Pt. Pelee National Park in Ontario, Canada. This park, which occupies approximately 5,000 acres, is a major stop-over for migratory birds and attracts nearly 500,000 visitors each year. The park is well-known and visitors come from as far away as Europe. A 1987 study of bird-watchers in the Pt. Pelee National Park (Hvenegaard, Butler and Krystofiak

1989) demonstrated that bird-watchers alone spent over $3 million annually in the local economy. Most of the money was spent on food and lodging. Bird watchers tended to be older, better educated than average, and to have above average incomes. The average stay in the Pt. Pelee area was 3.4 days. Nearly all bird-watchers came to the park specifically to watch birds. For this study, estimates of both consumptive and non-consumptive resource-use are based on FWS management goals and comparisons made with existing parks and refuges in the two states, and in the region. Estimates of total recreational expenditures as a result of the proposed refuge are based on two pieces of information: (1) estimates of the number of refuge visitors; and (2) estimates of the expenditure patterns of refuge visitors. Each of these estimates is presented below.

1. Estimates of number of refuge visitors

Estimates of the number of refuge visitors were based on visitor information from reports from several existing refuges and parks offering recreational opportunities similar to those that would be available within the proposed refuge. Sites that were examined for this study include Crab Orchard and Rend Lake National Wildlife Refuges (located in Southern Illinois), DeSoto National Wildlife Refuge (located along the Missouri River in Iowa), Point Pelee National Park (located in southern Ontario), Horicon National Wildlife Refuge (located in central Wisconsin), and Quivira National Wildlife Refuge (located in southern Kansas). Data from use-estimates for the proposed Goose Pond Fish and Wildlife Area in Indiana (Southwick Associates, 1996) have also been included.

Visitation rates vary widely depending on distance from the refuge to major population centers, the types of habitats represented, and the types of amenities and recreational activities available. Observed data on refuge sizes and annual visitation rates are listed in Table IV-5. These data were used to construct estimates of potential visitors to the proposed refuge. When using visitation rates from other sites to estimate visitation rates for the proposed refuge, data on the number of visitors on specific supporting land types were used whenever available. Table IV-6 presents annual visitation rates that are assumed to prevail for this analysis. For waterfowl hunting the annual visitation rate assumed for modeling purposes is 0.70 visitors per acre per year. This value is equal to the average rate observed for those sites in Table IV-5 where waterfowl hunting occurred. For deer hunting a rate of 0.23 visitors per acre per year is assumed. This value is equal to the average rate observed for Crab Orchard, DeSoto, Goose Pond, and Horicon. For both waterfowl and deer hunting, it was assumed that 1/6 of visitors would be local and 5/6 would be non-resident visitors.

Establishment of the proposed refuge could result in increased opportunities for recreational fishing. Fishing opportunities might be enhanced for two reasons. One, establishment of the proposed refuge would increase public access to the Kankakee River. Two, changes in the structure of the river, such as the opening of ox-bows and increases in shallow spawning areas, could create conditions more favorable for fish and fishermen.
Although estimates of recreational fishing collected at other sites are reported in Table IV-5, most of these estimates come from recreation areas with lakes and therefore are not directly applicable to the proposed refuge. For this reason, estimates used in this analysis are based on a

study of recreational fishing in the Illinois portion of the Kankakee River (Graham, Larimore, and Dimond 1986). The study indicated that fishing effort during 1978 and 1979 averaged 3,823 angler-hours per year per km of river (or 3.823 angler-hours per year per meter). The study suggested that a significant constraint on fishing effort at the time of the survey was limited public access due to private ownership of land: sections of the river that received the greatest fishing effort were those located adjacent to state parks or other public lands. Based on these findings it could be assumed that rates of recreational fishing on the Kankakee would increase if refuge land provided public access to the river. However, survey data suggest that increases in rates of sport fishing can be linked to stocking efforts (Outdoor Illinois 1997). Currently, stocking is not planned by the FWS. For this analysis it was estimated that each acre of wetland would provide, on average, 25 feet (8.3 m) of river access, and that each acre of wetland would therefore generate an average of 4.7 days of recreational fishing per year. The Kankakee fishing survey identified fishing by both local and Chicago residents. Non-resident visitors from the Chicago metropolitan area accounted for approximately 61 percent of fishing-days in the study. Local residents accounted for approximately 39 percent of fishing days. The total number of visitor days used in the analysis is decomposed into local and non-local visitors according to these proportions.

As in the cases of other refuges, the nearby metropolitan area (in this case, Chicago) also is expected to be an important source of non-consumptive recreational visitors. For the analysis it is assumed that 1/6 of visitors would be local and 5/6 would be non-resident visitors. The rate of visitation for non-consumptive uses was assumed to be equal to the average observed for other

refuges listed in Table IV-5. For this analysis, a value of 19.62 non-consumptive visitors per acre per year is used.

Table IV-5. Annual per-acre visitor rates for seven recreation areas

Visitor category	Crab Orchard	Rend Lake	DeSoto NWR	Point Pelee	Goose Pond	Horicon NWR	Quivira NWR
Location	Illinois	Illinois	Iowa	Ontario	Indiana	Wisconsin	Kansas
Size (acres)	22,000	12,690	7,823	4,942	8,000	21,265	21,820
Survey Year	1990	1990	1990	1996	1996	1995	1995
Waterfowl Hunting	0.20	1.17	0.08	---	0.75	--	1.28
Deer Hunting	0.38	---	0.21	---	0.25	0.10	0.56
Fishing	11.10	---	4.77	---	---	0.01	--
Non-Consumptive	22.55	---	33.53	31.67	6.25	6.29	1.08

Source: various

Table IV-6. Assumed annual per-acre visitor rate for proposed refuge and supporting land types

Visitor category	Visitor rate used in model (visitors/acre/year)			Proportion non-resident	Applicable Land Categories
	Baseline	Scenario A	Scenario B		
Waterfowl Hunting	0.70	0.35	1.05	0.83	Wetland only
Deer Hunting	0.23	0.115	0.345	0.83	Forest and grassland only
Fishing	4.70	2.35	7.05	0.61	Riverine wetland only
Non-Consumptive	19.62	9.81	29.43	0.83	All but agricultural and urban

For this study it was necessary to link potential recreational activities to specific categories of land cover. Table IV-6 lists the categories of land types that are assumed to support the recreational activities examined in this study. For example, in the Baseline Scenario the visitation rate for waterfowl hunters is assumed to be 0.70 persons per acre per year. However, it is assumed that this activity would be supported only by refuge land in the wetland category. For example, if 5,000 out of 30,000 acres of refuge were wetland, the number of annual visitors in the waterfowl-hunting category would equal 5,000x0.70 or 3,500. It is assumed that deer hunting would be primarily supported by grassland and forest habitats only; it is assumed that fishing would be supported by rivers, streams, and other wetland habitat only; and it is assumed that non-consumptive uses would be supported by all categories except agricultural and urban land. To the extent that estimated visitation rates are derived from use estimates for entire refuges, the data used here may underestimate possible visitation rates. Table IV-6b contains estimates of the annual number of visitors for each activity for the Baseline Scenario. As is clear from the table, it is expected that most visitors would engage in non-consumptive activities.

Table IV-6b. Projected number of annual visitors, Baseline Scenario

	Activity				
Management Alternative	**Waterfowl hunting**	**Deer hunting**	**Fishing**	**Non consumptive**	**All visitors**
Grassland	168	5,868	1,134	510,806	517,976
Wetland	4,506	5,275	30,428	581,912	622,121
T&E	0	0	0	580,648	580,648
Hybrid	2,605	5,468	17,589	545,015	570,676

2. Estimates of refuge visitor expenditures

Visitor expenditures for consumptive and non-consumptive activities are derived from a wide-range of studies of recreational demand.

Expenditure profiles for consumptive and non-consumptive uses were drawn from previous studies of proposed or actual wildlife refuges. It is assumed that expenditure profiles would be similar to those in other refuge areas in the mid-west (Bowman, 1992; Hvenegaard et al., 1989, Southwick Associates, 1996; Williamson County Tourism Bureau, 1994). Expenditure estimates used here are consistent with the U.S. Department of Interior (USDI) Fish and Wildlife Service's 1991 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation. This survey provides information at the state level, including estimates of the amount of money spent by recreational visitors in the states of Indiana and Illinois on wildlife-based recreation. Expenditure profile data for recreational activities associated with the proposed Grand Kankakee Marsh Refuge are listed in Table IV-7.

Table IV-7. Expenditure patterns by category and activity ($ per person per day, 1994 $)

Category	Activity	Transport	Food	Lodging	Total
Local residents	Waterfowl	1.85	1.06	--	2.91
	Upland Game	2.92	1.82	--	4.74
	Fishing	6.4	7.33	--	13.73
	Non-Consumptive	0.71	3.12	--	3.83
Non-resident visitors	Waterfowl	5.56	6.95	5.79	18.30
	Upland Game	5.67	5.91	3.32	14.90
	Fishing	9.83	10.24	5.76	25.83
	Non-Consumptive	5.56	6.95	5.79	18.30

Source: Various studies

E. IMPLAN

Visitation rates and expenditure patterns described in Table IV-7 can be combined to estimate the total impacts of the proposed refuge on output, employment, and personal income in the economic study area. Doing so requires that one estimate the direct and indirect effects of each dollar spent in the local economy. These direct and indirect effects of expenditures are measured using a county-level economic model of the U.S. economy called IMPLAN. The IMPLAN model (IMpact Analysis for PLANning) was originally developed by the USDA Forest Service in conjunction with the Federal Emergency Management Agency and the USDI Bureau of Land Management to assist the Forest Service in land resource management planning. The most recent version of the IMPLAN model includes data from 1994 describing economic activities and linkages for all counties in the United States (Minnesota IMPLAN Group, Inc. 1997). National income accounts serve as the empirical base for economic analysis performed with IMPLAN. National income accounts measure the productivity of the entire nation in terms of products and income generated by production of all goods and services in the U.S. economy. Because national income accounts are derived from county level data, it is possible to examine regional economic activity in terms of any combination of counties. Information required to conduct such an analysis with IMPLAN includes reliable data on expected expenditure changes in the economic study area.

When determining appropriate data for this analysis it was necessary to distinguish between new expenditures and expenditure reallocations. New expenditures occur when visitors spend money in the study site as a result of being drawn to the area by the proposed refuge. The

money spent by these new visitors represents a new flow of resources in the local economy that would not have occurred without the proposed refuge. Some of these new visitors may be local residents who formerly spent recreational dollars outside the region and who now spend money that is captured within the economic study area. For example, visitors to the proposed refuge who reside outside the economic study area would introduce new expenditures to the area that would not otherwise occur. For this reason money spent by non-resident refuge visitors represents revenues that would not exist without the proposed refuge. These expenditures increase demand for goods and services provided locally that are associated with outdoor recreation. For example, refuge visitors might purchase food in local restaurants, which increases restaurant business and also increases the number of restaurant jobs. New employees receive income that is spent in the local economy further expanding the impact of recreational spending.

Expenditure reallocations, on the other hand, are simply changes in money spending patterns in the area. The important point here is that these expenditures are reallocations of expenditures within the regional economy and do not add anything new to the local economy. This study considers the impacts of new expenditures only; expenditure reallocations are not considered economic impacts for purposes of this study.

It is important to note that when money is spent in the study site some of it is used to purchase goods and services that originate outside the study site. The proportion of money spent within the study site that remains inside the study site depends on the extent to which the local economy depends on goods imported from outside the economic study area. The IMPLAN

model accounts for the percentage of local input demand met by local producers using regional purchasing coefficients. These coefficients are used to determine the extent to which new expenditures lead to changes in output, employment, and income within the economic study area. Input data used for the IMPLAN model are reported in Appendix C.

F. Time-line of Proposed Refuge Impacts

The development of the proposed refuge would be a gradual process, dependent upon both federal budget allocations for land acquisition and patterns of voluntary sales of land in the watershed over time. Therefore, the economic impacts resulting from land use changes would begin slowly and would accumulate over time. The procedure for estimating the accumulated impacts is briefly described below.

1. Agricultural impacts over time

For agriculture and related sectors, it is assumed that the economic impacts from refuge development would accumulate at the same rate as land acquisition. For example, if a management alternative predicts a total reduction in agricultural row crop area of 15,000 acres over the 30-year period, then the assumption is that $15{,}000/30 \approx 500$ acres would be taken out of production in each year. For the first year of refuge development, the model estimates the impact of withdrawing these 500 acres from production. In the second year, it is assumed that an additional 500 acres would be taken out of production. For the second year of refuge development, therefore, the analysis indicates the total impact of cumulative land withdrawn

from production, i.e. 500 + 500 = 1,000 acres. Using this procedure, the amount of agricultural acreage withdrawn from production (and therefore the regional economic impact associated with reductions in agricultural production) is assumed to accumulate in a linear progression. The total impact of withdrawing the entire targeted amount of row-crop land would not be realized until year 30. In the intervening years the model predicts an impact proportional to the total amount of land withdrawn from production up to that point in time.

2. Direct FWS expenditures over time

In the case of direct FWS expenditures (on construction, operation and maintenance, and levee construction) a different time path of impacts is used. For these categories of expenditures it is assumed that an initial start-up phase would be associated with spending below the targeted amount, but that spending would rise to the full budgeted level within five years. The progression used in the analysis is outlined in Section IV.C and Table IV-4 and is illustrated in Figure IV-1.

3. Recreational expenditures over time

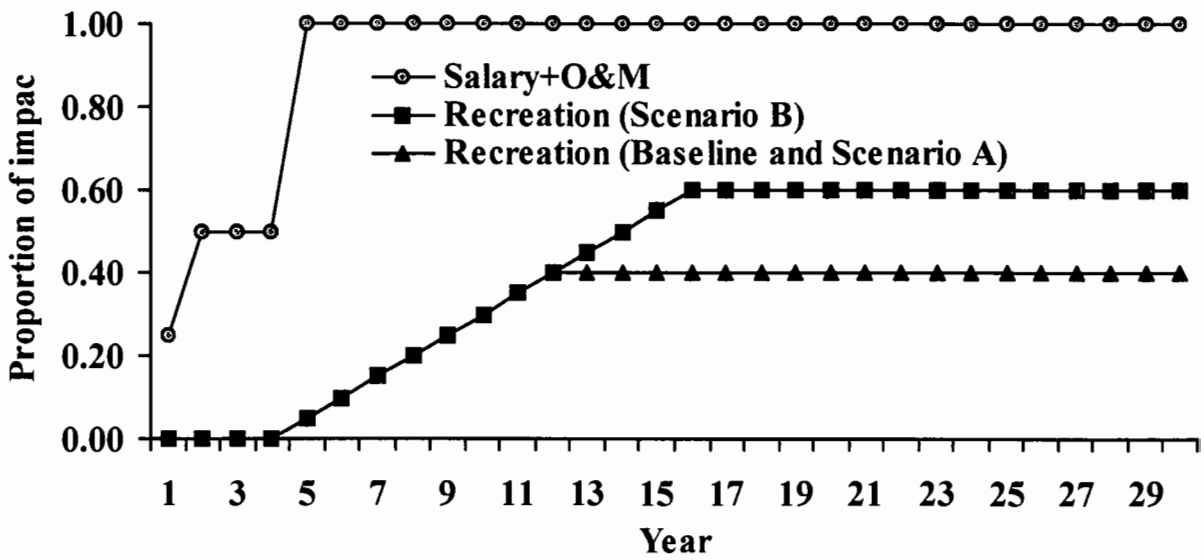
In determining the accumulated impact of recreational opportunities, the analysis addresses two important issues. One, in the early years of refuge establishment the number of refuge visitors could be expected to be less than the numbers listed for the Baseline Scenario in Table IV-6. This is because the total number of acres in the proposed refuge would be small and because public knowledge about the proposed refuge would be limited. Two, the ability of the local

economy to prosper from refuge visitors would be limited both in the early years of refuge establishment and in later years. In large part this is because amenities may be unavailable to visitors in neighboring business districts, and therefore some of the expenditures that would be made by refuge visitors would be made outside the economic study area. For example, a 1976 study of recreation in the Kankakee region in Indiana suggested that most recreational facilities in the area were being utilized at their maximum level, especially during peak periods (State of Indiana, 1976). This indicates that demand for recreation is high in the area, but that greater recreational activity would require establishment of infrastructure to support recreational activities. Both of these features suggest that the ability of the local economy to capture recreational expenditures could be low during the initial years of refuge operation.

For the purposes of the analysis, it has been assumed that during years 1-4, none of the expenditures made by refuge visitors would be captured by the economy of the economic study area. However, it has been assumed that over time existing local businesses and entrepreneurs would respond to opportunities afforded by the proposed refuge. Furthermore, it is assumed that the ability of the local economy to capture an increasing share of expenditures will increase over time. This assumption is consistent with those used in similar studies that have examined the ability of rural economies to capture expenditures by refuge visitors. It is assumed that starting in year 5 the economic study area would be able to capture 5 percent of expenditures made by refuge visitors. In the Baseline Scenario, this figure increases by 5 percent each year until year 12, at which time a cap of 40 percent of expenditures is reached. The Baseline Scenario assumes that beyond year 12, 60 percent of expenditures by refuge visitors would always accrue to

businesses outside the economic study area. Scenario A uses the same assumption. Scenario B assumes that the total cap on recreation expenditures captured locally would be 60 percent. These assumptions provide reasonable estimates of the ability of new and existing businesses in the economic study area to turn recreational activities in the refuge into economic gains. The time paths of these parameters are graphed in Figure IV-1.

Figure IV-1. Assumed time line for shares of FWS expenditures and recreation increases



V. Impact Assessment

A. Overview

Results from the economic impact assessment are presented in this part of the report in a series of summary tables and graphs. Additional details, including breakdowns of total economic impacts due to specific changes in agriculture, recreation and direct FWS expenditures, by year, are presented in a series of tables in Appendix D.

Three features of the analysis and results are noteworthy. One, although it may be tempting to judge the proposed refuge on the basis of direct impacts, analysis shows that indirect and induced impacts are very important, and in some cases equally important as direct impacts. In other words, the regional economy is complex, and the proposed refuge could have important implications far beyond the sectors that would be immediately affected by land use changes.

Two, while it is relatively easy to predict the economic impact of withdrawing land from agricultural production, it is more difficult to predict the impact of the proposed refuge on land not directly taken out of production, or on related issues such as flood control or water quality. These and other issues are discussed in greater detail in Part VI of this report.

Three, assumptions regarding visitation rates, visitor activities, and visitor expenditures are key elements for estimating economic impacts of the proposed refuge. In particular, given reasonable estimates of expenditure patterns by refuge visitors, assumptions about the number of refuge visitors have important implications for the analysis. To account for this issue and others, results are reported below for a Baseline Scenario and for two alternative scenarios that use different agricultural values and rates of expenditure capture by the local economy.

This part of the report is organized as follows. Section B presents results from the analysis derived from a set of baseline assumptions. Estimates of incremental changes in economic output, employment, and personal income are examined. These Baseline Scenario estimates are based on a 30-year time horizon of impacts. Economic impacts over time from each of the four management alternatives are compared in a series of graphs. Section C summarizes the data from section B and presents aggregate measures of changes in economic output, employment, and personal income for each management alternative. Results are presented in both discounted and undiscounted form. Section D presents results from a sensitivity analysis of the model. Sensitivity results are reported for two alternative scenarios (Scenarios A and B) which have been obtained under assumptions that visitation rates might differ from the baseline rates, that the value of agricultural production in the area might differ, and that the rate of expenditure capture in the local economy might differ. Results from these two sensitivity analyses are presented to provide some reasonable indication of possible deviations from the Baseline Scenario. Section E summarizes this part of the report.

B. Impacts of the proposed refuge

This analysis focuses on potential impacts of the proposed refuge on aggregate economic output, personal income, and employment. This study considers the impacts of new expenditures only; expenditure reallocations are not considered economic impacts for purposes of this study. Initial insights into the impacts of the proposed refuge on these measures can be gained by examining the impacts of refuge establishment that occur in each year of the 30-year time horizon. Data

summarizing these impacts are presented in a series of tables in Appendices D (containing annual impacts discounted at 3.6 percent) and E (containing undiscounted annual impacts). Each table contains data on annual impacts on output, employment and income for a specific management alternative. As an aide to interpreting the data contained in Appendices D and E, Figures V-1a, V-1b, and V-1c display the results of the economic impact assessment for economic output, annual employment, and personal income, respectively. The horizontal axis in each graph corresponds to time, and the vertical axis measures the variable of interest. Each line in the graph corresponds to a different management alternative.

Figure V-1a displays changes in economic output in the economic study area over time as a result of the proposed refuge. The shapes of the lines in the graph illustrate three features. First, during the early years of the project the impact of expenditures for construction of a visitor center and other facilities leads to an increase in aggregate economic output in the economic study area. The total amount of land taken out of agricultural production at this stage is low. As a result the total impact of the proposed refuge on agriculture is small and no economic impacts from refuge visitors can be expected. The main impact of refuge establishment is to increase economic activity in the early years of the project due to expenditures on construction. Second, construction expenditures end in year 5. As a result, the accumulating impact of agricultural land being taken out of production begins to outweigh direct FWS expenditures on operation and maintenance and economic output in the region declines. This decline reflects reductions in agricultural production and modest amounts of recreational demand. Third, increases in economic impacts from recreational activities begin to offset declines in agriculture. Beyond

year 10 the trend in economic output is upward for all management alternatives. However, economic output remains negative over the entire horizon for the Wetland and Threatened and Endangered Species Alternatives. For the Grassland and Hybrid Alternatives, the change in economic output is positive beyond year 15.

Figure V-1a. Refuge impact on annual economic output, Baseline Scenario (millions of 1994 $)

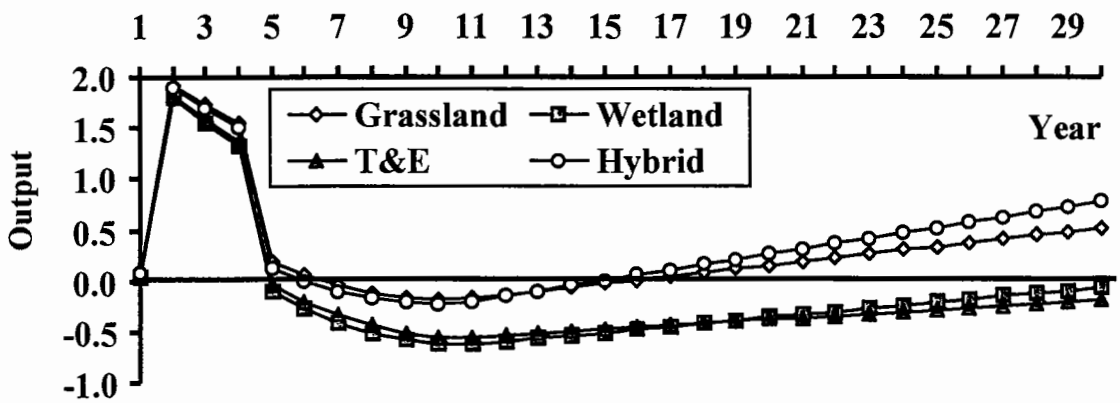
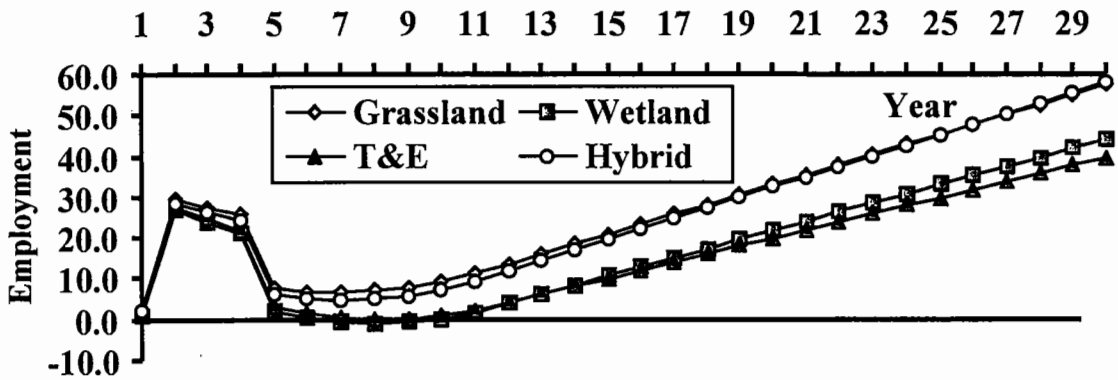


Figure V-1b displays changes in annual employment in the economic study area over time as a result of the proposed refuge. The shapes of the lines in the graph generally follow those of the graph of economic output. The initial rise in employment corresponds to construction expenditures during the establishment stage of the refuge. However, the upward trend in employment begins sooner than in the case of output and the incremental impact on

employment is positive over the 30-year period. As before, the Grassland and Hybrid Alternatives have the largest impacts.

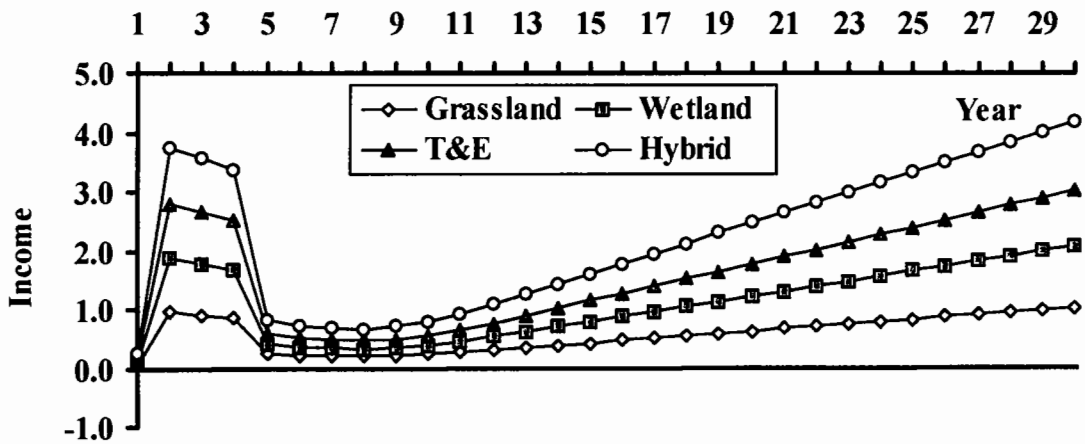
Figure V-1b. Refuge impact on annual employment, Baseline Scenario (number of jobs)



Finally, Figure V-1c displays changes in annual personal income in the economic study area over time. During the early years of the project, construction expenditures generate an increase in personal income in the economic study area. This reflects the fact that the total amount of land taken out of agricultural production at this stage is modest and construction activities are at their maximum. Construction expenditures end in year 5. As a result, the accumulating impact of agricultural land being taken out of production begins to outweigh direct FWS expenditures on operation and maintenance. The initial surge in personal income diminishes. Income in the area then begins to rise as recreational activities increase. The upward slope of the curve in years 7 through 30 reflects, in part, the upward path for recreational expenditure capture that was illustrated in Figure IV-1. In terms of changes in personal income,

the Hybrid Alternative generates the largest impact of the management alternatives and the Grassland Alternative generates the smallest impact.

Figure V-1c. Refuge impact on annual personal income, Baseline Scenario (millions of 1994 $)



C. Aggregate measures of economic impact

The graphs in section B display refuge impacts in the Baseline Scenario for each year of the 30-year horizon. As such, they provide an easily understood picture of how output, employment, and income could change if the refuge were established in accordance with the assumptions of the Baseline Scenario and the management plans under consideration. In this section, these annual impacts are aggregated to derive a measure of the expected total impact of the refuge over the 30-year period.

Before presenting estimates of total impact, it is important to point out that the graphs presented above were derived from undiscounted values of refuge impacts. That is, values were charted exactly as the model predicted for each year in the life of the proposed refuge. No special accounting was made for whether impacts occurred early or late in the planning horizon. In other words, results were reported in *current value terms*. In contrast, in this section measures of total impact are presented in discounted or *present value terms*. The process of discounting converts future values into present values. This procedure answers the question: what would be the total economic impact of the refuge, taking into consideration the fact that some economic impacts arise in the near term and some arise in the future? Discounting tends to affect the results in an important way, namely, those economic impacts that accrue in the later years of the project are given relatively smaller weight in the analysis than those that occur sooner. This is because income obtained today could be used productively during intervening years, for example to earn interest or a rate of return from alternative investments.[1]

In the case of the proposed refuge the impact of discounting is the following. First, when future values are discounted, the impact of construction expenditures tends to outweigh subsequent reductions in agricultural output. In addition, increases in economic activity that result from recreational activities near the end of the 30-year period are given a smaller weight in the analysis. The extent to which the weight of the analysis is shifted in favor of early impacts

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[1] Discounting is not the same as inflating or deflating to adjust for inflation. In this study, no adjustment is made for possible inflation during the life of the project. That is, all values are presented in real, not nominal, terms, in constant 1994 dollars.

depends on the discount rate used. Higher discount rates tend to emphasize early impacts compared with later impacts.

In this analysis undiscounted measures of refuge impacts (that is incremental net benefits associated with establishing the refuge) are compared with impacts discounted at *real* (i.e. net of inflation) rates of 3.6 percent and 7.0 percent. These rates are based on the federal Office of Management and Budget Circular A-94 (and updates). These guidelines recommend using a real discount rate of 3.6 percent to assess the cost effectiveness of projects of 30 years duration and 7.0 percent to conduct federal benefit-cost studies.

The projected economic impact of the proposed refuge under the Baseline Scenario is summarized in Table V-1. Each row in the table corresponds to a different management alternative. For each management alternative, the table lists the total and annual average impact of the proposed refuge on economic output and personal income. Pairs of columns in the table correspond to output and income impacts under three different discount rates (0.0, 3.6, and 7.0, respectively).

Analysis shows that the undiscounted total change in aggregate economic output resulting from the proposed refuge would range from - $4.93 million and - $4.86 million (for the Wetland and Threatened and Endangered Species Alternatives, respectively), to $8.25 million and $10.12 million (for the Grassland and Hybrid Alternatives, respectively). These impacts are similar but smaller when the values are discounted at a rate of 3.6%. At a discount rate of 3.6%, the impact of the proposed refuge on aggregate economic output ranges from - $1.56 million and - $1.23 million (for the Wetland and Threatened and Endangered Species Alternatives,

respectively), to $5.95 million and $6.60 million (for the Grassland and Hybrid Alternatives, respectively). At a discount rate of 7.0%, the pattern of results changes: the discounted value of economic output is estimated to be positive for all management alternatives. This shift reflects the fact that with a higher discount rate the early impacts of construction receive relatively greater weight in the analysis than later impacts due to changes in agriculture and recreation.

Table V-1. Total impact of proposed refuge on output and income over 30 years, Baseline Scenario (million 1994 $)

	Undiscounted		**Discount rate = 3.6%**		**Discount rate = 7.0%**	
Management Alternative	**Output**	**Income**	**Output**	**Income**	**Output**	**Income**
Wetland	-4.93	15.80	-1.56	8.93	.16	5.87
Grassland	8.25	17.40	5.95	9.99	4.97	6.64
T&E	-4.86	14.94	-1.23	8.58	.53	5.74
Hybrid	10.12	18.48	6.60	10.44	5.15	6.83

For all discount rates considered in the Baseline Scenario the total change in personal income is projected to be positive. The total change in undiscounted personal income is largest under the Hybrid Alternative ($18.48 million). The total change in personal income falls to $10.44 million and $6.83 million at discount rates of 3.6% and 7.0%, respectively. The smallest impact is associated with the Threatened and Endangered Species Alternative. Because much of the difference in impact among the management alternatives occurs in later years of refuge

development, discounting tends to reduce the differences between the alternatives and make them look more similar than they actually are.

Appendix F contains data on changes in output and personal income arising from component changes in direct FWS expenditures, recreation, and agriculture. These data show that direct FWS expenditures lead to an increase in output and personal income in the economic study area. Because the same pattern of FWS expenditures was assumed for each management alternative, the impact of FWS expenditures is the same in each management alternative. Over 30 years, direct expenditures by the FWS are expected to increase the undiscounted value of personal income by approximately $14 million in the economic study area, or about $500,000 per year on average.[2]

Recreational activities are expected to increase personal income in the economic study area. The largest increase would be associated with the Wetland Alternative. The smallest increase would be associated with the Grassland Alternative. These differences can be traced to three factors. One, restored land types differ across alternatives. Two, recreational activities depend on the type of land available. And three, expenditure patterns differ by recreational

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[2] Tables F.1 through F.3 break down changes in output and personal income into three categories corresponding to the source of economic change: (1) impacts arising from direct spending by FWS; (2) impacts arising from changes in recreational activities; and (3) impacts arising from changes in agriculture. When interpreting these data it is important to keep in mind that the impacts listed under each heading are those *associated* with the changes taking place in those sectors, and not necessarily changes taking place completely within the sector itself. For example, changes listed under agriculture will include changes in sectors as different from agricultural production as restaurants, banking, and computer supplies, provided the changes in these sectors' activities came about as a result of indirect or induced activities due to changes originating in the agricultural sector.

activity. As an example, the Wetland Alternative supports the widest range of recreational activities, including hunting, fishing and non-consumptive activities and thereby generates greater economic impact from recreation than other management alternatives.

Changes in agriculture are expected to reduce net personal income in the economic study area. The reduction in personal income is largest for the Wetland Alternative and smallest for the Grassland Alternative. These differences can be traced to the amount of row-crop land coming out of production in each alternative. For example, the Grassland Alternative targets approximately 18,000 acres of row-crop land for acquisition, more than any other management alternative.

As for changes in employment, as a result of the proposed refuge, expected outcomes are mixed. Results for the Baseline Scenario are presented in Table V-2. The Baseline Scenario predicts that employment would fall slightly in several years for two alternatives – Wetland and Threatened and Endangered Species. However, for all management alternatives the total impact of the refuge on employment in the economic study area over the 30-year horizon is expected to be a net increase in the number of jobs. The average number of jobs created ranges from 17 in the Threatened and Endangered Species Alternative to 28 in the Grassland Alternative.

Table V-2. Total impact of refuge on employment over 30 years, Baseline Scenario (average number of jobs per year)

Alternative	Average Number of New Jobs
Wetland	18.2
Grassland	27.9
T & E	17.0
Hybrid	27.0

D. Sensitivity analysis

Potential economic impacts of the proposed refuge described in section C were derived under the Baseline Scenario assumptions. In order to gauge the sensitivity of model predictions to the assumptions used, this section reports results based on the alternative assumptions set forth for Scenarios A and B.

In deriving results under an alternative set of assumptions, three major modifications to the model are made. These alternative assumptions were discussed in part IV of the report but are reviewed here for convenience. Modifications are as follows. One, visitor rates are assumed to differ from those used above. Specifically, in Scenario A, visitor rates are assumed to be 50% of the values in the Baseline Scenario. In Scenario B visitor rates are assumed to be 150% of the values in the Baseline Scenario. Scenario A can therefore be best thought of as a "low visitation" scenario and Scenario B can be best thought of as a "high visitation" scenario. Two, in Scenario A the value of corn production is raised from 80% of the 10-year average yield to 100% of the

10-year average yield. In Scenario B the value of agricultural production remains at the same value as in the Baseline Scenario, namely 80 percent of the 10-year average. Three, in Scenario B the ceiling on the expenditure capture rate is assumed to be 60 percent. The capture rate for Scenario B is assumed to increase in five-percent increments so that the 60 percent capture rate is realized during years 16 to 30. In Scenario A, the capture rate remains at the value of the Baseline Scenario, namely 40 percent. Assumptions used in the three scenarios are summarized in Table V-3. In terms of overall impact on the model, compared with the Baseline Scenario, Scenario A reduces the projected level of recreational activities and at the same time increase the value of corn production. Scenario B increases the projected level of recreational activities as well as the share of recreational expenditures captured within the economy of the study area. At the same time, Scenario B holds the value of corn production at the lower, baseline level.

Table V-3. Assumptions used in the sensitivity analysis

Assumption	**Baseline Model**	**Scenario A**	**Scenario B**
Agricultural yields	80% of 10 year average	100% of 10 year average	80% of 10 year average
Recreational visitation rates	100% of value in Table IV-6	50% of value in Table IV-6	150% of value in Table IV-6
Expenditure capture rate	40% of total expenditures	40% of total expenditures	60% of total expenditures

Figure V-3a. Aggregate economic output, Scenario B

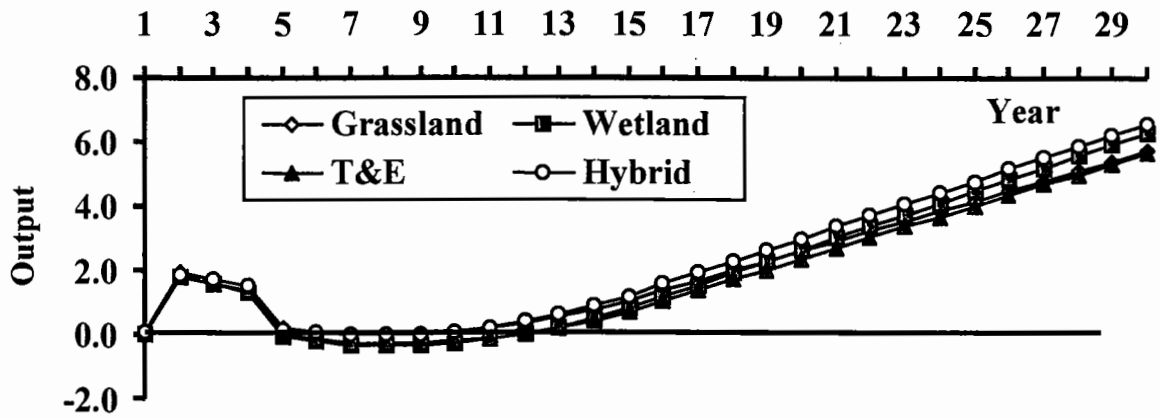


Figure V-3b. Employment, Scenario B

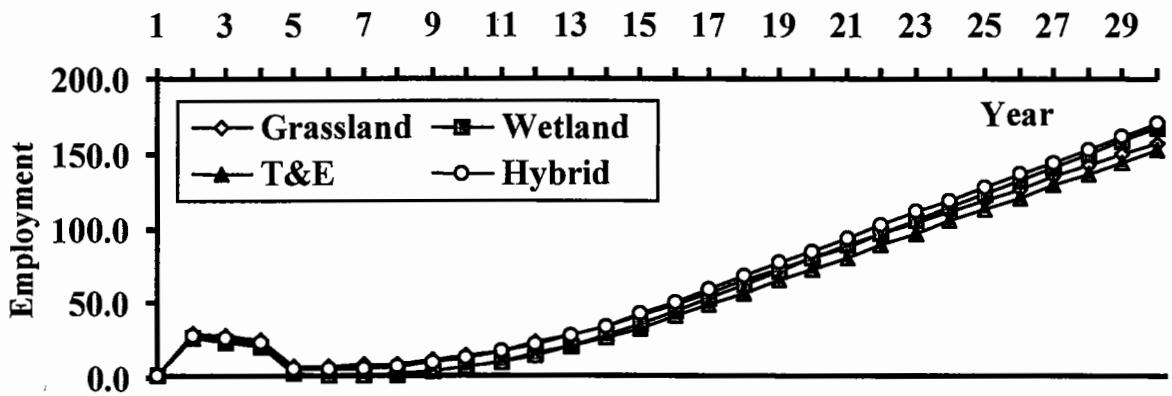
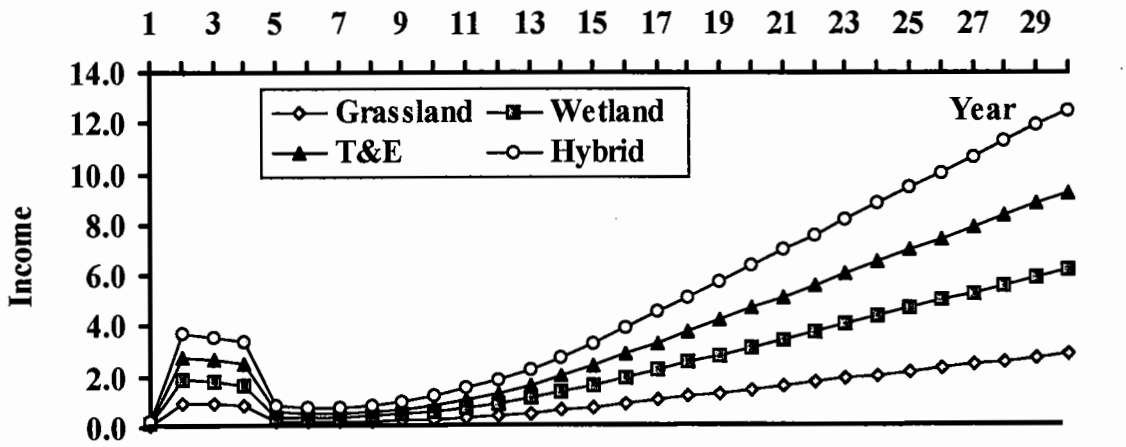


Figure V-3c. Personal income, Scenario B



To summarize the results of the sensitivity analysis, Scenarios A and B provide some indication of potential differences that arise in projected refuge impacts when key assumptions in the model are changed. Scenario A assumes 50 percent lower visitation rates than the Baseline Scenario and 25 percent higher values for corn production. Compared with the Baseline Scenario, at a discount rate of seven percent, total personal income would be 64 to 87 percent lower in Scenario A. Scenario B assumes 50 percent higher visitation rates and a 50 percent higher expenditure capture rate and the same values for corn production as the Baseline Scenario. Compared with the Baseline Scenario, at a discount rate of seven percent, total personal income would be 66 to 92 percent higher in Scenario B.

E. Summary of Impacts

Each of the four development alternatives indicates three stages of impact. During the initial stage output, income and employment increase as a result of refuge establishment. These increases reflect large expenditures for facility construction and modest land acquisition in the early years of the project. As the pace of land acquisition continues and the accumulated amount of land taken out of production increases, the proposed refuge leads to a reduction in economic activity in the economic study area. The second stage of the project indicates decreases to the study region due to reductions in agricultural production. These decreases reflect reductions in agricultural acreage and a lack of compensating recreational activities. In the third stage of the project recreational activities begin to generate income and employment in the regional economy. Whether the proposed refuge increases or decreases economic activity depends, in part, on the management alternative under consideration and assumptions regarding recreational demand and expenditure capture rates. In all alternatives, the proposed refuge is projected to increase personal income in the economic study area. Only the Wetland and Threatened and Endangered Species Alternatives generate employment gains over the 30-year period. From an economic perspective the consequences of the Threatened and Endangered Species and Wetland Alternatives suggest that if the proposed refuge becomes established, these management alternatives may generate smaller economic impacts than either the Grassland or Hybrid management options.

VI. Impacts not measured in this study

This study was limited to measurable and easily quantified impacts that would likely result from the establishment of the proposed Grand Kankakee National Wildlife Refuge. Several other potential impacts are difficult to measure but are nevertheless worthy of consideration. Some of these factors have been observed at other, similar refuges. Some of these issues have been discussed in public meetings focusing on the potential impacts of the proposed refuge. The issues are briefly discussed below.

A. Flooding

Farmland flooding is an important concern in the watershed. Flooding is caused by a number of factors. One important impact of the proposed refuge is that riverside land would be removed from agricultural production. Some of this land would be restored to seasonal or permanent wetland. This change in land use could have two effects on adjacent lands. One, new wetland could provide a flood buffer. By increasing the containment area for water, flooding on adjacent land might be reduced. Two, by increasing the amount of land under water, the refuge could raise the water table and increase waterlogging and flooding on adjacent farms. Assessing the potential impact of the proposed refuge on flooding of neighboring land is a question that requires more accurate hydrologic information than is available to date. For this reason assessing the potential impact of the proposed refuge on flood risk for adjacent farms has not been possible. If the refuge increased flooding on adjacent lands, or restricted the ability of adjacent landowners to pump water to clear land, then costs could increase or agricultural output

could decrease. Both state and federal legislation address these issues. Furthermore, under the Clean Water Act, FWS wetland restoration projects associated with the refuge would require review and issuance of section 404 permits by the U.S. Army Corps of Engineers.

B. Water quality

Flooding in the Kankakee River area currently poses a risk to households that rely upon near-surface wells for drinking water. These wells can be contaminated by flooding and septic system failure. If the proposed refuge influenced the frequency or degree of flooding, then it could have an impact on household water supplies . Numerous studies have examined the value of groundwater protection (for a review, see Crutchfield, Feather, and Hellerstein 1995). For example, a study assessing the perceived value to individuals of protecting groundwater from contamination by agricultural pollutants suggests that rural households would be willing to pay $165 to $1,452 per year to protect groundwater (Sun, Bergstrom and Dorfman 1992). The impact of the proposed refuge on local drinking water supplies would depend upon the impact of the refuge on the water table, flooding on adjacent farms, and septic systems.

As for potential improvements in surface water quality due to refuge establishment, it has been demonstrated that downstream surface water quality improves when natural vegetation separates agricultural crops from a river (Lowrance, Leonard & Sheridan 1985). Buffers can serve as filters that restrict pesticides, sediment, and/or nutrient loads in waterways. Buffers can lead to nutrient uptake, which can improve the river as a habitat and source of drinking water. These are potential impacts of replacing agricultural activities in the immediate vicinity of the

river with natural vegetation. A study of Conservation Reserve Program (CRP) land shows that the water quality benefits (due to reduced erosion and nutrient loading) of retiring cropland average $76 per acre, with a range of $36-117, in the corn belt (Ribaudo et al 1989). Some benefits could also be generated without total removal of row crops through agricultural best management practices and proper design and installation of riparian buffer strips.

Finally, a potential link has been hypothesized between nutrient runoff from eastern cornbelt farms and hypoxia and water quality degradation in the Gulf of Mexico (e.g. Anteweiler, Goolsby, and Taylor 1995; Cooper and Lipe, 1992). This concern underscores the need to consider water quality issues in assessing the merits of the proposed refuge.

C. Local property taxes and revenue sharing

Changes in land use and ownership could be accompanied by changes in the property tax bases of communities in the economic study area. The federal government has a policy of making payments to local governments to compensate for lost property tax revenues.

Specifically, the *Refuge Revenue Sharing Act* of 1935, as amended, provides for annual payments to local communities when land is occupied by a National Wildlife Refuge. Payments are based on both the amount of acreage occupied by the refuge and the underlying value of that land. Payments are typically made to either the county or the lowest unit of government that collects and distributes taxes. Funds for these payments come from two sources: (1) the National Wildlife Refuge Revenue Sharing Fund, and (2) annual Congressional appropriations. The National Wildlife Refuge Revenue Sharing Fund consists of annual receipts from the sale of

products obtained on all National Wildlife Refuge system lands in the US. This includes, for example, revenues from oil and gas leases, timber sales, and grazing fees. Annual Congressional appropriations, as authorized by a 1978 amendment, are intended to make up any difference between the net receipts from the Refuge Revenue Sharing Fund and the total amount payable to local units of government.

Payments are calculated based on a formula set out in the *Refuge Revenue Sharing Act* (Corn 1990). The formula specifies that a community should receive the largest of three amounts:

(1) $0.75 per acre;

(2) 25 percent of the net receipts collected from refuge lands in the county; or

(3) 3/4 of 1 percent of the appraised value of land occupied by the proposed refuge.

For existing refuges in the states of Illinois and Indiana, the FWS staff has estimated that 3/4 of one percent of the fair market value of land would likely bring the greatest return to local tax authorities. When this method of revenue sharing is used, land is re-appraised every five years.

In November and December 1994, the FWS studied revenue sharing patterns in all 141 counties of Region 3. This 8-state area includes Indiana and Illinois. Counties were surveyed and asked to estimate the amount of real estate tax that would have been received from refuge lands had they remained in private ownership. In Indiana, 2 of 3 counties that receive refuge revenue sharing payments responded to the survey. In Illinois, 8 of 18 counties responded to the

survey. Based on the responses to this survey, the FWS calculated that refuge revenue sharing was 164 percent of the private tax revenue level in Indiana, and 99 percent in Illinois.

Payments are typically made as a lump sum. The Refuge Revenue Sharing Act is the federal law that authorizes the FWS to make these payments. According to the Act,

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

In other words, the Act directs the local unit of government to distribute refuge revenue sharing payments *in the same proportion* as it would for tax monies received. The impact of the proposed refuge on local property tax bases has not been considered in this analysis. In recent years Congress has not always fully appropriated amounts payable to local tax authorities. Changes in compensation methods to ensure fair payment to local governments have been proposed. Some of these proposed changes are detailed in Corn (1990).

E. Municipal services

Establishment of the proposed refuge could result in changes in demand for local municipal services. Although the undeveloped land in the refuge would not be expected to add to local school or services burdens, increased road and highway maintenance could be required to support traffic associated with refuge visitors. Roads within the refuge boundaries would be

maintained by the FWS. Potential direct impacts on municipal expenditures have not been considered in this analysis.

VII. Summary and Conclusions

This report presented results from an analysis of the potential regional economic impacts of the proposed Grand Kankakee Marsh National Wildlife Refuge. Establishment of the proposed refuge would involve federal purchase or lease of approximately 30,000 acres of land in a 13-county area of northwestern Indiana and northeastern Illinois. The economic study area lies immediately south of the Chicago Metropolitan Area. This and other nearby urban areas exert a strong influence on the Kankakee regional economy and would play a key role in supplying visitors to the proposed refuge.

Land acquisition for the refuge would occur over a 30-year time period. Land would be acquired only from willing sellers and would be managed by the FWS. Management goals would include providing and enhancing wildlife habitat as well as providing recreational opportunities for local residents and non-resident visitors.

This report assesses the output, employment, and income impacts of the proposed refuge under a series of four management alternatives and three scenarios. Management alternatives were outlined by FWS staff. The *Wetland Alternative* focuses on creating permanent and/or periodic natural wetlands, with the goal of expanding habitat for migratory waterfowl and other animal species. It would directly affect roughly 19,000 acres of cropland in eight counties. The *Grassland Alternative* focuses on restoring land to grassland, pasture, and woodland with the goal of expanding tallgrass prairie. It would directly affect about 16,000 acres of cropland in four counties. The *Threatened and Endangered Species Alternative* focuses on creating both wetlands and woodlands for the purpose of protecting and enhancing a number of state and

federally-listed threatened and endangered species. It would directly affect approximately 17,000 acres of cropland in seven counties. The *Hybrid Alternative* combines all of these management goals. It would directly affect nearly 16,000 acres of cropland in eight counties. Each management alternative reflects a different conservation goal and emphasizes a different constellation of land use changes. Four counties in the area – Kosciusko, Pulaski, St. Joseph and Will – are not projected to have land acquisition in any management alternative.

This study was limited to quantifiable economic impacts associated with a decline in agricultural activity as land is taken out of production and an increase in activity from FWS operation of the proposed refuge and visitor activity. The analysis focused on impacts related to land use changes within the economic study area, specifically those changes associated with a reduction in agricultural production and an increase in recreational activities. The analysis also included estimates of the impact of direct spending by the FWS on construction and maintenance of refuge facilities. The report focused on direct, indirect, and induced economic impacts that could be quantified. Prospective land use changes and expenditures were used to estimate changes in agricultural, recreational and other activities. Both consumptive and non-consumptive recreational uses were examined. Estimated levels of recreational use were combined with estimates of expenditure patterns of refuge visitors, and operation and maintenance expenditures by the FWS to construct a profile of potential changes in the scope and composition of the economy of the economic study area. These data on economic changes were used in conjunction with the IMPLAN input-output model of the 13-county regional economy to estimate overall economic impacts of the proposed refuge in this area. For each management alternative the total

and annual average impacts of the proposed refuge on output, employment and income were determined.

Analysis under the Baseline Scenario showed that the FWS expenditures for construction and operation of the refuge would increase economic output in the region. Recreational activities would also increase the total amount of local economic activity. However, the proposed refuge was found to reduce aggregate economic output under two management alternatives and to increase aggregate economic output in two management alternatives.

The refuge is projected to increase employment in the economic study area. Approximately 18 jobs would be gained due to construction, operation, and maintenance of the refuge. Between 39 and 48 jobs would be gained due to activities associated with recreational visitors. Between 29 and 48 jobs would be lost due to changes in agriculture. The total impact would be an increase of 17-28 jobs in the economic study area. The average net annual impact of the refuge on employment ranged from a net increase of 17 jobs (in the Threatened and Endangered Species Alternative) to a net increase of 28 jobs (in the Grassland Alternative).

Analysis indicated that expenditures by the FWS on refuge construction and operation would increase personal income in the economic study area. Over 30 years, direct expenditures by the FWS would increase personal income by approximately $14 million in the economic study area, or about $500,000 per year on average. Recreational activities would be expected to increase personal income in the economic study area. Increases were found to be largest for the Wetland Alternative, and smallest for the Grassland Alternative. These differences can be attributed to different patterns of land use changes and recreation. Personal income was found

to decrease as a result of changes in agriculture. Reductions ranged from $18-$24 million over 30 years. Differences in outcomes could be traced to the amount of row-crop land coming out of production in each alternative. For example, the Grassland Alternative targets approximately 16,000 acres of row-crop land for acquisition, more than any other management alternative. Overall, however, under the assumptions of the Baseline Scenario, the proposed refuge was found to increase personal income under all management alternatives. This projected increase in income ranged from $15 million (in the Wetland Alternative) to $18 million (in the Hybrid Alternative).

For comparison purposes results were reported for analyses based on alternative assumptions. In Scenario A aggregate economic output and employment were projected to decrease for all management alternatives, but personal income was projected to increase in the Grassland and Hybrid Alternatives. Scenario B assumed 50 percent higher recreation visitation rates than the Baseline Scenario and generated increases in output, employment and income for all management alternatives.

In summary, each development alternative indicated three stages of impact. During the initial stage, output, income and employment increased as a result of establishing the proposed refuge. These increases reflected large expenditures for facility construction and modest land acquisition in the early years of the project. As the pace of land acquisition continued and the accumulated amount of land taken out of production increased, economic output fell. In the second stage of the project decreases accrued to the study region due to reductions in agricultural production. These decreases reflected reductions in agricultural acreage and a lack of

compensating recreational activity. In the third stage recreational activities generated increases in income and employment in the region. Whether the proposed refuge would lead to an increase or decrease in economic activity and income depends, in part, on the alternative under consideration and the assumptions made regarding recreational demand. Under all sets of assumptions and all scenarios considered in this report, the Grassland and Hybrid Alternatives were projected to increase personal income in the economic study area. No unambiguous impacts on output or employment were found.

Several important questions remain regarding the potential economic impact of the refuge. Because riverside land would be removed from agricultural production and restored to seasonal or permanent wetland, adjacent lands may be affected. New wetland could provide containment and filtering areas for water and thereby reduce flooding on adjacent land and improve downstream water quality. Although the refuge could potentially raise the water table and increase waterlogging and flooding on adjacent farms, state and federal laws restrict the FWS from engaging in activities that would negatively impact adjacent landowners. Section 404 of the federal Clean Water Act requires hydrological studies and permits to be issued whenever wetland restorations are undertaken.

Another issue for consideration is the potential impact of changes in land use and ownership on property tax revenues in affected communities. Although the federal government has a policy of making compensating payments to local communities, congressional appropriations have fluctuated in the past. Historically, however, communities in Indiana and Illinois where other refuges are located have been fully compensated for lost tax revenue.

Several other important issues remain unresolved and should be taken into consideration by the public and by policy makers. A first issue is the extent to which goals of wildlife protection and habitat enhancement could be furthered in the Kankakee watershed through means other than a wildlife refuge. Federal acquisition of private land is one method for protecting habitat and improving water quality. Alternatives – such as establishing riparian buffers on private land or encouraging stewardship of land through economic incentives – might also achieve some of the environmental goals met by a refuge at a lower economic cost than the proposed refuge. However, it is important to recognize that from an environmental perspective, private measures are unlikely to fully substitute for the habitat protection afforded by a refuge.

A second issue to be taken into consideration in interpreting this analysis is the potential response of local communities to the refuge, if it were to become established. In some areas where refuges have been created, local communities have viewed a restored natural area as a valuable economic resource to spur local economic revitalization. However, while it is true that spending by refuge visitors can generate local income and employment, the extent to which increases might accrue to local communities depends, in part, on the response of local businesses and community leaders to changes in market forces that would accompany the proposed refuge.

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Appendix A

Characteristics of economic study area

Table A.1 Acreage and population in economic study area

County	Area of county (Sq. mi.)	Area of County (Acres)	1985 Population	1995 Population	% Growth 1985-1995
Jasper, IN	560	358,749	25,800	27,800	7.7
Kosciusko, IN	538	344,330	62,100	68,500	10.3
Lake, IN	497	322,008	491,500	481,900	-1.9
La Porte, IN	598	385,893	107,300	109,700	2.2
Marshall, IN	444	287,641	41,100	44,500	8.3
Newton, IN	402	257,641	13,900	14,200	2.2
Porter, IN	418	268,504	124,300	139,200	12.0
Pulaski, IN	434	277,833	13,000	13,000	0
St. Joseph, IN	457	294,633	241,400	256,400	6.2
Starke, IN	309	199,618	21,200	22,400	5.7
Iroquois, IL	1,116	715,649	31,800	31,400	-1.3
Kankakee, IL	678	435,442	97,900	101,200	3.4
Will, IL	837	542,800	336,100	404,800	20.4
Total	**7,288**	**4,690,741**	**1,609,385**	**1,716,995**	**6.7**

Source: BEA:REIS

Table A.2 Employment for counties in economic study area, 1994

County	Farm employment	Nonfarm employment	Total employment
Jasper	974	12,254	13,228
Kosciusko	1,638	37,656	39,294
Lake	720	230,964	231,684
La Porte	1,147	55,261	56,408
Marshall	1,251	24,625	25,921
Newton	606	4,945	5,551
Porter	642	64,390	65,032
Pulaski	823	5,550	6,373
St. Joseph	1,076	149,793	150,869
Starke	534	6,240	6,774
Iroquois	2,154	13,156	15,310
Kankakee	1,374	48,839	50,213
Will	1,573	144,668	146,241
Area Total	**14,512**	**798,341**	**812,898**

Source: BEA:REIS

Table A.3 Population and income for counties in economic study area, 1994

County	Population	Total Personal ($000)	Farm ($000)	Per Capita
Jasper	27,400	459,603	21,690	$16,789
Kosciusko	68,000	1,397,936	26,299	$20,571
Lake	481,600	9,393,960	10,857	$19,504
La Porte	109,600	2,037,214	15,852	$18,583
Marshall	44,200	828,362	8,570	$18,738
Newton	14,100	233,688	10,591	$16,537
Porter	138,200	3,019,973	7,083	$21,845
Pulaski	13,000	225,331	12,393	$17,329
St. Joseph	255,400	5,257,844	17,923	$20,584
Starke	22,300	322,483	15,224	$14,439
Iroquois	31,400	616,799	72,255	$19,626
Kankakee	101,300	1,918,289	54,840	$18,939
Will	398,700	8,438,874	38,538	$21,165
Area Total	**1,705,200**	**34,150,356**	**312,115**	**$20,027**

Source: BEA:REIS

Table A.4 Farm statistics by counties in economic study area, 1992

County	# of Farms	% Farming Principle Occupation	Land in Farms (acres)	Avg. Farm Size (acres)	Value of Products Sold ($000)	Primary Agricultural Product
Jasper	716	67.2	301,962	422	98,065	Corn
Kosciusko	1,123	49.2	251,603	224	87,654	Poultry
Lake	482	56.2	144,305	299	33,570	Corn
La Porte	826	54.2	267,695	324	225,617	Corn
Marshall	956	52.3	219,402	203	58,118	Corn
Newton	390	71.3	206,885	530	66,862	Corn
Porter	496	53.2	142,482	287	34,689	Corn
Pulaski	630	61.9	242,777	385	75,282	Corn
St. Joseph	768	49.1	172,348	224	49,799	Corn
Starke	387	51.9	134,960	349	28,321	Corn
Iroquois	1,509	72.4	662,629	439	187,908	Corn
Kankakee	928	65.7	358,920	387	105,208	Corn
Will	1,057	56.4	325,227	308	91,509	Corn
Area Total	**10,268**	**59.0**	**3,431,195**	**334**	**1,142,602**	**Corn**

Source: BEA:REIS

Table A.5 Harvested corn acreage for counties in economic study area, 1992

County	Corn (acres)	Soybeans (acres)	Wheat (acres)	Harvested Cropland (acres)
Jasper	152,012	92,071	1,580	251,579
Kosciusko	104,136	65,797	6,267	192,885
Lake	64,854	50,112	737	112,190
La Porte	125,779	76,355	4,856	225,617
Marshall	92,307	60,840	5,259	174,005
Newton	107,819	68,762	486	180,048
Porter	63,827	49,911	2,322	121,941
Pulaski	115,557	71,734	979	204,381
St. Joseph	73,481	51,170	6,421	143,636
Starke	61,360	21,122	278	105,299
Iroquois	311,765	268,316	1,613	597,863
Kankakee	182,399	129,159	1,044	326,603
Will	144,035	125,298	1,868	288,370
Area Total	**1,599,331**	**1,130,647**	**33,710**	**2,924,417**

Source: BEA:REIS

Appendix B

Land cover classification by county, with and without proposed refuge

Note: Column totals may not sum exactly, due to rounding

Table B.1 Scaled land use without refuge – Wetland Alternative

County	Forest	Shrub	Emergent	Barren	Woodland	Pasture	Coniferous	Deciduous	Urban Grass	Water	Row Crop	Urban	Total
Jasper	229	0	9	0	1	56	1	43	2	37	1987	4	**2370**
Kankakee	1118	0	113	0	37	483	0	421	9	119	1157	15	**3474**
Lake	477	20	23	0	25	101	6	188	12	55	1455	17	**2383**
La Porte	476	8	162	0	5	75	37	194	1	36	1054	0	**2049**
Marshall	663	150	139	41	110	138	167	1750	2	437	5909	36	**9542**
Newton	243	4	40	0	35	53	1	134	0	26	479	4	**1020**
Porter	672	3	103	0	33	108	38	439	4	20	2979	0	**4402**
Starke	870	52	180	3	33	83	48	393	13	51	3030	1	**4759**
Total	**4748**	**238**	**773**	**44**	**282**	**1097**	**299**	**3565**	**45**	**782**	**18050**	**77**	**30000**

Table B.2 Scaled land use with refuge – Wetland Alternative

County	Forest	Shrub	Emergent	Barren	Woodland	Pasture	Coniferous	Deciduous	Urban Grass	Water	Row Crop	Urban	Total
Jasper	1818	0	406	0	1	56	1	43	2	37	0	4	**2370**
Kankake	1986	0	114	0	327	483	0	422	9	119	0	15	**3474**
Lake	1641	20	315	0	25	101	6	188	12	55	0	17	**2383**
La Porte	891	8	801	0	6	75	37	194	1	36	0	0	**2049**
Marshall	3429	150	1881	41	1511	138	167	1750	2	437	0	36	**9542**
Newton	483	4	41	0	275	53	1	134	0	26	0	4	**1020**
Porter	3056	3	700	0	34	108	38	440	5	20	0	0	**4402**
Starke	2883	52	1197	3	34	83	48	393	13	52	0	1	**4759**
Total	**16188**	**238**	**5454**	**44**	**2212**	**1097**	**299**	**3565**	**45**	**782**	**0**	**77**	**30000**

Table B.3 Scaled land use without refuge – Grassland Alternative

County	Forest	Shrub	Emergent	Barren	Woodland	Pasture	Coniferous	Deciduous	Urban Grass	Water	Row Crop	Urban	Total
Iroquois	19	0	5	0	19	615	1	79	0	37	1490	13	**2279**
Jasper	41	3	12	0	814	250	42	2260	51	11	5440	36	**8961**
Kankakee	51	0	34	0	222	5141	19	1101	81	55	3779	104	**10586**
Newton	286	5	51	0	658	432	54	1683	53	29	4838	87	**8174**
Total	**397**	**7**	**103**	**0**	**1713**	**6438**	**115**	**5123**	**185**	**131**	**15547**	**240**	**30000**

Table B.4 Scaled land use with refuge – Grassland Alternative

County	Forest	Shrub	Emergent	Barren	Woodland	Pasture	Coniferous	Deciduous	Urban Grass	Water	Row Crop	Urban	Total
Iroquois	19	0	5	0	392	1733	1	79	0	37	0	13	**2278**
Jasper	41	3	12	0	2174	4331	42	2260	51	11	0	36	**8961**
Kankakee	51	0	34	0	1167	7975	19	1101	81	55	0	104	**10586**
Newton	552	5	51	0	2000	3661	54	1683	53	29	0	87	**8174**
Total	**663**	**7**	**103**	**0**	**5733**	**17700**	**115**	**5123**	**185**	**131**	**0**	**240**	**30000**

Table B.5 Scaled land use without refuge – Threatened and Endangered Species Alternative

County	Forest	Shrub	Emergent	Barren	Woodland	Pasture	Coniferous	Deciduous	Urban Grass	Water	Row Crop	Urban	Total
Jasper	91	0	4	0	1	3	2	8	3	21	29	0	**162**
Kankakee	1528	0	155	0	52	660	0	576	12	163	1581	20	**4749**
Lake	652	27	33	0	34	139	9	258	17	75	1990	24	**3257**
La Porte	1018	33	453	0	48	321	71	632	21	101	2961	2	**5661**
Marshall	576	60	71	0	43	14	47	466	0	28	2334	0	**3639**
Newton	5	0	4	0	0	0	0	0	0	0	1	0	**10**
Porter	919	4	142	0	46	147	52	601	6	27	4072	0	**6017**
Starke	1189	71	246	4	46	114	66	537	18	70	4141	2	**6505**
Total	**5979**	**196**	**1107**	**4**	**271**	**1398**	**246**	**3079**	**77**	**486**	**17108**	**48**	**30000**

Table B.6 Scaled land use with refuge – Threatened and Endangered Species Alternative

County	Forest	Shrub	Emergent	Barren	Woodland	Pasture	Coniferous	Deciduous	Urban Grass	Water	Row Crop	Urban	Total
Jasper	114	0	9	0	1	3	2	8	3	21	0	0	**162**
Kankakee	2715	0	155	0	447	660	0	576	12	163	0	20	**4749**
Lake	2244	27	431	0	34	139	9	258	17	76	0	24	**3258**
La Porte	1966	33	1706	0	428	321	71	632	21	101	0	2	**5280**
Marshall	2443	440	538	0	43	14	47	466	0	28	0	0	**4019**
Newton	5	0	4	0	0	0	0	0	0	0	0	0	**9**
Porter	4177	4	956	0	46	147	52	601	6	27	0	0	**6017**
Starke	3941	71	1636	4	46	114	66	537	18	70	0	2	**6506**
Total	**17604**	**576**	**5435**	**4**	**1046**	**1398**	**247**	**3079**	**77**	**486**	**0**	**48**	**29999**

Table B.7 Scaled land use without refuge – Hybrid Alternative

County	Forest	Shrub	Emergent	Barren	Woodland	Pasture	Coniferous	Deciduous	Urban Grass	Water	Row Crop	Urban	Total
Iroquois	17	0	4	0	17	536	1	68	0	32	1298	11	1985
Jasper	93	2	9	0	311	99	7	1015	6	16	2428	0	3989
Kankakee	1125	0	117	0	193	3687	4	1241	79	160	3452	70	10129
Lake	461	19	23	0	24	98	6	182	11	53	1408	17	2306
La Porte	721	23	321	0	34	227	50	447	14	71	2096	1	4007
Newton	235	4	39	0	41	99	1	140	2	25	1177	3	1767
Porter	651	3	101	0	32	104	37	425	4	19	2882	0	4259
Starke	358	21	79	0	11	41	27	195	7	24	793	0	1557
Total	**3662**	**73**	**693**	**0**	**664**	**4891**	**134**	**3715**	**127**	**401**	**15536**	**103**	30000

Table B.8 Scaled land use with refuge – Hybrid Alternative

County	Forest	Shrub	Emergent	Barren	Woodland	Pasture	Coniferous	Deciduous	Urban Grass	Water	Row Crop	Urban	Total
Iroquois	17	0	4	0	341	1510	1	68	0	32	0	12	1985
Jasper	110	2	13	0	913	1905	7	1015	7	16	0	0	3989
Kankakee	1965	0	117	0	1056	5437	4	1241	79	160	0	70	10129
Lake	1588	19	305	0	24	98	6	182	12	53	0	17	2306
La Porte	1391	292	1208	0	303	227	50	447	15	71	0	2	4006
Newton	467	4	39	0	452	634	1	140	2	25	0	4	1768
Porter	2957	3	677	0	33	104	37	425	4	19	0	0	4259
Starke	595	21	635	0	11	41	27	195	8	24	0	0	1557
Total	**9090**	**342**	**2999**	**0**	**3133**	**9955**	**134**	**3715**	**127**	**401**	**0**	**103**	30000

Appendix C

IMPLAN input data for models presented in Part V

Table C.1 IMPLAN input data, Baseline scenario (values in 1994 $)

Category	IMPLAN Sector	Wetland Alternative	Grassland Alternative	T & E Alternative	Hybrid Alternative
Corn	11 and 12	-4,616,515	-396,421	-4,375,701	-3,973,527
Hay	13	24,369	492,055	38,234	276,761
Gas	451	3,109,519	2,476,802	2,766,481	2,804,532
Food	454	4,103,215	3,326,306	3,731,361	3,725,508
Lodging	463	2,939,598	2,475,743	2,790,422	2,708,562
Salary	488	395,221	395,221	395,221	395,221
O&M	56	134,191	134,191	134,191	134,191
Levees	49	27,574	27,574	27,574	27,574
Construction	49	919,118	919,118	919,118	919,118

Note: Values are IMPLAN input data corresponding to complete acquisition and restoration of 30,000 acres in accordance with the land use changes outlined for each management alternative in Part III of the report. Values for salary, operation and maintenance, and levee construction correspond to years 5-30 of the planning horizon. For amounts in years 1-4 see Table IV-4 in the text. Values for construction correspond to years 2, 3 and 4 of the planning horizon. Construction expenditures in other years are assumed to be 0.

Table C.2 IMPLAN input data, Scenario A (values in 1994 $)

Category	IMPLAN Sector	Wetland Alternative	Grassland Alternative	T & E Alternative	Hybrid Alternative
Corn	11 and 12	-5,770,644	-4,970,526	-5,469,626	-4,966,908
Hay	13	24,369	492,055	38,234	276,761
Gas	451	1,554,760	1,238,401	1,383,241	1,402,266
Food	454	2,051,608	1,663,153	1,865,680	1,862,754
Lodging	463	1,469,799	1,237,872	1,395,211	1,354,281
Salary	488	395,221	395,221	395,221	395,221
O&M	56	134,191	134,191	134,191	134,191
Levees	49	27,574	27,574	27,574	27,574
Construction	49	919,118	919,118	919,118	919,118

Note: Values are IMPLAN input data corresponding to complete acquisition and restoration of 30,000 acres in accordance with the land use changes outlined for each management alternative in Part III of the report. Values for salary, operation and maintenance, and levee construction correspond to years 5-30 of the planning horizon. For amounts in years 1-4 see Table IV-4 in the text. Values for construction correspond to years 2, 3 and 4 of the planning horizon. Construction expenditures in other years are assumed to be 0.

Table C.3 IMPLAN input data, Scenario B (values in 1994 $)

Category	IMPLAN Sector	Wetland Alternative	Grassland Alternative	T & E Alternative	Hybrid Alternative
Corn	11, 12	-4,616,515	-396,421	-4,375,701	-3,973,527
Hay	13	24,369	492,055	38,234	276,761
Gas	451	4,664,279	3,715,203	4,149,722	4,206,798
Food	454	6,154,823	4,989,459	5,597,041	5,588,262
Lodging	463	4,409,397	3,713,615	4,185,634	4,062,843
Salary	488	395,221	395,221	395,221	395,221
O&M	56	134,191	134,191	134,191	134,191
Levees	49	27,574	27,574	27,574	27,574
Construction	49	919,118	919,118	919,118	919,118

Note: Values are IMPLAN input data corresponding to complete acquisition and restoration of 30,000 acres in accordance with the land use changes outlined for each management alternative in Part III of the report. Values for salary, operation and maintenance, and levee construction correspond to years 5-30 of the planning horizon. For amounts in years 1-4 see Table IV-4 in the text. Values for construction correspond to years 2, 3 and 4 of the planning horizon. Construction expenditures in other years are assumed to be 0.

Appendix D
Impact analysis results by year and management alternative (Baseline Scenario, dollar values discounted at 3.6 percent)

Table D.1 Economic output, Wetland Alternative (1994 $)

Year	FWS	Recreation	Agriculture	Total
	All	All	All	Impact
1	266233	0	-240396	25837
2	2195803	0	-464085	1731718
3	2119501	0	-671937	1447564
4	2045851	0	-864784	1181066
5	924447	29294	-1043417	-89676
6	892324	84827	-1208592	-231441
7	861316	163759	-1361027	-335951
8	831386	263448	-1501408	-406574
9	802497	381440	-1630390	-446454
10	774611	515459	-1748595	-458526
11	747694	663396	-1856617	-445527
12	721712	823299	-1955019	-410008
13	696633	971288	-2044341	-376420
14	672426	1107998	-2125095	-344671
15	649060	1234034	-2197768	-314674
16	626505	1349973	-2262824	-286345
17	604735	1456364	-2320705	-259606
18	583721	1553732	-2371831	-234379
19	563437	1642573	-2416602	-210591
20	543858	1723365	-2455397	-188174
21	524960	1796558	-2488578	-167061
22	506718	1862583	-2516488	-147187
23	489110	1921851	-2539454	-128493
24	472114	1974750	-2557785	-110921
25	455708	2021652	-2571775	-94414
26	439873	2062910	-2581705	-78921
27	424588	2098860	-2587839	-64391
28	409834	2129820	-2590429	-50775
29	395592	2156095	-2589715	-38028
30	381846	2177971	-2585922	-26105
Total	**22,624,093**	**34,167,300**	**-58,350,522**	**-1,559,129**
Average	**770,961**	**1,178,183**	**-2,003,797**	**-54,654**

Table D.2 Employment, Wetland Alternative (# jobs)

Year	FWS	Recreation	Agriculture	Total
	All	All	All	Impact
1	4.0	0.0	-3.0	1.1
2	31.7	0.0	-5.7	26.0
3	30.6	0.0	-8.3	22.3
4	29.5	0.0	-10.7	18.9
5	14.0	0.6	-12.9	1.7
6	13.5	1.6	-14.9	0.2
7	13.0	3.2	-16.8	-0.6
8	12.6	5.1	-18.5	-0.9
9	12.1	7.3	-20.1	-0.7
10	11.7	9.9	-21.6	0.0
11	11.3	12.8	-22.9	1.1
12	10.9	15.9	-24.2	2.6
13	10.5	18.7	-25.3	4.0
14	10.2	21.3	-26.3	5.2
15	9.8	23.8	-27.2	6.4
16	9.5	26.0	-28.0	7.5
17	9.1	28.0	-28.7	8.5
18	8.8	29.9	-29.3	9.4
19	8.5	31.6	-29.9	10.3
20	8.2	33.2	-30.3	11.1
21	7.9	34.6	-30.7	11.8
22	7.7	35.9	-31.1	12.4
23	7.4	37.0	-31.4	13.0
24	7.1	38.0	-31.6	13.6
25	6.9	38.9	-31.8	14.0
26	6.7	39.7	-31.9	14.5
27	6.4	40.4	-32.0	14.9
28	6.2	41.0	-32.0	15.2
29	6.0	41.5	-32.0	15.5
30	5.8	41.9	-31.9	15.8
Total	**338**	**658**	**-721**	**275**
Average	**11.5**	**22.7**	**-24.8**	**9.4**

Table D.3 Personal income, Wetland Alternative income (1994 $)

Year	FWS	Recreation	Agriculture	Total
	All	All	All	Impact
1	104845	0	-51976	52869
2	990450	0	-100341	890109
3	956033	0	-145281	810752
4	922812	0	-186977	735835
5	364057	10519	-225599	148977
6	351406	30460	-261312	120555
7	339195	58804	-294270	103729
8	327408	94601	-324622	97387
9	316031	136970	-352510	100492
10	305050	185095	-378067	112077
11	294449	238217	-401422	131244
12	284218	295636	-422698	157155
13	274341	348777	-442011	181107
14	264808	397868	-459471	203205
15	255606	443126	-475183	223549
16	246724	484758	-489249	242233
17	238151	522961	-501764	259348
18	229875	557925	-512818	274982
19	221887	589827	-522498	289216
20	214177	618838	-530886	302129
21	206735	645120	-538060	313795
22	199551	668829	-544094	324285
23	192617	690111	-549060	333668
24	185923	709107	-553023	342007
25	179463	725949	-556048	349363
26	173226	740764	-558195	355796
27	167207	753673	-559521	361359
28	161397	764791	-560081	366106
29	155788	774225	-559927	370087
30	150375	782081	-559107	373349
Total	**9,273,805**	**12,269,029**	**-12,616,070**	**8,926,763**
Average	**316,171.0**	**423,070.0**	**-433,244.6**	**305,996.4**

Table D.4 Economic output, Grassland Alternative (1994 $)

Year	FWS	Recreation	Agriculture	Total Impact
	All	All	All	
1	266233	0	-183480	82752
2	2195803	0	-354209	1841594
3	2119501	0	-512851	1606650
4	2045851	0	-660040	1385810
5	924447	23891	-796380	151958
6	892324	69184	-922448	39059
7	861316	133559	-1038793	-43918
8	831386	214863	-1145938	-99689
9	802497	311095	-1244383	-130791
10	774611	420399	-1334602	-139593
11	747694	541054	-1417049	-128301
12	721712	671468	-1492154	-98974
13	696633	792165	-1560328	-71530
14	672426	903663	-1621963	-45874
15	649060	1006456	-1677430	-21914
16	626505	1101014	-1727083	436
17	604735	1187784	-1771260	21259
18	583721	1267195	-1810282	40634
19	563437	1339653	-1844453	58637
20	543858	1405545	-1874063	75340
21	524960	1465240	-1899388	90811
22	506718	1519089	-1920691	105116
23	489110	1567426	-1938219	118317
24	472114	1610570	-1952210	130474
25	455708	1648823	-1962888	141643
26	439873	1682472	-1970467	151879
27	424588	1711792	-1975148	161232
28	409834	1737043	-1977125	169751
29	395592	1758472	-1976580	177484
30	381846	1776314	-1973685	184474
Total	**22,624,093**	**27,866,228**	**-44,535,592**	**5,954,729**
Average	**770,961**	**960,904**	**-1,529,383**	**202,482**

Table D.5 Employment, Grassland Alternative (# jobs)

Year	FWS	Recreation	Agriculture	Total Impact
	All	All	All	
1	4.0	0.0	-1.8	2.2
2	31.7	0.0	-3.5	28.2
3	30.6	0.0	-5.1	25.6
4	29.5	0.0	-6.5	23.0
5	14.0	0.5	-7.9	6.6
6	13.5	1.3	-9.1	5.7
7	13.0	2.6	-10.2	5.4
8	12.6	4.1	-11.3	5.4
9	12.1	6.0	-12.3	5.9
10	11.7	8.1	-13.2	6.7
11	11.3	10.4	-14.0	7.8
12	10.9	12.9	-14.7	9.1
13	10.5	15.3	-15.4	10.4
14	10.2	17.4	-16.0	11.6
15	9.8	19.4	-16.5	12.7
16	9.5	21.2	-17.0	13.6
17	9.1	22.9	-17.5	14.6
18	8.8	24.4	-17.9	15.4
19	8.5	25.8	-18.2	16.1
20	8.2	27.1	-18.5	16.8
21	7.9	28.2	-18.7	17.4
22	7.7	29.3	-18.9	18.0
23	7.4	30.2	-19.1	18.5
24	7.1	31.0	-19.3	18.9
25	6.9	31.8	-19.4	19.3
26	6.7	32.4	-19.4	19.6
27	6.4	33.0	-19.5	19.9
28	6.2	33.5	-19.5	20.2
29	6.0	33.9	-19.5	20.4
30	5.8	34.2	-19.5	20.5
Total	**338**	**537**	**-439**	**435**
Average	**11.5**	**18.5**	**-15.1**	**14.9**

Table D.6 Personal income, Grassland Alternative (1994 $)

Year	FWS	Recreation	Agriculture	Total
	All	All	All	Impact
1	104845	0	-38246	66599
2	990450	0	-73834	916616
3	956033	0	-106903	849130
4	922812	0	-137584	785227
5	364057	8573	-166004	206625
6	351406	24825	-192283	183948
7	339195	47924	-216535	170585
8	327408	77099	-238869	165638
9	316031	111629	-259389	168271
10	305050	150850	-278196	177704
11	294449	194144	-295381	193212
12	284218	240940	-311037	214121
13	274341	284250	-325248	233343
14	264808	324258	-338095	250971
15	255606	361143	-349657	267092
16	246724	395073	-360008	281789
17	238151	426208	-369216	295143
18	229875	454703	-377350	307228
19	221887	480703	-384473	318117
20	214177	504347	-390645	327878
21	206735	525767	-395924	336577
22	199551	545089	-400365	344275
23	192617	562434	-404018	351032
24	185923	577915	-406935	356903
25	179463	591641	-409161	361943
26	173226	603715	-410740	366201
27	167207	614236	-411716	369727
28	161397	623297	-412128	372565
29	155788	630986	-412015	374760
30	150375	637388	-411411	376352
Total	**9,273,805**	**9,999,136**	**-9,283,368**	**9,989,574**
Average	**316,171.0**	**344,797.8**	**-318,797.3**	**342,171.5**

Table D.7 Economic output, T&E Alternative (1994 $)

Year	FWS	Recreation	Agriculture	Total
	All	All	All	Impact
1	266233	0	-227098	39134
2	2195803	0	-438414	1757390
3	2119501	0	-634769	1484733
4	2045851	0	-816948	1228902
5	924447	26805	-985700	-34447
6	892324	77622	-1141737	-171792
7	861316	149849	-1285740	-274575
8	831386	241070	-1418357	-345900
9	802497	349039	-1540204	-388668
10	774611	471675	-1651870	-405585
11	747694	607046	-1753916	-399177
12	721712	753367	-1846876	-371797
13	696633	888785	-1931257	-345838
14	672426	1013883	-2007544	-321235
15	649060	1129213	-2076196	-297923
16	626505	1235304	-2137654	-275844
17	604735	1332658	-2192333	-254940
18	583721	1421755	-2240631	-235155
19	563437	1503050	-2282926	-216438
20	543858	1576979	-2319575	-198737
21	524960	1643955	-2350920	-182005
22	506718	1704372	-2377287	-166197
23	489110	1758605	-2398982	-151266
24	472114	1807011	-2416299	-137173
25	455708	1849930	-2429515	-123877
26	439873	1887683	-2438896	-111339
27	424588	1920579	-2444690	-99523
28	409834	1948910	-2447138	-88394
29	395592	1972952	-2446463	-77918
30	381846	1992971	-2442880	-68063
Total	**22,624,093**	**31,265,073**	**-55,122,815**	**-1,233,649**
Average	**770,961**	**1,078,106**	**-1,892,956**	**-43,889**

Table D.8 Employment, T&E Alternative (# jobs)

Year	FWS	Recreation	Agriculture	Total
	All	All	All	Impact
1	4.0	0.0	-2.8	1.2
2	31.7	0.0	-5.4	26.3
3	30.6	0.0	-7.8	22.8
4	29.5	0.0	-10.0	19.5
5	14.0	0.5	-12.1	2.4
6	13.5	1.5	-14.0	1.0
7	13.0	2.9	-15.8	0.1
8	12.6	4.6	-17.4	-0.2
9	12.1	6.7	-18.9	-0.1
10	11.7	9.1	-20.3	0.5
11	11.3	11.7	-21.5	1.5
12	10.9	14.5	-22.7	2.7
13	10.5	17.1	-23.7	3.9
14	10.2	19.5	-24.7	5.0
15	9.8	21.8	-25.5	6.1
16	9.5	23.8	-26.3	7.0
17	9.1	25.7	-26.9	7.9
18	8.8	27.4	-27.5	8.7
19	8.5	29.0	-28.0	9.4
20	8.2	30.4	-28.5	10.1
21	7.9	31.7	-28.9	10.7
22	7.7	32.8	-29.2	11.3
23	7.4	33.9	-29.5	11.8
24	7.1	34.8	-29.7	12.3
25	6.9	35.6	-29.8	12.7
26	6.7	36.4	-30.0	13.1
27	6.4	37.0	-30.0	13.4
28	6.2	37.6	-30.1	13.7
29	6.0	38.0	-30.1	13.9
30	5.8	38.4	-30.0	14.2
Total	**338**	**602**	**-677**	**263**
Average	**11.5**	**20.8**	**-23.3**	**9.0**

Table D.9 Personal income, T&E Alternative (1994 $)

Year	FWS	Recreation	Agriculture	Total
	All	All	All	Impact
1	104845	0	-49056	55790
2	990450	0	-94702	895748
3	956033	0	-137117	818916
4	922812	0	-176469	746342
5	364057	9617	-212921	160752
6	351406	27847	-246627	132627
7	339195	53760	-277733	115222
8	327408	86486	-306379	107515
9	316031	125221	-332700	108552
10	305050	169217	-356821	117446
11	294449	217783	-378864	133369
12	284218	270277	-398944	155550
13	274341	318859	-417171	176030
14	264808	363739	-433650	194898
15	255606	405115	-448480	212242
16	246724	443176	-461755	228145
17	238151	478103	-473566	242687
18	229875	510067	-483999	255943
19	221887	539232	-493135	267984
20	214177	565755	-501052	278880
21	206735	589783	-507823	288695
22	199551	611458	-513518	297491
23	192617	630915	-518205	305327
24	185923	648281	-521945	312259
25	179463	663678	-524800	318341
26	173226	677223	-526826	323623
27	167207	689025	-528078	328153
28	161397	699188	-528607	331978
29	155788	707814	-528461	335141
30	150375	714996	-527687	337683
Total	**9,273,805**	**11,216,615**	**-11,907,090**	**8,583,330**
Average	**316,171.0**	**386,779.8**	**-408,897.7**	**294,053.1**

Table D.10 Economic output, Hybrid Alternative (1994 $)

Year	FWS	Recreation	Agriculture	Total
	All	All	All	Impact
1	266233	0	-194108	72125
2	2195803	0	-374725	1821078
3	2119501	0	-542556	1576946
4	2045851	0	-698270	1347581
5	924447	26659	-842507	108599
6	892324	77197	-975877	-6356
7	861316	149029	-1098960	-88615
8	831386	239750	-1212312	-141175
9	802497	347129	-1316458	-166833
10	774611	469093	-1411903	-168199
11	747694	603723	-1499124	-147708
12	721712	749242	-1578580	-107625
13	696633	883920	-1650703	-70150
14	672426	1008332	-1715907	-35149
15	649060	1123031	-1774587	-2496
16	626505	1228541	-1827116	27930
17	604735	1325363	-1873852	56245
18	583721	1413971	-1915134	82558
19	563437	1494822	-1951284	106975
20	543858	1568346	-1982609	129595
21	524960	1634955	-2009402	150513
22	506718	1695041	-2031938	169822
23	489110	1748978	-2050481	187607
24	472114	1797119	-2065282	203950
25	455708	1839802	-2076579	218932
26	439873	1877349	-2084596	232625
27	424588	1910065	-2089549	245103
28	409834	1938240	-2091641	256433
29	395592	1962151	-2091064	266679
30	381846	1982060	-2088002	275904
Total	**22,624,093**	**31,093,907**	**-47,115,106**	**6,602,894**
Average	**770,961**	**1,072,204**	**-1,617,965**	**225,199**

Table D.11 Employment, Hybrid Alternative (# jobs)

Year	FWS	Recreation	Agriculture	Total
	All	All	All	Impact
1	4.0	0.0	-2.2	1.9
2	31.7	0.0	-4.2	27.6
3	30.6	0.0	-6.0	24.6
4	29.5	0.0	-7.7	21.8
5	14.0	0.5	-9.3	5.2
6	13.5	1.5	-10.8	4.2
7	13.0	2.9	-12.2	3.7
8	12.6	4.6	-13.4	3.8
9	12.1	6.7	-14.6	4.2
10	11.7	9.0	-15.6	5.1
11	11.3	11.6	-16.6	6.3
12	10.9	14.4	-17.5	7.9
13	10.5	17.0	-18.3	9.3
14	10.2	19.4	-19.0	10.6
15	9.8	21.6	-19.7	11.8
16	9.5	23.7	-20.2	12.9
17	9.1	25.5	-20.8	13.9
18	8.8	27.2	-21.2	14.9
19	8.5	28.8	-21.6	15.7
20	8.2	30.2	-22.0	16.5
21	7.9	31.5	-22.3	17.2
22	7.7	32.6	-22.5	17.8
23	7.4	33.7	-22.7	18.4
24	7.1	34.6	-22.9	18.9
25	6.9	35.4	-23.0	19.3
26	6.7	36.2	-23.1	19.7
27	6.4	36.8	-23.1	20.1
28	6.2	37.3	-23.2	20.4
29	6.0	37.8	-23.2	20.6
30	5.8	38.2	-23.1	20.8
Total	**338**	**599**	**-522**	**415**
Average	**11.5**	**20.7**	**-17.9**	**14.2**

Table D.12 Personal income, Hybrid Alternative (1994 $)

Year	FWS	Recreation	Agriculture	Total
	All	All	All	Impact
1	104845	0	-41195	63650
2	990450	0	-79527	910923
3	956033	0	-115145	840888
4	922812	0	-148192	774620
5	364057	9570	-178803	194824
6	351406	27713	-207108	172011
7	339195	53499	-233229	159465
8	327408	86067	-257285	156190
9	316031	124615	-279388	161258
10	305050	168398	-299644	173804
11	294449	216729	-318155	193023
12	284218	268968	-335017	218169
13	274341	317316	-350324	241333
14	264808	361978	-364162	262625
15	255606	403154	-376615	282145
16	246724	441031	-387764	299991
17	238151	475788	-397682	316257
18	229875	507598	-406443	331030
19	221887	536622	-414115	344394
20	214177	563016	-420764	356430
21	206735	586928	-426450	367213
22	199551	608498	-431232	376817
23	192617	627861	-435168	385309
24	185923	645143	-438309	392757
25	179463	660465	-440706	399222
26	173226	673944	-442408	404763
27	167207	685689	-443459	409437
28	161397	695804	-443903	413297
29	155788	704387	-443781	416395
30	150375	711534	-443131	418778
Total	**9,273,805**	**11,162,316**	**-9,999,104**	**10,437,017**
Average	**316,171.0**	**384,907.5**	**-343,376.2**	**357,702.3**

Appendix E

Table E.1 Summary of annual refuge impacts, Wetland Alternative (undiscounted)

	Baseline			Scenario A			Scenario B		
Year	Output	Employment	Income	Output	Employment	Income	Output	Employment	Income
1	25837	1.1	52869	-34567	0.3	39790	25837	1.1	52869
2	1794060	26.9	922153	1673252	25.4	895996	1794060	26.9	922153
3	1553664	23.9	870177	1372452	21.7	830942	1553664	23.9	870177
4	1313268	21.0	818200	1071652	18.0	765887	1313268	21.0	818200
5	-103304	1.9	171616	-422197	-2.2	100165	-86430	2.2	177675
6	-276210	0.2	143874	-689251	-5.3	47227	-225587	1.2	162052
7	-415370	-0.8	128250	-939433	-8.0	349	-314126	1.2	164606
8	-520785	-1.2	124744	-1172743	-10.4	-40471	-352044	2.1	185336
9	-592454	-0.9	133355	-1389180	-12.5	-75233	-339344	4.0	224243
10	-630379	0.1	154083	-1588744	-14.3	-103935	-276024	6.9	281327
11	-634558	1.6	186929	-1771435	-15.8	-126579	-162085	10.7	356588
12	-604992	3.9	231892	-1937254	-16.9	-143164	2473	15.6	450025
13	-575426	6.1	276856	-2103073	-18.0	-159749	217651	21.4	561639
14	-545860	8.3	321819	-2268892	-19.1	-176334	483448	28.1	691430
15	-516294	10.5	366782	-2434711	-20.3	-192919	799864	35.9	839398
16	-486728	12.8	411746	-2600530	-21.4	-209504	1166899	44.6	1005542
17	-457162	15.0	456709	-2766349	-22.5	-226089	1533935	53.3	1171686
18	-427596	17.2	501672	-2932168	-23.6	-242674	1900970	62.1	1337830
19	-398030	19.4	546636	-3097987	-24.7	-259259	2268005	70.8	1503975
20	-368464	21.7	591599	-3263806	-25.9	-275844	2635041	79.5	1670119
21	-338898	23.9	636562	-3429625	-27.0	-292429	3002076	88.2	1836263
22	-309332	26.1	681526	-3595444	-28.1	-309014	3369112	97.0	2002407
23	-279766	28.4	726489	-3761263	-29.2	-325599	3736147	105.7	2168552
24	-250200	30.6	771452	-3927082	-30.4	-342184	4103182	114.4	2334696
25	-220634	32.8	816416	-4092901	-31.5	-358769	4470218	123.1	2500840
26	-191068	35.0	861379	-4258720	-32.6	-375354	4837253	131.9	2666984
27	-161502	37.3	906343	-4424539	-33.7	-391939	5204289	140.6	2833129
28	-131936	39.5	951306	-4590358	-34.9	-408524	5571324	149.3	2999273
29	-102370	41.7	996269	-4756177	-36.0	-425109	5938359	158.1	3165417
30	-72804	43.9	1041233	-4921995	-37.1	-441694	6305395	166.8	3331561
Total	**-4,925,295**	**528**	**15,800,936**	**-69,053,068**	**-516**	**-3,222,009**	**60,476,829**	**1,788**	**39,285,993**
Average	**-170,729**	**18**	**543,037**	**-2,379,948**	**-18**	**-112,476**	**2,084,517**	**62**	**1,352,866**

Table E.2 Summary of annual refuge impacts, Grassland Alternative (undiscounted)

	Baseline			Scenario A			Scenario B		
Year	Output	Employment	Income	Output	Employment	Income	Output	Employment	Income
1	82752	2.2	66599	30723	1.6	55334	82752	2.2	66599
2	1907891	29.2	949614	1803834	27.9	927084	1907891	29.2	949614
3	1724411	27.4	911368	1568325	25.5	877572	1724411	27.4	911368
4	1540931	25.6	873122	1332816	23.0	828061	1540931	25.6	873122
5	175050	7.6	238025	-98854	4.1	176762	188812	7.9	242963
6	46614	6.8	219530	-306841	2.1	137126	87897	7.6	234344
7	-54300	6.6	210911	-501067	0.5	102428	28266	8.2	240538
8	-127693	6.9	212167	-681532	-0.9	72668	9917	9.6	261545
9	-173563	7.8	223299	-848237	-2.1	47846	32852	11.7	297366
10	-191911	9.1	244307	-1001180	-2.9	27962	97070	14.7	348001
11	-182738	11.0	275190	-1140362	-3.5	13015	202571	18.5	413449
12	-146042	13.5	315949	-1265783	-3.9	3006	349354	23.0	493710
13	-109346	15.9	356708	-1391204	-4.2	-7002	537421	28.4	588785
14	-72651	18.3	397466	-1516625	-4.5	-17011	766771	34.5	698673
15	-35955	20.8	438225	-1642046	-4.9	-27020	1037403	41.5	823374
16	741	23.2	478984	-1767467	-5.2	-37029	1349319	49.2	962889
17	37436	25.6	519743	-1892888	-5.6	-47038	1661235	56.9	1102404
18	74132	28.1	560501	-2018309	-5.9	-57046	1973151	64.7	1241919
19	110828	30.5	601260	-2143730	-6.2	-67055	2285066	72.4	1381434
20	147523	32.9	642019	-2269151	-6.6	-77064	2596982	80.1	1520949
21	184219	35.4	682778	-2394572	-6.9	-87073	2908898	87.9	1660464
22	220915	37.8	723537	-2519993	-7.3	-97082	3220814	95.6	1799979
23	257611	40.2	764295	-2645415	-7.6	-107090	3532729	103.3	1939494
24	294306	42.7	805054	-2770836	-7.9	-117099	3844645	111.1	2079010
25	331002	45.1	845813	-2896257	-8.3	-127108	4156561	118.8	2218525
26	367698	47.5	886572	-3021678	-8.6	-137117	4468476	126.5	2358040
27	404393	49.9	927331	-3147099	-8.9	-147125	4780392	134.3	2497555
28	441089	52.4	968089	-3272520	-9.3	-157134	5092308	142.0	2637070
29	477785	54.8	1008848	-3397941	-9.6	-167143	5404224	149.7	2776585
30	514480	57.2	1049607	-3523362	-10.0	-177152	5716139	157.5	2916100
Total	**8,247,610**	**812**	**17,396,911**	**-45,339,251**	**-56**	**1,611,477**	**61,585,258**	**1,840**	**36,535,867**
Average	**281,547**	**27.9**	**597,597**	**-1,564,482**	**-2.0**	**53,660**	**2,120,776**	**63.4**	**1,257,561**

Table E.3 Summary of annual refuge impacts, T & E Alternative (undiscounted)

	Baseline			Scenario A			Scenario B		
Year	Output	Employment	Income	Output	Employment	Income	Output	Employment	Income
1	39134	1.2	55790	-18119	0.5	43393	39134	1.2	55790
2	1820656	27.3	927995	1706150	25.8	903203	1820656	27.3	927995
3	1593557	24.5	878940	1421798	22.3	841751	1593557	24.5	878940
4	1366459	21.7	829884	1137447	18.8	780299	1366459	21.7	829884
5	-39682	2.8	185181	-341387	-1.1	117660	-24243	3.1	190720
6	-205022	1.2	158281	-594859	-4.0	67287	-158704	2.0	174898
7	-339484	0.1	142460	-832892	-6.6	22452	-246848	1.9	175694
8	-443067	-0.3	137717	-1055486	-8.9	-16844	-288673	2.7	193107
9	-515771	-0.1	144052	-1262640	-11.0	-50600	-284179	4.4	227137
10	-557596	0.7	161464	-1454355	-12.7	-78818	-233368	7.0	277784
11	-568542	2.1	189955	-1630630	-14.1	-101497	-136238	10.4	345048
12	-548609	4.0	229524	-1791466	-15.2	-118636	7210	14.8	428929
13	-528677	6.0	269093	-1952302	-16.3	-135776	196977	20.0	529428
14	-508744	8.0	308662	-2113137	-17.5	-152915	433062	26.1	646543
15	-488811	10.0	348231	-2273973	-18.6	-170055	715465	33.2	780275
16	-468879	11.9	387800	-2434809	-19.7	-187194	1044186	41.1	930625
17	-448946	13.9	427369	-2595645	-20.8	-204334	1372907	49.0	1080975
18	-429013	15.9	466938	-2756481	-22.0	-221473	1701629	56.9	1231324
19	-409081	17.8	506507	-2917317	-23.1	-238613	2030350	64.8	1381674
20	-389148	19.8	546076	-3078153	-24.2	-255753	2359071	72.8	1532023
21	-369215	21.8	585645	-3238988	-25.3	-272892	2687793	80.7	1682373
22	-349282	23.7	625214	-3399824	-26.5	-290032	3016514	88.6	1832722
23	-329350	25.7	664783	-3560660	-27.6	-307171	3345236	96.5	1983072
24	-309417	27.7	704352	-3721496	-28.7	-324311	3673957	104.4	2133422
25	-289484	29.7	743920	-3882332	-29.8	-341450	4002678	112.4	2283771
26	-269552	31.6	783489	-4043168	-30.9	-358590	4331400	120.3	2434121
27	-249619	33.6	823058	-4204003	-32.1	-375730	4660121	128.2	2584470
28	-229686	35.6	862627	-4364839	-33.2	-392869	4988842	136.1	2734820
29	-209754	37.5	902196	-4525675	-34.3	-410009	5317564	144.0	2885169
30	-189821	39.5	941765	-4686511	-35.4	-427148	5646285	152.0	3035519
Total	**-4,864,445**	**495**	**14,938,967**	**-64,465,751**	**-472**	**-2,656,665**	**54,978,802**	**1,648**	**36,408,252**
Average	**-169,089**	**17**	**513,213**	**-2,222,332**	**-16**	**-93,105**	**1,894,471**	**57**	**1,253,533**

Table E.4 Summary of annual refuge impacts, Hybrid Alternative (undiscounted)

	Baseline			Scenario A			Scenario B		
Year	Output	Employment	Income	Output	Employment	Income	Output	Employment	Income
1	72125	1.9	63650	20134	1.2	52393	72125	1.9	63650
2	1886637	28.6	943716	1782655	27.3	921203	1886637	28.6	943716
3	1692529	26.4	902522	1536557	24.5	868751	1692529	26.4	902522
4	1498422	24.3	861327	1290458	21.7	816299	1498422	24.3	861327
5	125102	6.0	224430	-150207	2.4	162634	140457	6.2	229943
6	-7586	5.0	205284	-365596	0.2	121206	38479	5.9	221821
7	-109564	4.6	197163	-565630	-1.7	85291	-17435	6.4	230236
8	-180832	4.8	200066	-750309	-3.3	54888	-27283	7.8	255188
9	-221391	5.6	213993	-919633	-4.6	29997	8933	10.1	296676
10	-231240	7.0	238944	-1073602	-5.6	10619	91213	13.2	354701
11	-210378	9.0	274921	-1212216	-6.4	-3247	219559	17.3	429263
12	-158808	11.6	321921	-1335475	-6.8	-11601	393969	22.2	520361
13	-107237	14.2	368922	-1458734	-7.2	-19955	614444	28.1	627996
14	-55666	16.8	415922	-1581994	-7.7	-28310	880984	34.8	752167
5	-4095	19.3	462923	-1705253	-8.1	-36664	1193588	42.4	892876
16	47476	21.9	509923	-1828512	-8.5	-45018	1552257	50.9	1050120
17	99047	24.5	556924	-1951771	-9.0	-53372	1910926	59.4	1207365
18	150618	27.1	603924	-2075031	-9.4	-61726	2269595	67.9	1364610
19	202189	29.7	650925	-2198290	-9.8	-70080	2628264	76.4	1521855
20	253760	32.3	697926	-2321549	-10.3	-78434	2986933	84.9	1679100
21	305331	34.8	744926	-2444808	-10.7	-86788	3345602	93.4	1836345
22	356901	37.4	791927	-2568067	-11.1	-95142	3704271	101.9	1993590
23	408472	40.0	838927	-2691327	-11.6	-103496	4062940	110.4	2150834
24	460043	42.6	885928	-2814586	-12.0	-111850	4421609	118.9	2308079
25	511614	45.2	932928	-2937845	-12.4	-120204	4780278	127.4	2465324
26	563185	47.8	979929	-3061104	-12.8	-128558	5138947	135.9	2622569
27	614756	50.3	1026929	-3184364	-13.3	-136912	5497616	144.4	2779814
28	666327	52.9	1073930	-3307623	-13.7	-145266	5856285	152.9	2937059
29	717898	55.5	1120931	-3430882	-14.1	-153621	6214954	161.4	3094304
30	769469	58.1	1167931	-3554141	-14.6	-161975	6573623	169.9	3251548
Total	**10,115,105**	**785**	**18,479,612**	**-46,858,744**	**-147**	**1,471,062**	**69,630,723**	**1,931**	**39,844,958**
Average	**346,310**	**27**	**635,033**	**-1,616,513**	**-5**	**48,920**	**2,398,572**	**67**	**1,371,769**

Appendix F

Table F.1 Present value of component output and income impacts of proposed refuge over 30 years, discount rate = 0.0% (million $)

	Output			Income		
Baseline	**FWS**	**Recreation**	**Agriculture**	**FWS**	**Recreation**	**Agriculture**
Wetland	34.78	72.08	-111.78	14.09	25.88	-24.17
Grassland	34.78	58.79	-85.32	14.09	21.09	-17.78
T&E	34.78	65.96	-105.60	14.09	23.66	-22.81
Hybrid	34.78	65.60	-90.26	14.09	23.55	-19.16
Scenario A	**FWS**	**Recreation**	**Agriculture**	**FWS**	**Recreation**	**Agriculture**
Wetland	34.78	36.04	-139.87	14.09	12.94	-30.25
Grassland	34.78	29.39	-109.51	14.09	10.55	-23.02
T&E	34.78	32.98	-132.22	14.09	11.83	-28.57
Hybrid	34.78	32.80	-64.47	14.09	11.77	-24.39
Scenario B	**FWS**	**Recreation**	**Agriculture**	**FWS**	**Recreation**	**Agriculture**
Wetland	34.78	137.48	-111.78	14.09	49.37	-24.17
Grassland	34.78	112.12	-85.32	14.09	40.23	-17.78
T&E	34.78	125.80	-105.60	14.09	45.13	-22.81
Hybrid	34.78	125.11	-90.26	14.09	44.91	-19.16

Table F.2 Present value of component output and income impacts of proposed refuge over 30 years, discount rate = 3.6% (million $)

	Output			Income		
Baseline	**FWS**	**Recreation**	**Agriculture**	**FWS**	**Recreation**	**Agriculture**
Wetland	22.62	34.17	-58.35	9.27	12.27	-12.62
Grassland	22.62	27.87	-44.54	9.27	1.00	-9.28
T&E	22.62	31.27	-55.12	9.27	11.22	-11.91
Hybrid	22.62	31.09	-47.11	9.27	11.16	-1.00
Scenario A	**FWS**	**Recreation**	**Agriculture**	**FWS**	**Recreation**	**Agriculture**
Wetland	22.62	17.08	-73.01	9.27	6.13	-15.79
Grassland	22.62	13.93	-57.16	9.27	5.00	-12.02
T&E	22.62	15.63	-69.02	9.27	5.61	-14.92
Hybrid	22.62	15.55	-59.73	9.27	5.58	-12.73
Scenario B	**FWS**	**Recreation**	**Agriculture**	**FWS**	**Recreation**	**Agriculture**
Wetland	22.62	64.05	-58.35	9.27	23.00	-12.62
Grassland	22.62	52.23	-44.54	9.27	18.74	-9.28
T&E	22.62	58.60	-55.12	9.27	21.02	-11.91
Hybrid	22.62	58.28	-47.11	9.27	20.92	1.00

Table F.3 Present value of component output and income impacts of proposed refuge over 30 years, discount rate = 7.0% (million $)

	Output			Income		
Baseline	**FWS**	**Recreation**	**Agriculture**	**FWS**	**Recreation**	**Agriculture**
Wetland	16.52	17.95	-34.31	6.85	6.44	-7.42
Grassland	16.52	14.64	-26.19	6.85	5.25	-5.46
T&E	16.52	16.43	-32.41	6.85	5.89	-7.00
Hybrid	16.52	16.33	-27.70	6.85	5.86	-5.88
Scenario A	**FWS**	**Recreation**	**Agriculture**	**FWS**	**Recreation**	**Agriculture**
Wetland	16.52	8.97	-42.93	6.85	3.22	-9.28
Grassland	16.52	7.32	-33.61	6.85	2.63	-7.07
T&E	16.52	8.21	-40.58	6.85	2.95	-8.77
Hybrid	16.52	8.17	-35.12	6.85	2.93	-7.49
Scenario B	**FWS**	**Recreation**	**Agriculture**	**FWS**	**Recreation**	**Agriculture**
Wetland	16.52	33.03	-34.31	6.85	11.86	-7.42
Grassland	16.52	26.94	-26.19	6.85	9.67	-5.46
T&E	16.52	30.23	-32.41	6.85	10.84	-7.00
Hybrid	16.52	30.06	-27.70	6.85	10.79	-5.88

APPENDIX II

Frequently Asked Questions

FREQUENTLY ASKED QUESTIONS

1. Who is the U.S. Fish and Wildlife Service?

The U.S. Fish and Wildlife Service is the principal Federal agency responsible for conserving, protecting, and enhancing fish and wildlife and their habitats for the continuing benefit of the American people. The Service manages the 92-million-acre National Wildlife Refuge System comprised of more than 500 national wildlife refuges, thousands of small wetlands, and other special management areas. It also operates 66 national fish hatcheries and 78 ecological services field stations. The agency enforces Federal wildlife laws, administers the Endangered Species Act, manages migratory bird populations, restores nationally significant fisheries, conserves and restores wildlife habitat such as wetlands, and helps foreign governments with their 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 Kankakee River Basin 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 1.2 million acres of land and water on 46 national wildlife refuges and 9 wetland management districts, including more than 240,000 acres in waterfowl production areas. The Region also manages 6 national fish hatcheries, 9 fisheries stations, 10 ecological services field offices, and 18 law enforcement field offices.

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

Service programs and management actions are guided by the following goals:

√ *Sustainability of Fish and Wildlife Populations*: Migratory birds, endangered fish and wildlife species, interjurisdictional fish, and marine mammals are conserved, protected, enhanced, or restored. The Service is participating in conservation of other species when its expertise, facilities, or lands can enhance state, tribal, or local efforts.
√ *Habitat Conservation - 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's scientific expertise - fully support achievement of the Service mission.

2. What is the National Wildlife Refuge System?

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

Today, over 500 national wildlife refuges have been established from the Arctic Ocean to the South Pacific, from Maine to the Caribbean. Varying in size from half-acre parcels to thousands of square miles, they encompass more than 92 million acres of the Nation's best wildlife habitats.

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. But by far the most have been created to protect migratory 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 also play a vital role in preserving endangered and threatened species and their habitat. Among these are Aransas refuge in Texas, the winter home of the whooping crane; the Florida Panther refuge, which protects one of the Nation's most endangered mammals; and the Hawaiian Islands refuge, home of the Laysan duck, monk seal, and many other species.

National wildlife refuges offer the public a wide variety of recreational and educational opportunities. Many refuges have fishing and hunting programs, visitor centers, wildlife trails, and environmental education programs. Nationwide, some 34 million visitors annually hunt, fish, observe, and photograph wildlife or participate in interpretive activities on Service national wildlife refuges.

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.*

National Wildlife Refuge System goals include:

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

National Wildlife Refuge System guiding principles include:

√ *Habitat:* Fish and wildlife will not prosper without high quality habitat, and without fish and wildlife, traditional uses of refuges cannot be sustained. The Refuge System will continue to conserve and enhance the quality and diversity of fish and wildlife habitat within refuges.
√ *Public Use:* The Refuge System provides important opportunities for compatible wildlife-dependent recreational activities involving hunting, fishing, wildlife observation and photography, and environmental education and interpretation.
√ *Partnerships:* America's sportsmen and women were the first partners who insisted on protecting valuable wildlife habitat with wildlife refuges. Conservation partnerships with other Federal agencies, state agencies, tribes, organization, industry, and the general public can make significant contributions to the growth and management of the Refuge System.
√ *Public Involvement:* The public should be given full and open opportunity to participate in decisions regarding the acquisition and management of our national wildlife refuges.

The National Wildlife Refuge System is one of the most unique and unmatched collections of public land in the world. Many refuges are close to urban areas and almost every part of the country has a refuge nearby.

Here are just a few facts that make refuges interesting and unique.

☞ North Dakota has the most refuges, followed by California, then Florida.
☞ The Aleutian islands of Attu and Kiska in Alaska Maritime NWR were seized by Japan in World War II, the only U.S. lands controlled by a foreign power since the War of 1812.
☞ Oil found on Kenai NWR in 1957 gave impetus to Alaska statehood in 1959.
I☞ In 1935, Red Rock Lakes NWR (Montana) was created to save the last 73 endangered trumpeter swans known in the wild. Today, 16,000 of the majestic birds are found in Alaska, Montana, and the upper Midwest.
☞ One of the largest U.S. swamps, the 600 square mile Okefenokee NWR (Georgia) is also a National Wetlands Conservation Site and home to 15,000 alligators and carnivorous plants such as the hooded pitcher plant and golden trumpet.

3. Why locate a national wildlife refuge in the Kankakee River Basin?

A number of factors go into determining locations for new wildlife refuges. Generally, the Service looks at areas with significant wildlife values or the potential for restoration of significant wildlife values. In many cases a proposal is seeking to fill a void in habitat availability for a group of species of Federal interest, such as migratory birds or interjurisdictional fish, or for a single species, such as an endangered species.

The Kankakee River Basin has long been recognized for its wetland and wildlife values. Prior to nineteen hundred, the Basin contained one of the most ecologically important and largest wetland complexes in the nation. The Great Kankakee Swamp (also known as the Grand Marsh) contained more than one million acres of wet prairie and marshes. The area provided internationally-renowned habitat for migratory birds, resident game, and fish. However, by the early 1900's, the marsh had been almost entirely drained for agricultural production. Today, only a small fraction of the former wetlands remain and nearly all of the wet prairies have disappeared.

Such losses have not been confined to the Basin. Of the estimated 5,600,000 acres of wetlands that existed in Indiana prior to European settlement, a mere 13 percent remain, and few of these support the full array of plants and animals that existed in this habitat originally. Likewise, of the 8,212,000 acres of wetlands that existed in Illinois, only 15 percent remain.

Tallgrass prairie habitat once dominated the landscape from western Indiana to the eastern portions of Kansas, Nebraska, and North and South Dakota and south to Oklahoma and Texas. Today less than 1 percent of original tallgrass prairie remains in the Basin.

For years following the initial conversion of native Midwestern prairies, many prairie dependent wildlife populations remained relatively stable because of their ability to colonize agricultural grasslands. However, since the 1950's, the acreage of agricultural grasslands has significantly declined, and in many parts of the region, is at its lowest level in more than 100 years.

Consequently, grassland-dependent birds have shown steeper and geographically more widespread declines than any other group of North American birds. Breeding Bird Surveys for the Great Lakes-Big Rivers Region indicate that grassland nesting, non game species have shown significant average annual declines since the mid-1960's. Species experiencing declines include the grasshopper sparrow (-5.5 percent), dickcissel (-3.6 percent), bobolink (-3.3 percent), Henslow's sparrow (-7.6 percent), vesper sparrow (-1.7 percent), savannah sparrow (-1.1 percent), lark sparrow (-2.7 percent), field sparrow (-3.0 percent), eastern meadowlark (-2.9 percent) western meadowlark (-4.0 percent), and American bittern (-7.5 percent).

Fortunately, the Basin still provides some outstanding remnants and restorable habitat for migratory birds. Reestablishment of riparian areas, wetlands, wet prairies, sedge meadows, and associated grasslands would create habitats essential for many nesting and migrating songbirds, and contribute to the long-term recovery of some neotropical migrant populations. Particularly large wetland complexes with interspersed grassy uplands are vital to the survival of many of these species. Wet prairies and sedge meadows are particularly important as they provide an important early source of insects and other invertebrates for many grassland birds. These areas also tend to stay moist longer into the summer, thus prolonging insect and invertebrate availability.

The Basin also provides important habitat for several federally endangered and threatened species, such as the Mitchell's Satyr butterfly, Indiana bat, copperbelly watersnake, Mead's milkweed, and eastern prairie-fringed orchid. Unfortunately, many of these habitats are threatened by air and water pollution, exotic species, and particularly habitat fragmentation caused by development. The area also has great potential for meeting other Service objectives, such as providing high quality environmental education and recreation opportunities to the public.

4. How and when did this project get its start?

The Service has long been aware of the tremendous natural resource value of the Basin. Numerous Federal, state, local, and private entities provide background and framework for the Service's proposed action. These include the North American Waterfowl Management Plan, the National Wetlands Priority Conservation Plan, the Kankakee River Master Plan, the Service's Regional Wetlands Concept Plan and Unique Ecosystems Plan, the Service's Ecosystem Plan for the Upper Mississippi River, ongoing planning efforts of the U.S. Army Corps of Engineers (COE), and comprehensive planning efforts of Kankakee County, Illinois, just to name a few.

In 1996, the Service initiated a formal planning process aimed at evaluating the feasibility of developing a new national wildlife refuge in the Basin. The process has included a thorough review of opportunities and issues related to fish and wildlife resource management by the Service in the Basin, as well as an assessment of roles the Service might take in achieving its mission, the mission of the National Wildlife Refuge System, and goals established for the region. The planning process was initiated in response to the declining status of numerous Service trust resources in the Basin and studies indicating that habitat loss and degradation are common causal factors in those declines.

Following is a general outline of that planning process:

1996 - The Service developed a Preliminary Project Proposal seeking the Director's approval to initiate a refuge planning project in the Kankakee River Basin.

1997 - Assembled planning team, determined the scope of the planning effort, developed project goals, designed a process and schedule for the project.

1997-1998 - Identified opportunities and issues through public involvement, gathered and analyzed information, developed Conceptual Management Plan.

1998 - Published Draft Environmental Assessment and Conceptual Management Plan.

1999 - Publish final Environmental Assessment and Conceptual Management Plan. (July-August of 1999).

1999-2001 - Initiate detailed planning or close project.

5. How did the Service involve the public when developing the draft and final environmental assessments for this project?

Public participation is a vital part of refuge planning and the Service has worked hard to ensure inclusive public participation in this proposal. Numerous Federal, state, local, and private entities were involved in the DEA development process. These include Indiana's and Illinois' Congressional Delegations, the U.S. Department of Agriculture, U.S. Department of Interior, Indiana and Illinois Legislative members representing the counties involved, Indiana Department of Natural Resources, Illinois Department of Natural Resources, representatives from County, Township, and other local governments, representatives of national, state, and local conservation organizations, Farm Bureau, landowners, and many other interested groups and citizens.

Information about the project was provided to stakeholders and the general public through news releases, presentations, interviews, informational letters, public meetings, briefings, and the Internet. Questionnaires, focus groups, and one-on-one discussions were used to gather input. More than 5,000 DEA's were distributed for public review and comment. DEA's were available for viewing in all public libraries throughout the Basin and also on the Internet.

In June 1997, the Service hosted three public scoping meetings in Knox and Enos, Indiana, and Bradley, Illinois, to exchange information on the refuge proposal. Informational meetings continued over the next six months at the request of the general public, government agencies, conservation organizations, and Congressional staff.

In March 1998, the Service issued a Draft Environmental Assessment (DEA) which described the possible environmental consequences that development of the Refuge by the Service could have on the quality of the physical, biological, and human environment.

On May 26 and 27, 1998, the Service held public hearings in Wheatfield, Indiana, and Kankakee, Illinois, to encourage additional public comment. Approximately 600 people attended the Wheatfield meeting and approximately 60 attended the meeting in Kankakee.

The 150-day comment period on the DEA closed on August 20, 1998.

Comments on this proposal have covered a wide range of opportunities and concerns. Many comments encouraged the development of a new national wildlife refuge, while others cited potential conflicts that would need to be addressed before the proposal moved forward. To date, more than 14,000 people from 44 states have inquired and/or commented on the refuge proposal.

6. The proposed refuge would be "scattered within the 3.3-million acre Kankakee River Basin." How much and what type of habitat does the Service intend to restore and preserve as part of the Refuge?

This proposal would restore and preserve thirty thousand acres (less than 1 percent of the land in the Basin). The types of land the Service would consider include oak savannas, existing wetlands, bottomland agricultural areas with hydric soils that could be restored to wetlands, and native tallgrass prairies.

7. The Draft Environmental Assessment identified 14 focus areas in Illinois and Indiana. What are "focus areas?"

Focus areas are locations where the Service would initially concentrate detailed planning (conduct biological assessments, surveys, hydrologic studies) if the Refuge proposal is approved for development. Focus areas are the first cut in a planning process aimed at narrowing down high potential geographic

areas with significant resource value in the Great Lakes-Big Rivers Region, ie. ⇨ Kankakee River Basin ⇨ focus area ⇨ individual refuge units. However, focus areas are not Refuge boundaries. Refuge boundaries would ultimately conform to individual land tracts as they are purchased from willing sellers within the focus areas.

8. What is the Service's policy toward land acquisition?

The 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-oriented 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 (control of all property rights) only if control of lesser property interests (such as conservation easements, leases, or cooperative agreements) will not achieve objectives. The Service land acquisition policy is to purchase land from willing sellers only. Written offers to willing sellers are based on professional appraisals using recent sales of comparable properties in the area. Additional information on Service land acquisition can be found on the Internet at: http://www.fws.gov/r9realty/

9. What criteria would the Service use when selecting lands for refuge status?

Apart from biological criteria, the presence of willing sellers is the most basic criterion in selecting land. Other criteria will include:

1. Large tracts of 1,000 acres or more; smaller tracts would be considered given the presence of outstanding biological characteristics.
2. Tracts that require minimal management and development cost and low annual operation and maintenance costs.
3. Tracts enrolled in the Conservation Reserve Program, Conservation Reserve Enhancement Program, or Wetland Reserve Program.
4. Lands that have the capacity to provide flood relief along with providing fish and wildlife benefits.

10. Can the Service estimate the "ideal" composition of the Refuge once it is complete?

Intuitively the "ideal" composition of Refuge habitats would be those that possess all the attendant functional values and attributes of the Kankakee River ecosystem prior to human disturbance. Unfortunately, conservation biology is not an exact science, and to provide an exact formula for this at this time would be an educated guess. We do know that restoration and preservation of ecosystem values and attributes require increased management actions to mitigate or reverse the effects of human-induced influences such as fire suppression, hydrologic cycle maintenance, exotic species, development, and infrastructure. By working with our partners in the Basin, the Service could provide a comprehensive and coordinated approach to ecosystem restoration by complementing existing conservation efforts.

11. Where does funding for land acquisition for wildlife refuges come from?

Typically, money to acquire land for national wildlife refuges comes from the Land and Water Conservation Fund and/or the Migratory Bird Conservation Fund, both of which were established through Federal law. The Land and Water Conservation Fund derives its money primarily from the sale of products on Federal land, such as offshore oil and gas leases. Funds for the Migratory Bird Conservation Fund are derived from the sale of Federal duck stamps.

12. If I own land in one of the focus areas, would I ever be forced to sell?

No. Focus areas are not refuge boundaries. They are planning units. All habitat restoration and preservation by the Service would be on a voluntary basis (willing buyer/willing seller only) and only lands in which the Service acquires a realty interest would become part of the Refuge. Actual Refuge

boundaries would ultimately conform to specific land tracts as they are purchased from willing sellers within the focus areas. The Refuge is envisioned as a patchwork or checkerboard pattern of habitats comprising land parcels acquired from willing sellers within the focus areas. Neither specific acreages within each focus area nor the number of focus areas where land acquisition might occur have been determined. Lands identified in the focus areas are in private and public ownership. It is not the intent of the Service to acquire lands already in public ownership. Only the presence of willing sellers and only after detailed planning would lands be acquired for the Refuge.

13. If I own land in or around an area that the Service says has high resource value, will my property ever be condemned?

While the Service has this authority, it doesn't use it except to clear title or preserve critically imperiled endangered species (which are rare). The latter is not the case in with this project. Our record has shown that in almost 99 per cent of all transactions we have not used condemnation. In fact, we were directed by Congress to use it in one of the few cases on record. Service policy is to acquire land only from willing sellers. Landowners within the Basin would retain all of their rights, privileges, and responsibilities of private land ownership. The presence of Refuge lands in the Basin would not afford the Service any authority to impose restrictions on any private lands. Service control of access, land use practices, water management practices, hunting, fishing, and general use is limited only to those lands in which the Service purchases an appropriate realty interest.

14. Will my rights as a property owner be infringed as a result of refuge designation?

No. If lands are developed into a refuge area, the Service will have no more authority over private land within or adjacent to the boundaries of the refuge than any other landowner. Landowners within the Basin would retain all the rights, privileges, and responsibilities of private land ownership, including the right of access, control of trespass, right to sell, and payment of taxes.

15. If I sell my land to the Service, are there any relocation benefits?

Yes. The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended (Uniform Act) provides for certain relocation benefits to home owners, businesses, and farm operators who choose to sell and relocate as a result of Federal acquisition. The law provides for benefits to eligible owners and tenants in the following areas: 1) reimbursement of reasonable moving and related expenses; 2) replacement housing payments under certain conditions; 3) relocation assistance services to help locate replacement housing, farm, or business properties; and, 4) reimbursement of certain expenses incurred in selling real property to the government.

16. Are there ways the Service can acquire an interest in land without buying it outright?

Yes. One way is by purchasing an easement from the landowner. A conservation easement involves the acquisition of certain rights that can help achieve fish and wildlife habitat objectives (for instance, encouraging certain practices such as delaying haying fields until ground nesting birds have left the nest). Easements become part of the title to the property and are usually permanent. If a landowner sells the property, the easement continues as part of the title.

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

Cooperative agreements are negotiated between the Service and other government agencies, conservation groups, or individuals. An agreement usually specifies a particular management action or activity the landowner will do, or not do, with his or her property. For example, a simple agreement would be for the landowner to agree to delay hayland mowing until after a certain date to allow ground nesting birds to hatch their young. More comprehensive agreements are possible for such things as wetland or upland restoration, or public access. Agreements are strictly voluntary on the part of the landowner and are not legally binding. As long as a landowner abides by the terms of the agreement, this protection can be effective in meeting certain refuge objectives. Unfortunately, because these agreements are voluntary and can be modified by either party, there is no complete assurance the terms will continue to be met.

17. How will the creation of a wildlife refuge affect 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 lands located within the county. The monies for these payments come from two sources: (1) net receipts from the sale of products from National Wildlife Refuge System lands (oil and gas leases, timber sales, grazing fees, etc.) and (2) annual Congressional appropriations. Annual Congressional appropriations, as authorized by a 1978 amendment, were intended to make up the difference between the net receipts from the Refuge Revenue Sharing Fund and the total amount due to local units of government.

Payments to the counties are calculated based on the following formulas which provides the largest return to the counties: (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. Using this method, lands are reappraised every five years to reflect current market values.

In November and December of 1994, the Service canvassed all 141 counties in the eight-state area of Region 3 where refuge revenue sharing payments are made on National Wildlife Refuge System lands. The counties were asked to estimate the real estate taxes on these lands had they remained in private ownership. In Indiana, two of the three counties that receive refuge revenue sharing payments from the Service responded to the survey. In Illinois, eight of the 18 counties surveyed responded. Based on their estimates, the refuge revenue sharing payment at full entitlement for these two states is 164 percent (Indiana) and 99 percent (Illinois) of what taxes would be if the lands had remained in private ownership. It must be noted that revenue sharing payments are only made when lands are purchased in fee title. Less-than-fee purchases (such as conservation easements) remain in private ownership and thus are subject to taxation.

According to the Refuge Revenue Sharing Act which authorizes the Service to make these payments: "Each county which receives payments....shall distribute, under guidelines established by the Secretary, such payments on a proportional basis to those units of local government (including, but not limited to, school districts and the county itself in appropriate cases) which have incurred the loss or reduction in real property tax revenues by reason of existence of such area." In essence, the Act directs the counties or lowest unit of government that collects and distributes taxes to distribute refuge revenue sharing payments in the same proportion as it would for tax monies received.

18. Will drainage be changed in a way that affects my property?

The Service's intent is to have no impact on drainage from neighboring lands and to follow state laws regarding drainage activities. Service staff work with adjacent landowners and drainage districts to ensure that existing drainage facilities or patterns are not negatively impacted by refuge activity. If this project is approved, detailed hydrologic planning will be undertaken for all water-related activities on

Service lands to ensure that Service activities do not alter drainage in any way that would cause flooding or drainage problems to private lands. The Service would not cause any artificial increase of the natural level, width, or flow of waters without ensuring that the impact would be limited to lands in which the Service has acquired an appropriate realty interest from a willing seller (e.g., fee title ownership, flowage easement, cooperative agreement). The Service would comply with all Federal and state regulations regarding development, some of which are specifically intended to ensure that the actions of one landowner do not adversely affect another. If Service activities inadvertently created a water-related problem for any private landowner (flooding, soil saturation or deleterious increase in water table height, etc.), the problem would be corrected at the Service's expense.

Through the Service's Partner's for Wildlife program, the Service has restored over 10,000 wetlands in the Great Lakes - Big Rivers Region, which includes Indiana and Illinois. The expertise gained through this experience and by coordinating with partners like the North American Waterfowl Management Plan, the States Departments of Natural Resources, the Natural Resource Conservation Service, The Nature Conservancy, and others, will help us achieve the wetland goals of this Refuge and not adversely effect others.

19. Is there a potential for land devaluation as a result of having land located in a Service "focus area?"

Data from other Service projects reveals that during the course of acquiring land for developing refuges, the value of land within project boundaries, as well as lands adjacent to refuge boundaries, tends to increase over time. This is due in part to the increased demand created by other, outdoor-oriented buyers interested in owning lands adjacent to a national wildlife refuge because of their enhanced recreational value. Likewise, it seems logical that the presence of a guaranteed willing buyer (the Service) would reassure lending institutions considering a secured loan using land inside a project area as collateral.

20. If the Service acquires land in an active drainage district with an easement for maintenance of drainage, does that district retain the right of access for maintenance of drainage ditches, tile and outlets?

Yes. Like any landowner, the Service is subject to any outstanding rights (easements) on any of the land it acquires.

21. Has the Service ever challenged the authority of a drainage district to maintain or improve the drainage of agricultural lands adjoining a Refuge? If so, how was the issue resolved?

We are not aware of the Service ever challenging the authority of a drainage district to maintain or improve drainage of privately owned lands adjacent to units of the National Wildlife Refuge System.

22. Who has ultimate authority over the granting of Section 404 permits for drainage activities that may affect Service lands in a drainage district, the U.S. Fish and Wildlife Service or the Corps of Engineers?

The U.S. Army Corps of Engineers.

23. Who is responsible for controlling noxious weeds on refuge property?

The Service is responsible. The Service's policy is to control plants listed as noxious weeds by States. This control uses nonchemical methods when possible and chemical treatments when necessary to prevent noxious weeds from spreading to adjacent private land.

24. If private lands served by public roads become landlocked (surrounded by property acquired by the Service), are local governments under any obligation to continue maintenance?

Yes. However, if private lands are served by public roads, they are not considered "landlocked."

25. If the Service acquires land on both sides of a public road, will the Service close that road?

No. The Service has no authority to close roads or interfere with traffic or maintenance without township and county concurrence. Most of our refuges are overlaid by roads/highway easements without consequence. In fact, a refuge in New York is bisected by the New York State Thruway.

26. What is the Service's policy regarding crop damage resulting from increases in the wildlife population? Does the Service intend to make wildlife food plots part of its management plan?

The Service policy is to use tools such as hunting, lure crops, and habitat manipulation to assure that wildlife, particularly local Canada geese, do not cause depredation problems on neighboring farmland. While the development of wildlife food plots is not a primary objective of this Refuge, it does remain an option, depending on the site, type of wildlife, and type of food plot. Service policy is to use the most natural means available to meet wildlife objectives. If a localized depredation problem were to arise, the Service, working in concert with the USDA Animal Damage Control Division, would be available to assist in developing a damage abatement program specific to the problem.

27. Some people contend that the Service is destroying farmland when land is taken out of agricultural production and restored as wetlands, grasslands or other habitat; how do you respond?

Restoring wetlands, grasslands, and other natural habitats protects our Nation's long-term ability to produce food and fiber crops. Soil will rebuild itself when indigenous vegetative cover is restored. On the other hand, development can degrade soil and extensive commercial or dense residential development makes it very unlikely that the land will ever be restored to agricultural purposes in the future. If the Nation's lawmakers someday decide these areas are needed for agricultural production, it will be there.

28. Would the Service be required to act in accordance with the Federal Farmland Protection Policy Act as it develops this Refuge?

Yes. In compliance with this Act, the Service would implement the project in a manner that minimizes the extent to which the proposed refuge would contribute to the conversion of farmland to nonagricultural uses. Refuge programs would also be administered in a manner that, to the extent practical, would be compatible with state and local government, and private programs and policies to protect farmland. In addition, Form AD-1006, Farmland Conversion Impact Rating, would be completed for this project. This rating system evaluates the degree to which Federal projects impact farmland, and results in a score of 0 to 260. If a proposed action results in a score of 160 or less, USDA regulations require only a minimal level of consideration for protection to be provided to the site, and no additional sites need be evaluated.

29. Is a Federal refuge automatically closed to hunting, fishing and other recreational issues?

Not necessarily. The alternatives considered in refuge planning are mandated by Congress (Public Law 105-57, Oct. 9, 1997) to allow compatible wildlife-dependent recreational public uses such as hunting, fishing, wildlife observation and photography, environmental education and interpretation. Goals and objectives are identified for the refuge (with public input), and the specific public uses are determined

based on their consistency with the objectives established for the refuge. A refuge that serves as production areas for a federally endangered species is likely to offer less access for people during periods when the endangered species is present than at other times of the year. In Region 3, 88 percent of the refuges offer public recreational opportunities. Those that are closed include small islands or caves where endangered species or colonial nesting birds are present.

30. Is this proposal associated with the United Nations or any other multilateral institution in any way?

No. The Service is increasingly concerned about allegations that this refuge proposal is tied to the United Nations or some other multilateral institution. These allegations are false. Service programs are grounded in law and subject to the oversight of the United States Congress. The public can be assured that the United States has not and will not yield over sovereignty or control of any lands within the National Wildlife Refuge System to the United Nations or any other multilateral institution. Further, the United Nations does not have jurisdiction or authority to own or manage any U.S. property - private, county, state, or Federal.

31. What is the World Heritage List and a Biosphere Reserve?

The World Heritage List, based on a treaty of which the United States was the first signatory, contains sites that nations have voluntarily nominated as the most outstanding examples of their natural and cultural heritage, and which the nominating nations have pledged to conserve. At present, 506 properties worldwide are inscribed on the World Heritage List. The United States has placed 20 sites on the list. Some individuals believe that inclusion of lands in the World Heritage List somehow transfers U.S. sovereignty over these lands. This is just plain false. Biosphere Reserves conserve ecosystems of world-renowned importance, offering the world and local communities a chance to apply research and knowledge to developing sustainable human uses of natural resources.

World Heritage Sites and Biosphere Reserves have been embraced in many local areas as value-added designations. These designations have helped stimulate partnerships among Federal, state, and local governments, and private property owners for mutual benefit, and additionally have contributed to notable increases in international tourism, especially vital to rural economies. Biosphere Reserves and World Heritage recognition extends only to areas that already have legal protection. Recognition is a significant honor and participation is strictly voluntary and in no way overrides domestic law.

Our Nation's long-standing participation in these international conservation programs helps us to continue to maintain a leadership role in global environmental cooperation. Our partnerships also ensure that U.S. communities continue to benefit from these international designations and that our natural, cultural, and historic treasures receive the prestige and recognition they deserve.

32. Why is the Federal government involved in planning wildlife refuges? Why shouldn't states manage their own refuges?

The purpose of creating new refuges and expanding existing refuges is to preserve wildlife, plants and their habitat for the benefit of everyone. Wildlife and habitat simply do not conform to state boundaries, and neither does citizen investment in the Nation's natural resources. For example, preserving migratory waterfowl habitat requires a comprehensive approach because flight patterns for particular species can extend across the entire length of the country. Conservation practices in one state would be jeopardized or even nullified by lesser efforts in another state along the flight pattern. Citizenship, too, extends beyond state lines, and we all have an investment in preserving this country's unique or endangered species and habitats regardless of where we live. While state departments of natural resources are responsible for managing the bulk of wildlife and habitat issues, Federal involvement in refuge planning reflects this broader public interest.

33. Some people say the Federal government does not have authority to acquire land. Is this true?

No. The United States Constitution provides the following: "All legislative powers herein granted shall be vested in a Congress of the United States . . . " (Article 1, Section 1, Clause 1); and that, Congress shall have power, "to make all laws which shall be necessary and proper for carrying into execution the foregoing powers, and all other powers vested by this Constitution in the Government of the United States, or any Department or Officer thereof." (Article 1, Section 8, Clause 18). One of the first related laws passed by Congress was in 1820 and is cited in the U.S. Code of Federal Regulation (41 USC 14). It states: "No land shall be purchased on account of the United States except under a law authorizing such purchase."

The following Acts (laws) have been enacted to govern the conditions by which the Kankakee Refuge proposal has been conceived and will be administered: the Migratory Bird Conservation Act of 1929, the Fish and Wildlife Act of 1956, and the Emergency Wetlands Conservation Act of 1986.

Section 304 of the Emergency Wetlands Resources Act of 1986 (Public Law 99-645) specifically states "The Secretary is authorized to purchase wetlands or interests in wetlands, which are not acquired under the authority of the Migratory Bird Conservation Act of 1929."

The Service is mandated by the U.S. Congress to conserve, protect and restore migratory birds, threatened and endangered species and interjurisdictional fish. These are collectively referred to as Federal Trust Resources. A system of national wildlife refuges, beginning in 1903, exists today because of this national public interest.

34. Who will run the refuge if it is established?

It would be assigned its own staff and budget.

35. The Draft Environmental Assessment said that many remaining habitat fragments in the Basin are degrading from surrounding agricultural uses. How is that so?

A significant body of literature exists documenting the harmful effects of habitat fragmentation, defined as small, isolated patches of habitat in an agricultural or other altered matrix. These effects include: change in microclimate; increased susceptibility to aggressive exotic species, the inability of natural processes (e.g., fire) to function; the isolation of populations, leaving them vulnerable to stochastic extinction; genetic problems associated with small, isolated populations; increased susceptibility to predators and parasites; and the simple absence of sufficient space to meet life requisites. With this in mind, some agricultural uses could provide benefits in the Basin. In particular, pasture or hay ground, if managed with wildlife as one consideration, could provide an excellent buffer between more intense land uses and habitat for some species.

The relationship between breeding waterfowl and wetlands is one example. Breeding waterfowl are highly dependent on invertebrate foods, and the availability of these foods varies among wetland types. Shallow, eutrophic, seasonal and semipermanent wetlands are dependable recyclers of nutrients that support an available and abundant high-protein food source for many breeding waterfowl. However, food availability in wetlands is typically influenced by environmental conditions and adjacent land use activities. Seasonal wetlands adjacent to undisturbed cover typically contain a higher number of invertebrates, while wetlands adjacent to summer fallow contain lower numbers of invertebrates.

36. Is wetland loss a serious threat in the region?

Yes. The most recent Service statistics indicate that while net loss has slowed, in part because of enforcement of section 404 of the Clean Water Act and the 1985 Farm Bill's Swampbuster and other

wetland provisions, wetlands continue to be lost. The Service report to Congress, "Status and Trends of Wetlands in the Conterminous United States: Projected Trends 1985 to 1995," indicates wetland losses have dropped 60 percent from the previous decade. The report estimates that we continue to lose 117,000 acres of wetlands per year with 79 percent of the loss in the lower 48 states. The most common reason is conversion of land to agriculture.
In the State of Indiana, about 1 to 3 percent of the remaining wetlands are lost each year, primarily due to drainage for agricultural purposes (Indiana Division of Fish and Wildlife, written communication, 1993).

37. Does the Service recognize that existing land uses in the Basin make a significant contribution to local economies and have international significance as agricultural products from the area are shipped overseas?

Yes. The Service recognizes the important contribution of agriculture in the Kankakee River Basin. We feel strongly that agriculture and the proposed Refuge must co-exist. With that in mind, we ask that people recognize the precarious position of fish and wildlife habitat in the watershed: 85 percent - 90 percent loss of wetlands, greater than 99 percent loss of oak savannas, greater than 99 percent loss of native prairie, numerous state and at least two federally endangered species. We suggest that a compromise that will ultimately enrich the quality of life of the residents of both Illinois and Indiana is in the best interest of the citizens of both states.

Agriculture is an essential land use for our country and the world. The successes of agriculture have benefitted all of us. As this Nation's primary fish and wildlife conservation agency, however, we feel that it is important now to provide an additional option to landowners in the Basin. The accumulative tools that local, state, and Federal governments, as well as private organizations, can provide to protect and restore the resources of Kankakee River Basin, including farmland, ultimately improves the chances that this resource will not be jeopardized by development. We believe that this is being mindful of the future needs of all citizens without compromising individual property rights.

38. Does the Service recognize farmland as an ecosystem of importance in the Kankakee Basin?

Yes. The Service does recognize the importance of agricultural ecosystems in the Basin. Nevertheless, agricultural ecosystems, particularly modern, intensively farmed ecosystems, generally do not in themselves provide for the life requisites of native fauna. Land in intensive row-crop agriculture obviously eliminates native plants and therefore significantly reduces the overall biological diversity of an area. Moreover, basins like the Kankakee, where intensive agriculture dominates the landscape, tend to lack area-sensitive, large, and wide-ranging animals. From a regional perspective, extensive row-crop agricultural eliminates, limits the size, and disrupts the connectivity of natural ecosystems. The best available science suggests that human actions have and continue to precipitate drastic changes in biological diversity. The Service recognizes an opportunity with the proposed Refuge to work with landowners in an agricultural landscape to protect and restore biological diversity. We remain especially concerned in the Basin, in fact, with a second generation change from agricultural ecosystems to a landscape dominated by even more intensive uses (strip malls, subdivision, etc.) where that opportunity may be lost forever.

39. Is the Service aware of any studies that compare the capability of various land uses to absorb and store flood waters?

Yes. A number of studies have evaluated the flood water absorption and storage capabilities. In conjunction with the State of North Dakota, the Service evaluated the storage capacity of wetlands in the 2.4-million acre Devils Lake watershed in a 1983 study entitled "Water Storage Capacity of Natural Wetland Depressions in the Devils Lake Basin of North Dakota" (authors included Albert Ludden, D.

Frink and D. Johnson). That study found that wetland depressions contain 72 percent of a two-year frequency runoff and 41 percent of a 100-year runoff. In 1993, a report by Misganaw Demissie and Abdul Khan entitled "Influence of Wetlands on Stream Flow in Illinois," described the mechanism by which wetlands affect stream flows. They found that across Illinois, peak flow decreases as the percentage of the wetland area within the watershed increases. They further concluded that this reduction was more pronounced in northern and central Illinois. Like the authors of the Devils Lake watershed study, Demissie and Khan found that flood flow volumes decrease as the percentage of watershed area increases. In a similar vein, a study by Ogawa and Male in 1983, "Flood Mitigation Potential of Inland Wetlands of the Charles River Watershed in Massachusetts," identified the importance of floodplain wetlands (particularly downstream wetlands) to peak flow.

While this is not a direct comparison, the information is relevant to the proposed Grand Kankakee Marsh National Wildlife Refuge. The predominate land use in northern and central Illinois is agriculture (an average of 91.5 percent in Kankakee and Iroquois Counties), and the results of these studies suggest that increasing wetlands would be the logical approach to decreasing flood flows.

40. If the Service acquires land in an active drainage district with an easement for maintenance of drainage, does that district retain the right of access for maintenance of drainage ditches, tiles, and outlets?

Yes. The Service is subject to any outstanding rights on any of the lands it acquires.

41. How does the Environmental Assessment and Concept Management Plan for the proposed Refuge specifically address flood control associated with the Kankakee River?

As far as "conceptually" how would the Refuge contribute to flood control efforts in the Kankakee River Basin.....restored wetlands within the river's watershed would help moderate the discharge of water to the river (volume and timing). As more rooftops, roads, and other impermeable surfaces are built in the Basin, more water is being "shed" to the river at a faster rate. Wetlands help store water on the land. As the density or percentage of wetlands increase in the watershed, the peak flow and flood flow volume would be expected to decrease and low flows increase. According to a recent study in Illinois, an increase of one percent of wetlands in a watershed decreases the peak flow to average precipitation ratio an average of 3.7 percent, flood flow decreases 1.4 percent, and low flow increases 7.9 percent. Wetlands also affect the quality of the water by storing nutrients, reducing sediment loads, and reducing erosion. Restored tallgrass prairie would also keep more water on the land.

If the Refuge is established, the Service will work toward achieving flood control goals of cooperating organizations within the scope of our mission and that of the National Wildlife Refuge System.

42. What is environmental justice and how does it relate to this refuge proposal?

Environmental justice refers to the principle that all citizens and communities are entitled to: (a) equal protection from environmental and occupational health or safety hazards, (b) equal access to natural resources, and (c) equal participation in the environmental and natural resource policy formulation process.

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

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

Conservation of fish and wildlife and their habitats also provides opportunities for Americans to encounter their natural national heritage. The role of the national wildlife refuge system has evolved beyond protecting waterfowl to providing recreational and educational experiences as well. National wildlife refuges enrich people in a great variety of ways and these benefits should be equitably distributed among all segments of society.

Although many social or experiential benefits of refuges are not easily quantified, it can be demonstrated that recreational visits to national wildlife refuges generate substantial economic activity. In 1997, the Service initiated a multi-phase study to determine the impact of national wildlife refuges on their surrounding local economies. Eco-tourism refers to the relatively recent phenomenon where approximately 30,000,000 people visit refuges annually. Eco-tourism is one way to derive economic benefits from the conservation of fish and wildlife habitat. Non-resident refuge visitors pay for food, lodging, fuel, and other purchases from local businesses to pursue their recreational experience, thereby generating substantial local economic activity.

43. Can the Service and the U.S. Army Corps of Engineers work together on flood control and ecosystem restoration?

Yes. On April 16, 1999, the Service and U.S. Army Corps of Engineers signed an interagency partnership agreement to work together on refuge planning and flood control through ecosystem restoration activities within the Basin. The agreement will help the agencies consolidate resources focused on finding ways to reduce flood damage to property and natural resources, preserve ecosystem structure and function, and the protect prime farmland soils in the Basin. The Corps and the Service agree that sharing staff and information will better serve the needs of local communities and agricultural interests. Besides being fiscally smart, the combined resources of both agencies will help eliminate the duplication of effort in each agencies respective planning processes. The Refuge Comprehensive Conservation Plan and the Corps feasibility study should begin this spring and proceed on a parallel track with numerous public meetings to help identify appropriate management strategies.

44. What happens next if a national wildlife refuge is ultimately approved?

Once a refuge is approved, a management team (which includes local citizens) will develop a Comprehensive Conservation Plan, or CCP. The CCP will determine specific management direction necessary to meet Service objectives for the Basin. With community input, the CCP will establish refuge goals and objectives, and specific management strategies for achieving those goals and objectives. Specific issues, such as cleaning up a contaminated area, the presence of an endangered species, where and how much land would the Service acquire, or managing an overabundant deer herd, would be addressed in the CCP.

45. If the refuge is developed, is the planning process the only opportunity I will have to provide input into what goes on at the refuge?

No. Community involvement is important in refuge planning and refuge management. The Service encourages public participation in developing new refuges as well as detailed management plans for individual refuge units. Many refuges have citizen or "friends" groups that support the refuge through actively participating in refuge activities and operations.

46. How can I find out more about the National Wildlife Refuge System?

You can request information by writing to us at: U.S. Fish and Wildlife Service, Ascertainment and Planning, 1 Federal Drive, Ft. Snelling, MN 55111. You can call us at 1- 800-247-1247. If you have access to the Internet, you can read about us at: http://bluegoose.arw.rq.fws.gov
or at: http://www.fws.gov

47. What is the willing buyer/willing seller policy?

This project is framed by the policy of purchasing lands from willing sellers only. Landowners choosing not to sell would retain all the rights, privileges and obligations of land ownership. Service management activities, such as bottomland forest restoration, moist soil management, wetland enhancement, would be carried out in a manner so as not to negatively impact private property. No one would be forced into willing seller status. The Service recognizes this policy will greatly extend the time frame for acquisition and Project completion. However, based on past landowner surveys and recent local contacts, land availability from willing sellers within the proposed Project area already exceeds the initial acquisition funds anticipated by the Service.

48. What opportunities will their be for public use on the refuge?

Approximately 98 percent of the land in the National Wildlife Refuge System is open to the public. National Wildlife Refuges provide outdoor recreation for nearly 30 million people each year, pumping billions of dollars into local economies: 21 million visit for wildlife observation, 1.4 million to hunt, 5 million to fish, 334,768 for environmental education, and others just to experience nature. Nationally, 287 refuges have hunting programs and 293 have fishing programs. The proposed Grand Kankakee Marsh National Wildlife Refuge would provide opportunities for wildlife-dependent recreational activities involving hunting, fishing, wildlife observation and photography, and environmental education and interpretation.

49. What will the Service do about noxious weeds?

The Service, as is the case with any landowner, is responsible for controlling plant species that the state or local government has designated as noxious weeds. Efforts to control noxious weeds are ongoing at many Service properties across the country.

50. What if there is wildlife crop depredation?

The Service does not anticipate a wide-spread increase in the incidence of crop depredation resulting from project development. In the event of a localized depredation problem, Service biologists, as well as personnel from USDA's Animal Damage Control Division would be available to assist any landowner develop a damage abatement program.

APPENDIX III

U.S. Fish and Wildlife Service/
U.S. Army Corps of Engineers
Cooperative Partnership Agreement

INTERGOVERNMENTAL PARTNERSHIP AGREEMENT
between the
DEPARTMENT OF THE ARMY
and the
DEPARTMENT OF THE INTERIOR

THIS AGREEMENT is entered into this 16 day of April, 1999 between the Department of the Army, by and through the U.S. Army Corps of Engineers (hereinafter referred to as the "Corps") represented by the District Engineer, Chicago District and the Department of Interior, acting by and through the U.S. Fish and Wildlife Service (hereinafter referred to as the "Service") represented by the Regional Director.

WITNESSTH THAT:

WHEREAS, under the authority of the Rivers and Harbors Act of 1899, 33 U.S.C.§401 et. seq., the Clean Water Act of 1977, as amended, and the Commerce Clause of the United States Constitution, the Corps has primary jurisdiction over all navigable waters of the United States; and,

WHEREAS, under the authority of the U.S. House of Representatives Resolution 4886 and 33 U.S.C. 542 the Corps has initiated a multi-year feasibility study seeking various management alternatives to identify and evaluate measures to comprehensively integrate flood damage reduction and ecosystem restoration within the Kankakee River Basin; and,

WHEREAS, under the authority of the Migratory Bird Conservation Act of 1929, the Fish and Wildlife Act of 1956, the Endangered Species Act of 1973, and the Emergency Wetlands Act of 1986 the Service is the primary federal agency responsible for conserving, protecting, and enhancing America's fish and wildlife resources and their habitats; and,

WHEREAS, under the authority of the National Wildlife Refuge System Improvement Act of 1997 the Service has initiated a multi-year planning process to develop the Grand Kankakee Marsh National Wildlife Refuge; and,

WHEREAS, under the authority of the Fish and Wildlife Coordination Act of 1956, 16 U.S.C. §661 et seq., the Corps and Service desire to enter into this Agreement to promote cooperation and coordination between the parties as they pursue their individual project goals; and,

WHEREAS, both parties are interested in planning for the restoration, preservation, and protection of wetlands and aquatic ecosystems within the Kankakee River Basin; and,

WHEREAS, both parties are interested in increasing the quantity, quality, and diversity of habitats and species within the Kankakee River Basin; and,

WHEREAS both parties are interested in providing the public with additional high quality recreation and environmental education opportunities in the Kankakee River Basin; and,

NOW, THEREFORE, the Corps and the Service agree as follows:

SCOPE OF COOPERATION

A. The Corps and Service shall work, in partnership to develop a comprehensive plan of action that is consistent with reducing flood damage in the Kankakee River Basin and restoring and preserving Service Trust Resources in the Kankakee River Basin.

B. In order to closely coordinate and integrate the goals of the two agencies, the Corps and the Service shall utilize a mutual time line (Exhibit A) tracking the parties joint planning efforts and agree that a staff member will be designated by each agency to participate as an active member of each respective agencies core planning teams. These designated representatives of each agency will participate in the scoping process: plan formulation and analyses, meetings, reviews and other agreement related activities. In addition to the team member's internal review, draft documents of each agency's study will be provided to the other agency for review and comment before being released to the news media or members of Congress. The cost of the individual agencies external review and personnel participation in the team process shall be born by that agency.

SCOPE OF RESPONSIBILTIES

A. The Corps shall be responsible for:

1 The formulation and implementation of plans to reduce flood damage to property, infrastructure, agricultural crops and natural resources with the Kankakee River Basin.

2. Providing a role model for future flood damage reduction projects that concurrently provide flood damage reduction and prevention as well as natural resource benefits.

3. Coordinating and consulting with the Service on impacts to aquatic and terrestrial resources, federally protected species and habitat located within the Kankakee River Basin.

B. The Service shall be responsible for:

1. The formulation and implementation of a comprehensive conservation plan that would:

(a) restore, and enhance all species of animals and plants that are endangered or threatened with becoming endangered.

(b) restore and preserve a natural diversity and abundance of flora and fauna
(c) perpetuate migratory bird resources; and
(d) provide the public with high quality wildlife dependent recreational and educational opportunities, within the Kankakee River Basin.

2. The administration and maintenance of lands and waters designated as the Grand Kankakee Marsh National Wetland Refuge in ways that would not alter drainage patterns that would cause flooding to private lands.

NOTICE:

A. Any notice, request, demand, or other communication required or permitted to be given under this Agreement shall be deemed to have been duly given if in writing and either delivered personally or by telegram or mailed first-class, registered, or certified mail, as follows:

For the Corps:

District Engineer
U.S. Army Corps of Engineers
Chicago District
111 North Canal Street
Chicago, Illinois 60606-7206

For the Service:
Project Manager
Kankakee National Wildlife Refuge
8588 Rt. 148
Marion, IL 62959

B. A party may change the address to which such communications are to be directed by giving written notice to the other party in the manner provided in this Article.

C. Any notice, request, demand, or other communication made pursuant to this Article shall be deemed to have been received by the addressee at the earlier of such time as it actually received or seven calendar days after it is mailed.

TRANSFER OF FUNDS AND FINAL AUDIT

In the event that the parties to this Agreement determine that funds should be transferred between the parties, prior to any such funds transfer the parties shall determine that there exists a statutory basis permitting the transfer. Any such funds transfer shall use the appropriate interagency procedures. In the event that funds are

transferred between the parties to this Agreement a final audit shall be conducted not later than thirty (30) calendar days after the termination of this Agreement. The Corps and the Service shall develop procedures, in accordance with federal law and regulation, for keeping books, record, documents, and other evidence pertaining to costs and expenses incurred pursuant to this Agreement.

MODIFICATION AND TERMINATION

The parties to this Agreement shall, by mutual consent, be able to modify this Agreement upon thirty (30) days written notice. This Agreement shall continue in existence until terminated by either the Corps or the Service upon thirty (30) days written notice to the other party. In the event either party elect to terminate this Agreement both parties shall conclude their activities relating to this Agreement and proceed to a final accounting in accordance with this Agreement.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement, which shall become effective upon the date when both the District Engineer and the Regional Director have signed said Agreement.

BY: _____
PETER J. ROWAN, P.E.
District Engineer
United States Army Corps of Engineers
Chicago District

DATE: 16 APR 99

BY: _____
JOHN A. BLANKENSHIP
Assistant Regional Director
United States Department of the Interior
U.S. Fish and Wildlife Service

DATE: 4/16/99

APPENDIX IV

Chronology of Events on the Kankakee River

CHRONOLOGY OF EVENTS

Kankakee—Pottowatomi – Ti-yar-ac-ke – "Wonderful land" or "Slow river flowing through a wide marsh"

1679 De LaSalle, Tonti, and Father Hennepin went down the Kankakee River arriving at the mouth where it flows into the Illinois River in January, 1680.

1830's Major floods occurred

1850's Major floods occurred

1850 Congress passed "An act to enable the State of Arkansas and other states to reclaim the swamp lands within their limits."

1852 Illinois General Assembly passed "An act to dispose of the swamp and overflowed lands and to pay the expenses of selecting and surveying the same."

1853 The State of Indiana funded one of the first organized efforts to drain the Beaver Lake—with little effect.

1854 March 1: The title of the swamp lands lying in Kankakee County were vested in that county upon payment of any expenses Iroquois County and Will County had incurred in selecting the same, ...authorized the Auditor of the State to patent such lands to Kankakee County. William C. Richards was on April 27, 1854, appointed Drainage Commissioner. Honorable Orson Beebe was appointed Swamp Land Agent.

1860's Major floods occurred

1860 The Illinois Central Railroad tried to drain portions of the marsh and swamp land - also with minimal effect.

1870's Ice harvesting – 60,000 tons per year.

1871 Kankakee and Iroquois Navigation and Manufacturing Company was formed to build dams and locks for boat traffic.

1878 U.S. Army Corps of Engineers conducted their first study of the River. In 1880, Major Jared A. Smith filed a report to the House of Representatives. Smith makes two points worth noting:
1) He stated that the water was so clear that he was able to see fish swimming in the stream, as well as minute objects on the bottom to a depth of 5 feet.
2) He also commented that although the "rock ledge" near Momence was considered "a great obstacle to the drainage of the lands in Indiana," he believed that due to the greater than average slope of the river for several miles above the rock ledge, the removal of this ledge "would accomplish little or nothing for the drainage of lands so far above..."(This was the first time the "rock ledge" term is used and it has lead to serious misconceptions that has driven much debate over drainage of the Kankakee Swamp. Many have the impression that the "ledge" is a single obstruction, like a dam. The "rock ledge" is actually a 4 mile reach of the river where the water is flowing over natural bedrock.)

1880 "Hunter's Paradise" - Presidents Grover Cleveland and Theodore Roosevelt hunted there and Sportsmen's Clubs from New York, Boston, Philadelphia, Washington, and Chicago built hunting lodges there for their wealthy members. Tens of thousands of waterfowl and other wildlife were harvested by market hunters to be shipped to Chicago and New York.

1880's Legislation to create drainage districts was passed and the invention of the "stream dredge" paved the way for draining the Grand Kankakee Marsh.

1882 The Indiana Legislature directed Professor John L. Campbell to survey the Kankakee Valley from its source to Momence to determine an effective method of draining the marsh/swamp land. In his report to the House of Representatives in 1916, Campbell made three suggestions:
1) Construct a better main channel for the flow of the river.
2) Straighten and deepen the tributary stream beds that flow into the main channel.
3) Dig a large number of lateral ditches through the marshes and swamps to empty into the improved channels.

1886 Singleton Ditch became one of the first to be constructed under the new drainage authority. Ackerman, Hayden and Brown ditches were also built around this time. Still, these actions were only partially successful in draining the marsh and swamps.

1890's Major floods occurred

1893 The State of Indiana, still convinced that the rock ledge near Momence was the key to their drainage problems, appropriated $65,000 (between 1889-1891) to widen and deepen the channel near Momence. The work was done in 1893 and 66,447 cubic feet of rock was removed.

1906 Encouraged by the work done on "The Momence Rock Ledge", channelization of the upper reaches of the river in Indiana began in earnest. By 1906, 46 miles of the main channel from South Bend to Starke County was straightened. This work was done by private landowners, Kankakee Improvement Company and the Kankakee River Reclamation Company.
But the flooding problem was still not solved. The increased rate of runoff from the straightened reaches caused erosion and flooding down stream. The apparent solution was to continue the straightening of the river and remove more of the rock ledge at Momence (an effort Illinois refused to agree to).

1916 The U.S. Army Corps of Engineers reported to the House of Representatives that..."the work done on the upper portion of the Kankakee River failed to accomplish the goals adequately and it created some new problems downstream...the improved channel increased the rate of runoff so as to cause problems of increased discharge and flooding downstream of the drainage works...."
The report concluded that the cooperation of the federal government in planned improvements of the Kankakee River for drainage and flood protection could not be justified in terms of benefits to navigation.

1918 Completion of the channelization to the Illinois State line. The old 250 mile meandering river channel had been replaced by a straight, deep, short (82 mile long) drainage ditch. This project affected 400,000 acres of swamp and marshland, 600,000 acres of marginal land at a cost of $1.2 million.

1927 Continued flooding brought renewed attention to the "rock ledge" at Momence. The Yellowhead Drainage District removed boulders there, but this was the only work done on the main channel.

1931 U.S. Army Corps of Engineers were asked to assess the benefits of any additional work on the river for improving navigation, flood control, power development, and irrigation. As in the 1916 Corps' report, this report concluded that the federal government could not justify its involvement in terms of making improvements to benefit the areas reviewed.

1934 The Isaack Walton League passed a resolution to restore the Kankakee River.

1941 The Corps of Engineers conducted a study to review the improvements that would be necessary to control flooding along the Kankakee River. The improvements assessed included:
1) Lowering the rock ledge at Momence.
2) Constructing a moveable dam to maintain low flow levels.
3) Cleaning the river of sand bars, opening the outlets of sloughs, and enlarging and straightening portions of the river from Momence to the state line. The Corps analysis concluded that these proposed improvements should not be done, because the cost far exceeded any possible benefit.

1947 The Illinois Department of Transportation, Division of Water Resources, investigated the possibility of replacing the collapsed dam at Aroma Park to restore the recreational channel up to Momence. This plan was not acted upon.

1967 Illinois Department of Public Works and Buildings, Division of Waterways, published a report on the Kankakee River Basin that suggested:
1) The rock ledge at Momence be lowered, and
2) A lock and dam be constructed at the confluence of Yellowhead-Singleton Ditch.
The report also stated that the channel work could not be economically justified for the sole purpose of improving drainage and flood control.
Conservation and environmental groups strongly objected to these proposals, and the project was subsequently dropped.

1976 The Indiana DNR and U.S. Soil Conservation Service published a report on the Kankakee River Basin. The report identified problems and needs of the basin, including land use and management for agriculture, flooding, soil erosion, adequate drainage systems, recreational opportunities, protection and maintenance of natural water areas and prime wetlands. The estimated cost to implement - $124,739,000 (1976 dollars).

1977 In response to continued flooding, the Indiana General Assembly created a 24 member Kankakee River Basin Commission (KRBC) to coordinate a comprehensive development plan for the basin. Illinois, in response to public concern over what the Indiana Basin Commission may want to do to the river, formed the Illinois Kankakee River Basin Task Force in June, 1977. This Task Force recommended that the State of Illinois..."maintain the Kankakee River as a low density recreation and scenic river...by keeping it...in the most natural condition possible..."

1979 Major floods occur. The Kankakee River Basin Commission initiated a project for channel and levee improvements in and along the Kankakee River in Indiana.

1983 The project was stopped after a lawsuit was filed by the state of Illinois against the Army Corps of Engineers and the Kankakee River Basin Commission. Judgement on the Illinois lawsuit required federal permits from the Army Corps of Engineers for improvements on the Kankakee River under section 10 of the River and Harbors Act and section 404 of the Clean Water Act. The KRBC applied for and was denied a permit to clear and snag the river. The stated reason was that the environmental damage would outweigh any flood protection benefits.

1980's Illinois State Water Survey published a series of reports on the hydrology, hydraulics, flow, and sediment transport in the Kankakee River in Illinois.

1983 The KRBC adopted a new set of guidelines entitled "The Kankakee River in Indiana-A Program for the Future." There are five guidelines stated in the resolution that must be accepted by all interests in the basin before any action can take place.

1985 The USDA: Economic Research Service, Soil Conservation Service, U.S. Forest Service; Soil and Water Conservation Districts, Indiana Soil and Water Conservation Committee, Kankakee River Basin Commission, and Ill. Department of Agriculture prepared a special report for land treatment in the Kankakee River Basin.

1989 SEG Engineers and Consultants prepares Kankakee River Master Plan-A guide for flood control and land use alternatives in Indiana. Estimated cost to implement.....$101,013,882.

1992 Kankakee County Board approves a Comprehensive Land Use Plan that includes the creation of a proposed Kankakee River National Park.

1996 The U.S. Fish and Wildlife Service prepares a Preliminary Project Proposal proposing to evaluate the feasibility of developing a new national wildlife refuge in the Kankakee River Basin in Indiana and Illinois.

1997 The U.S. Army Corps of Engineers receives $100,000 of Federal funds to conduct a flood control reconnaissance study of the Kankakee River.

1998 The U.S. Fish and Wildlife Service releases a draft Environmental Assessment on a proposed 30,000 acre in the Kankakee River Basin.

1998 The U.S. Army Corps of Engineers receives $400,000 of Federal funds to conduct a Feasibility Study of the Kankakee River.

APPENDIX V

Planning Process and Schedule

GRAND KANKAKEE MARSH NATIONAL WILDLIFE REFUGE

Planning Process and Schedule

1995 The U.S. Fish and Wildlife Service's Bloomington Indiana Ecological Services Field Office developed a Preliminary Project Proposal seeking the Director's approval to initiate a national wildlife refuge feasibility study in the Kankakee River Basin.

1996 Service Director approves project proposal.

1997 Service's Great Lakes-Big Rivers Region initiates multi-year planning project.

- √ Assembled interdisciplinary planning team to determine the scope of the study effort, develop project goals, and design a process and schedule for completing the project.
- √ Identified opportunities and issues through extensive public involvement, gathered and analyzed information, developed Conceptual Management Plan.

1998 Published Draft Environmental Assessment (DEA) and Conceptual Management Plan for 30-day public review

- √ Due to extensive public interest in the project, the Service extended the DEA public review and comment period to 150 days.

1999 Publish final Environmental Assessment (July of 1999).

1999-2001 Initiate detailed refuge planning through the development of a Comprehensive Conservation Plan (formally called "Refuge Master Plan")(September 1999). The CCP will.....

1. Provide a clear and comprehensive statement of desired future conditions for the refuge and planning units (focus areas).
2. Provide a forum to promote broader goals and objectives for the landscapes in which the refuge will be located.
3. Provide a forum for determining the type, extent, and compatibility of uses on proposed refuge units, ie. hunting, fishing, biking, boating, environmental education, visitor center, etc.
4. Provide an avenue for effective coordination, interaction, and cooperation with affected parties, including Federal agencies, state conservation agencies, tribal governments, local governments, and private landowners.
5. Provide a mechanism for public involvement in management decisions on the refuge.

APPENDIX VI

Newsletters

Wild NEWS from the National Wildlife Refuge System

PROPOSED GRAND KANKAKEE MARSH NATIONAL WILDLIFE REFUGE

Newsletter 1 October 1997

☛ REFUGE PLANNING CONTINUES

The U.S. Fish and Wildlife Service (Service) is evaluating the feasibility of developing a new National Wildlife Refuge in northwestern Indiana and northeastern Illinois. If approved, the new refuge would consist of approximately 30,000 acres scattered within the 3.3 million acre watershed of the Kankakee River (Figure 1).

Using a landscape-scale approach and involving multiple Federal, state, local, and private partners, the Refuge would be developed to: (1) preserve, restore, and enhance all animals and plants that are endangered or threatened with becoming endangered; (2) restore and preserve a natural diversity and abundance of flora and fauna; (3) perpetuate the migratory bird resource; and (4) provide the public with additional high quality wildlife-dependent public use and environmental education opportunities.

Partners such as The Nature Conservancy, the Illinois Department of Natural Resources, the Indiana Department of Natural Resources, the Natural Resource Conservation Service, and others, along with the Service, would seek voluntary partnerships with landowners to restore and preserve approximately 100,000 acres of bottomland hardwood forests, prairies and oak savannas, watershed wetlands, and riparian woodland corridors. Of this total, the Service would restore and preserve roughly 30,000 acres.

☛ PUBLIC PARTICIPATION EXTENSIVE

Service staff from the Bloomington Indiana Field Office, the Patoka River Refuge, and the Regional Office hosted three public meetings June 17-19, 1997, in Knox and Enos, Indiana, and Bradley, Illinois, to exchange information on the refuge proposal. Approximately 300 people turned out to hear about the project and offer their planning suggestions. Informational meetings continue to be held at the request of the general public, government agencies, conservation organizations, and Congressional staff.

☛ OPPORTUNITIES AND ISSUES

Questions raised in conversation and correspondence with the public and others indicate the following opportunities and issues currently face the refuge proposal: If established, what effect would the refuge have on water quality in the Kankakee River, biological diversity and abundance, drainage and flood control within the watershed, county tax revenues and refuge revenue sharing payments, the agricultural economy, and the rights of landowners in the project area?

composed of warm and cool season grasses like big bluestem, porcupine grass, prairie dropseed, little bluestem, Indian grass, and prairie cordgrass and is among the most biologically productive of all ecosystems. It includes a diversity of forbs such as lead plant, Maximilian's sunflower, prairie coneflower, and several others. Beneath them are shade-tolerant grasses such as Scribner's panicum, able to flourish even as other plants dominate nearly all the sunlight. A full 75 to 85 percent of the prairie's biomass is underground, contained in the roots that extend anywhere from 12 to 20 feet beneath each main stem. Each plant species within the prairie attracts its own species of insects, invertebrates, and other organisms that provide the food base for birds, reptiles, and amphibians. Conversion of the prairie through plowing, drainage, and other development has resulted in the loss of more than 99 percent of the original 25 million acres.

☛ THE U.S. FISH AND WILDLIFE SERVICE

The mission of the U.S. Fish and Wildlife Service is to provide Federal leadership to conserve, protect and enhance fish and wildlife and their habitat for the American people. The Service is the primary Federal agency responsible for conserving, protecting, and enhancing America's fish and wildlife resources and their habitats. It shares this responsibility with other Federal, state, tribal, local, and private entities. However, by law and treaty, the Service has national and international management and law enforcement responsibilities for migratory birds, threatened and endangered species, interjuristictional fish, and certain marine mammals.

☛ THE NATIONAL WILDLIFE REFUGE SYSTEM

The mission of the National Wildlife Refuge System (NWRS) 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. The Service operates over 500 National Wildlife Refuges nationwide which represents the world's largest collection of lands and waters specifically managed for fish and wildlife.

☛ GUIDING PRINCIPLES FOR THE NATIONAL WILDLIFE REFUGE SYSTEM

On March 25, 1996, President Clinton released new guidance on the management and general use of the National Wildlife Refuge System. The Order affirmed four guiding principles for the National Wildlife Refuge System. These include:

Habitat. Fish and wildlife will not prosper without high quality habitat, and without fish and wildlife, traditional uses of refuges cannot be sustained. The Refuge System will continue to conserve and enhance the quality and diversity of fish and wildlife habitat within refuges.

Public Use. The Refuge System provides important opportunities for compatible wildlife-dependent recreational activities involving hunting, fishing, wildlife observation and photography, and environmental education and interpretation.

Partnerships. America's sportsmen and women were the first partners who insisted on protecting valuable wildlife habitat with wildlife refuges. Conservation partnerships with other Federal agencies, state agencies, Tribes, organizations, industry, and the general public can make significant contributions to the growth and management of the Refuge System.

Public Involvement. The public should be given full and open opportunity to participate in decisions regarding the acquisition and management of our National Wildlife Refuges.

☛ PARTICIPATION ENCOURAGED

The Service is attempting to reach as many people as possible to gather input on this Refuge proposal. Please take a few moments to complete the enclosed questionnaire. Your input helps us improve our planning and serve you better. If you have any suggestions or would like additional information, please contact Mr. Dave Hudak, U.S. Fish and Wildlife Service, 620 South Walker Street, Bloomington, Indiana 47403-2121 or telephone (812) 334-4261.

U.S. Fish & Wildlife Service

Wild NEWS from the National Wildlife Refuge System

PROPOSED GRAND KANKAKEE MARSH NATIONAL WILDLIFE REFUGE

Newsletter II October 1997

☞ REFUGE PLANNING UPDATE

As most of you know, the U.S. Fish and Wildlife Service (Service) is evaluating the feasibility of establishing a new National Wildlife Refuge in northwestern Indiana and northeastern Illinois. If approved, the new Refuge would consist of approximately 30,000 acres scattered within the 3.3 million acre watershed of the Kankakee River.

Last month we issued our first newsletter which included information about the proposed project and asked you for your opinion of the project and your input on issues and/or opportunities that you felt needed to be addressed during this planning effort. This newsletter attempts to do just that - provide responses to your questions and concerns voiced in your letters, completed questionnaires, and verbal statements. To date, we have received over 300 responses to our first newsletter, news articles, and public open houses held last June.

☞ NEED FOR THE PROJECT

The need for wildlife habitat restoration, preservation, and management by the Service in the Kankakee River watershed has been made clear by the declining status of numerous grassland and wetland-dependent species (Service Trust Resources) and studies that indicate habitat loss and degradation are common causal factors in those declines.

The last 100 years have seen dramatic declines in wetland and grassland habitats critical to fish and wildlife populations, water quality, and biological diversity. Of the estimated 5,600,000 acres of wetlands that existed in Indiana prior to European settlement, a mere 13 percent remain, and few of these support the full array of plants and animals which existed in this habitat originally. Likewise, of the 8,212,000 acres of wetlands that existed in Illinois, only 15 percent remain. Tallgrass prairie habitat once dominated the landscape from western Indiana to the eastern portions of Kansas, Nebraska, and North and South Dakota and south to Oklahoma and Texas and comprised roughly 25 million acres. Today less than 1 percent remains.

For years following the initial conversion of native Midwestern prairies, many prairie dependent wildlife populations remained relatively stable by their ability to colonize agricultural grasslands. However, since the 1950's, the acreage of agricultural grasslands has significantly declined, and in many parts of the region, is at its lowest level in more than 100 years. Consequently, grassland-dependent birds have shown steeper and geographically more widespread declines than any other group of North American birds.

would be forced into willing seller status. The Service recognizes this policy would greatly extend the time frame for acquisition and project completion. However, based on past landowner surveys and recent local contacts, land availability from willing sellers within the proposed project area already exceeds the initial acquisition funds anticipated by the Service if the project is implemented.

☛ SOURCE OF FUNDS TO ACQUIRE REFUGE LANDS

Acquisition funds for the Project would come from the Land and Water Conservation Fund (LWCF). This fund was established and is maintained in accordance with the Land and Water Conservation Fund Act of 1965. These funds are derived from a tax on motorboat fuels, the sale of surplus Federal real property and from outer continental shelf oil and gas leases, and are to be used exclusively for the purchase of lands for conservation purposes. Congress annually authorizes the amount of LWCF monies that will be available, and annual appropriations for individual projects are requested based on their ranking on a national priority list.

☛ PRIVATE PROPERTY RIGHTS

If this project is approved, landowners within the project area retain all their present individual freedoms as well as all the rights, privileges, and responsibilities of private land ownership. The presence of this project would not afford the Service any authority to impose restrictions on any private lands. Service control of access, land use practices, water management practices, hunting, fishing, and general use is limited only to those lands in which the Service purchases an appropriate realty interest. Landowners adjacent to lands acquired by the Service retain all the rights, privileges, and responsibilities of private land ownership, including the right of access, control of trespass, right to sell, and taxes.

☛ REFUGE REVENUE SHARING PAYMENTS AND POTENTIAL EFFECTS ON REAL ESTATE TAX REVENUES

Since 1935, the Service has made revenue sharing payments to counties for refuge lands under its administration. The monies for these payments come from two sources: (1) net receipts from the sale of products from National Wildlife Refuge lands (oil and gas leases, timber sales, grazing fees, etc.) and (2) annual Congressional appropriations. Payments to the counties are calculated based on the following three formulas which provides the largest return to the county: (1) $.75 per acre, (2) 25 percent of the net receipts collected from refuge lands in the county, or (3) 3/4 of 1 percent of the appraised value. In the state of Indiana, 3/4 of 1 percent of the appraised value brings the greatest return to the counties. Using this method, lands are re-appraised every five years to reflect current market values.

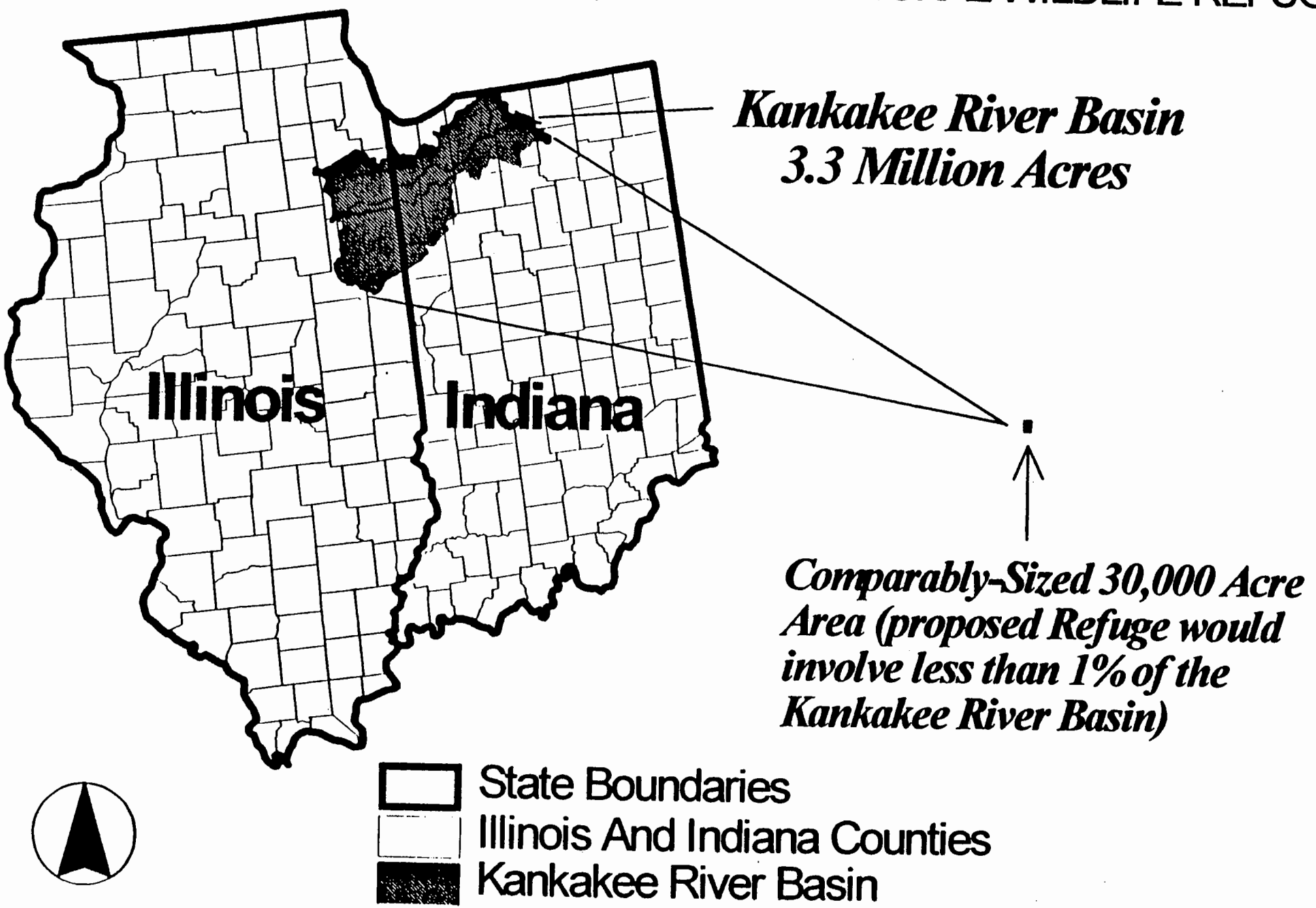
In November and December of 1994, the Service canvassed all 141 counties in the 8 state area of Region 3 where refuge revenue sharing payments are made on National Wildlife Refuge System lands. The counties were asked to estimate the real estate taxes on these lands had they remained in private ownership. In Indiana, 2 of the 3 counties that receive refuge revenue sharing payments from the Service responded to the survey. In Illinois, 8 of the 18 counties surveyed responded. Based on their estimates, the refuge revenue sharing payment at full entitlement for these 2 states is 164 percent (Indiana) and 99 percent (Illinois) of what taxes would be if the lands had remained in private ownership.

According to the Refuge Revenue Sharing Act which authorizes the Service to make these payments, "Each county which receives payments....shall distribute, under guidelines established by the Secretary, such payments on a proportional basis to those units of local government (including, but not limited to, school districts and the county itself in appropriate cases) which have incurred the loss or reduction in real property tax revenues by reason of existence of such area." In essence, the Act directs the counties or lowest unit of government that collects and distribute taxes to distribute refuge revenue sharing payments in the same proportion as it would for tax monies received.

☛ OPPORTUNITIES FOR ADDITIONAL WILDLIFE-DEPENDENT PUBLIC USE

Approximately 98 percent of the land in the National Wildlife Refuge System is open to the public. National Wildlife Refuges provide outdoor recreation

FIGURE 1 - SIZE COMPARISON OF THE KANKAKEE RIVER BASIN AND THE PROPOSED 30,000 ACRE NATIONAL WILDLIFE REFUGE



Wild NEWS from the National Wildlife Refuge System

PROPOSED GRAND KANKAKEE MARSH NATIONAL WILDLIFE REFUGE

Newsletter III December 1997

☛ REFUGE PLANNING UPDATE

As you know, the U.S. Fish and Wildlife Service (Service) is evaluating the feasibility of developing a new National Wildlife Refuge in northwestern Indiana and northeastern Illinois. If developed, the new Refuge could consist of roughly 30,000 acres scattered within the 3.3 million acre watershed of the Kankakee River (Figure 1).

Figure 1 - Kankakee River Basin

Over the past several months we have attempted, through a series of public meetings, briefings, newsletters, and media releases, to provide timely, accurate, and detailed information to the public concerning this planning process. The purpose of this newsletter is to 1) summarize the progress made on the draft environmental assessment, and 2) address some recent questions raised by the public regarding the proposed Refuge and this Refuge planning effort.

First of all we would like to assure everyone that the graphic to the left of the Kankakee River Basin is not the "Refuge boundary". The Kankakee River Basin totals over 3.3 million acres. If a Refuge is developed in the Basin, it would involve approximately 30,000 acres scattered within the 3.3 million acre Basin (less than 1 percent). To put 30,000 acres in perspective, consider this example. Assume this 8.5 X 11 piece of paper you are reading from were equal to the size of the Kankakee River Basin (3.3 million acres). If you were to spread it out flat and placed a quarter (25 cents) anywhere on the paper, the area covered by the quarter (25 cents) would roughly equal 30,000 acres, compared to the size of the 3.3 million acre Basin.

☛ THE DRAFT ENVIRONMENTAL ASSESSMENT

A Draft Environmental Assessment (DEA) has been prepared for this project in accordance with the National Environmental Policy Act of 1969 (NEPA). The purpose of the DEA is to identify and publicly disclose the possible environmental consequences that establishment of the proposed Refuge could have on the quality of the physical, biological, and human environment.

To assist this effort, the Service contracted with Purdue University to prepare an Economic Impact Assessment (EIA) to determine the direct, indirect, and induced economic impacts that could arise from changes in land use that could accompany the development of the Refuge. Both the DEA and the EIA will be made available for public review and comment in early 1998.

Information about the project has been provided to the public through news releases, presentations, interviews, newsletters, and one-to-one briefings. Three public scoping meetings were held June 17-19, 1997, in Knox and Enos, Indiana, and Bradley, Illinois, to exchange information on the new Refuge proposal. Approximately 300 people turned out to hear about the project and offer their planning suggestions.

Comments from the scoping process have covered a wide range of potential opportunities and concerns. Many comments encouraged the development of a new National Wildlife Refuge, while others cited conflicts that would need to be resolved before the proposal moved forward.

From questions raised in conversations and correspondence with individuals and organizations, the Service identified several opportunities and issues currently facing this proposal. If developed, what effect would the proposed Refuge have on:

1) water quality in the Kankakee River?
2) biological diversity and abundance (Service trust resources)?
3) drainage and flood control within the watershed?
4) county tax revenues and refuge revenue sharing payments and apportionment?
5) agricultural land and the economy?
6) private property rights of landowners within the watershed?

☞ **Formulation Of Alternative Strategies For The Service's Proposed Action**

Five alternative strategies were formulated for the Service's proposed action (four Action and one No Action). The four Action alternatives are all aimed at restoring and preserving habitat in an area where such habitat has been largely removed. The No Action alternative reflects the current state of conservation activity (status quo) within the Kankakee River watershed.

The process of developing the four action alternatives involved input from partner organizations, the public, and the use of geographic information system (GIS) technology. The GIS data, acquired in part through the Indiana Gap Analysis Project, the Illinois Natural History Survey, and the Illinois and Indiana Departments of Natural Resources, helped the Service identify a set of "focus areas" which constitute smaller subsets of the watershed. In this regard, focus areas are the "first cut" in this Refuge planning process and represent ecologically rich landscapes that the Service and its partners would further evaluate for potential Refuge development. They do not represent "refuge boundaries".

If a Refuge is developed, the Service would work with partner organizations and the public to further evaluate these broadly defined focus areas and where appropriate, identify and develop portions of them into specific management units. Each Refuge unit would contain a set of goals, objectives, and strategies directed at a desired future condition or position to be achieved. In addition to continued public involvement, this step-down process would involve detailed hydrologic and ecologic planning to ensure Service activities would not adversely impact other landowners in the watershed.

☞ **Description of Alternatives**

Alternative 1 - No Action, the Service would not establish the Grand Kankakee Marsh National Wildlife Refuge. Restoration and preservation activities in the watershed on behalf of Service trust resources would be expected to proceed at the status quo.

Alternative 2 - through voluntary partnerships, easements, and land acquisition, restore and preserve approximately 30,000 acres (primarily wetlands) in the watershed. This alternative would focus mainly on existing and restorable wetlands.

Alternative 3 - through voluntary partnerships, easements, and land acquisition, restore and preserve approximately 30,000 acres (primarily prairie and oak savanna) in the watershed. This alternative would focus mainly on existing and restorable grasslands and important oak-savanna habitats.

Alternative 4 - through voluntary partnerships, easements, and land acquisition, restore and preserve approximately 30,000 acres (primarily endangered species habitat) in the watershed. This alternative would focus on the protection of federally endangered and candidate species habitat across the watershed.

Alternative 5 - through voluntary partnerships, easements, and land acquisition restore and preserve approximately 30,000 acres within the watershed.

not only to provide a net increase in the amount of habitat preserved in the Basin, but also increase the ecological value of the existing lands in the Basin.

4) *Once scattered sites are acquired, how much priority does the Service place on making them contiguous?*

Acquisition of lands for the proposed Refuge would occur over an extended period of time and would be from willing sellers only. Undoubtedly the acquisition process would lead to sites scattered throughout the Basin since lands would only be acquired from willing sellers and annual funding is limited. In some cases it may be desirable for the Service to connect scattered sites, such as the case of restoring a 1,000 acre block of prairie habitat, one ownership at a time. In other circumstances, however, small scattered sites may be the appropriate treatment for a particular landscape, such as restoring a mosaic of scattered prairie wetlands surrounding a permanent water body for the benefit of nesting waterfowl. Our intent is to determine what lands within each focus area would be desirable to restore and preserve and then, articulate that vision to the public. At that time we would ascertain what mechanism would be most appropriate to achieve restoration and preservation, given each parcels unique circumstances.

5) *How will acquisition of lands by the Service or management of lands in voluntary partnership with the Service affect the ability of neighboring farmers to establish or expand livestock production facilities or operate waste management systems?*

We would expect no conflict with livestock production facilities or waste management systems that are in conformance with existing regulations governing those operations.

6) *What guarantee do existing taxing districts have of the continued existence of the Refuge Revenue Sharing "replacement tax" for Service acquired property which is moved off the tax rolls?*

Since 1935, the Service has made revenue sharing payments to counties for refuge lands under its administration. The monies for these payments come from two sources: (1) net receipts from the sale of products from National Wildlife Refuge lands (oil and gas leases, timber sales, grazing fees, etc.) and (2) annual Congressional appropriations. Payments to the counties are calculated based on the following three formulas which provide the largest return to the county: (1) $.75 per acre, (2) 25 percent of the net receipts collected from refuge lands in the county, or (3) 3/4 of 1 percent of the appraised value. In the state of Indiana, 3/4 of 1 percent of the appraised value brings the greatest return to the counties and usually equals or exceeds what property taxes would be on those lands had they remained in private ownership. Using this method, lands are re-appraised every five years to reflect current market values. Any change to the Refuge Revenue Sharing Act would require an Act of Congress.

7) *What are the tax consequences to local taxing districts of the restoration of the proposed 100,000 acres in voluntary partnership with landowners? (i.e. will this result in the land receiving a lower equalized assessed value and returning less money in the form of property taxes)?*

First, to distinguish between the proposed Refuge and other agency efforts in the watershed, the proposed Refuge would contain roughly 30,000 acres (less than 1% of the watershed). The 100,000 acre figure is an estimate of what other agencies, non-government organizations, and private partners have identified as resource needs for the Basin over the next 50 years.

As for lands in which the Service would have to obtain an interest (30,000 acres), the impact to local taxing districts would vary, depending on county and state. In November and December of 1994, the Service canvassed all 141 counties in the 8 state area of Region 3 where refuge revenue sharing payments are made on National Wildlife Refuge System lands. The counties were asked to estimate the real estate taxes on these lands had they remained in private ownership. In Indiana, 2 of the 3 counties that receive refuge revenue sharing payments from the Service responded to the survey. In Illinois, 8 of the 18 counties surveyed responded. Based on their estimates, the refuge revenue sharing payment at full entitlement for these 2 states is 164 percent (Indiana) and 99 percent (Illinois) of what taxes would be if the lands had remained in private ownership.

in the Kankakee River is one of the main objectives of this project and is a major concern of the public.

15) *What is the Service's policy regarding crop damage to adjacent lands resulting from increases in the wildlife population? Does the Service intend to make wildlife food plots part of its management plan?*

The Service policy is to use tools such as hunting, lure crops, and habitat manipulation to assure that wildlife, particularly local Canada geese, do not cause depredation problems on neighboring farmland. While the development of wildlife food plots is not a primary objective of this Refuge, it does remain an option, depending on the site, type of wildlife, and type of food plot. Service policy is to use the most natural means available to meeting wildlife objectives. If a localized depredation problem were to arise, the Service, working in concert with the USDA Animal Damage Control Division, would be available to assist in developing a damage abatement program.

16) *Would this project effect my ability to drain my lands?*

No. If this project is approved, detailed hydrologic planning would be undertaken for all water-related activities planned for potential Refuge lands. These plans would ensure that the Service would not alter drainage in any way that would cause increased flooding to private lands. The Service would not cause any artificial increase of the natural level, width, or flow of waters without ensuring that the impact would be limited to lands in which the Service has acquired an appropriate realty interest from a willing seller (e.g., fee title ownership, flowage easement, cooperative agreement). The Service would comply with all Federal and state regulations regarding development, some of which are specifically intended to ensure that the actions of one landowner do not adversely affect another. If Service activities inadvertently created a water-related problem for any private landowner (flooding, soil saturation or deleterious increase in water table height, etc.), the problem would be corrected at the Service's expense.

17) *Would this project effect my rights as a private landowner in the watershed?*

No. If this project is approved, landowners within the focus areas retain all their present individual freedoms as well as all the rights, privileges, and responsibilities of private land ownership. The presence of Refuge lands in the watershed would not afford the Service any authority to impose restrictions on any private lands. Service control of access, land use practices, water management practices, hunting, fishing, and general use is limited only to those lands in which the Service purchases an appropriate realty interest. Landowners adjacent to lands acquired by the Service retain all the rights, privileges, and responsibilities of private land ownership, including the right of access, control of trespass, right to sell, and payment of taxes.

18) *If I own land in one of the focus areas, would I ever be forced to sell?*

No. All habitat restoration and preservation by the Service would be on a voluntary basis (willing buyer/willing seller only) and only lands in which the Service acquires a realty interest would become part of the Refuge.

19) *If this project is approved, how would the Service pay for the lands it may purchase?*

Funding for Service land acquisition would be from the Land and Water Conservation Fund and the Migratory Bird Conservation Fund (proceeds from the sale of Federal Duck Stamps).

☞ **MORE PARTICIPATION ENCOURAGED**

Public input helps us improve our planning and serve you better. Please, if you have any suggestions, questions, or would like additional information on this project, please contact Mr. Dave Hudak, U.S. Fish and Wildlife Service, 620 South Walker Street, Bloomington, Indiana 47403-2121 or telephone (812) 334-4261.

U.S. Fish & Wildlife Service

Wild NEWS from the National Wildlife Refuge System

PROPOSED GRAND KANKAKEE MARSH NATIONAL WILDLIFE REFUGE

Newsletter IV February 1998

☞ REFUGE PLANNING UPDATE

The U.S. Fish and Wildlife Service (Service) is evaluating the feasibility of developing a new National Wildlife Refuge in northwestern Indiana and northeastern Illinois. If developed, the new Refuge could consist of roughly 30,000 acres scattered within the 3.3 million acre Kankakee River Basin.

The purpose of this newsletter is to inform you of the forthcoming release of our draft Environmental Assessment for the proposed Grand Kankakee Marsh National Wildlife Refuge. Also included is a summary of our planning process and schedule.

Copies of the draft EA will be distributed in 2-3 weeks. Summary copies of the document will be sent to everyone on our mailing list. Full copies of the document (approximately 250 pages) will be available in public libraries throughout the Basin, and upon request. To request a full copy, contact the Service at (812) 334-4261. A 30 day review and comment period will follow.

☞ PLANNING PROCESS AND SCHEDULE

STEP	PLANNING ACTIVITY
1	*Pre-Planning Phase*. Developed a Preliminary Project Proposal (PPP) seeking the Director's approval to initiate a refuge planning project in the Kankakee River Basin. (Summer-Fall 1996)
2	*Project Start-Up*. Assembled the planning team, determined scope of the project, developed project goals, designed a process and schedule for planning the project. (Winter 19)
3	*Identify The Planning Context*. Identified opportunities and issues through public involvement, gathered and analyzed information. (Spring-Summer-Fall 1997)
4 ✔	*Publish Draft Environmental Assessment (draft EA) and Conceptual Management Plan (CMP)*. The draft EA will describe the purpose and need for the project, management alternatives, and potential environmental consequences of each alternative. The CMP will present a general framework for how a new national wildlife refuge could be managed if developed by the Service. (Winter 1998)
5	*Revise And Publish Final EA/CMP or Publish Notice of Intent (NOI) To Prepare An Environmental Impact Statement (EIS)*. The Regional Director, Great Lakes-Bi Rivers Region, will use the draft EA to make a decision on whether the project significantly impacts the quality of the human environment. If no significant impact is determined a final EA/Finding of No Significant Impact (FONSI) will be prepared and made available to the public. If a significant impact is determined, the Service will issue a NOI to prepare an EIS. (Spring 1998)

☞ PARTICIPATION ENCOURAGED

We appreciate your continued support of our planning effort and value the many ideas and thoughts you have shared with us. If you have any suggestions or would like additional information, contact Mr. Dave Hudak, U.S. Fish and Wildlife Service, 620 South Walker Street, Bloomington, Indiana 47403-2121 or telephone (812) 334-4261.

U.S. Fish & Wildlife Service

Wild NEWS from the National Wildlife Refuge System

PROPOSED GRAND KANKAKEE MARSH NATIONAL WILDLIFE REFUGE

Newsletter V May 1998

☞ REFUGE PLANNING UPDATE

As you know, the U.S. Fish and Wildlife Service (Service) is evaluating the feasibility of developing a new 30,000 acre National Wildlife Refuge in the Kankakee River Basin

In March 1998, we issued a Draft Environmental Assessment (DEA) to publicly disclose the possible environmental consequences that development of the Refuge by the Service could have on the quality of the physical, biological, and human environment. To date, approximately 2,500 DEA's have been distributed for review and comment. Numerous comment letters have been received as a result of the DEA. Due to intense interest and at the request of the public, the Service extended the DEA review and comment period for an additional 60 days. Reviewers have until June 20, 1998, to review and comment on the document.

In addition, the Service is planning to hold two additional public meetings to encourage additional public comment on the draft environmental assessment. Meetings will be held May 26, 1998, in Wheatfield, Indiana, and May 27, 1998, in Kankakee, Illinois.

On May 26, the meeting will be held at the Kankakee Valley High School in Wheatfield, Indiana. On May 27, 1998, the meeting will be held at the Joint Armed Forces Reserve Center in Kankakee, Illinois.

Each meeting will begin at 4:00 PM with an "open house" where visitors can speak with Service personnel, gather information, and ask questions. At 6:00 PM a public meeting will begin with a presentation by the Service followed by an opportunity for individuals to present oral and written comments. Oral and written comments will also be accepted during the open house, which will run concurrently with the public meeting for those who prefer to provide comments in that session.

☞ MORE PARTICIPATION ENCOURAGED

We appreciate your continued support of our planning effort and value the many ideas and thoughts you have shared with us. If you have any suggestions or would like additional information, contact Mr. Dave Hudak, U.S. Fish and Wildlife Service, 620 South Walker Street, Bloomington, Indiana 47403-2121 or telephone (812) 334-4261.

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 which will enable them to participate meaningfully in activities and policy shaping.

Conservation of fish and wildlife and their habitats also provides opportunities for Americans to encounter their natural national heritage. The role of the national wildlife refuge system has evolved beyond protecting waterfowl to providing recreational and educational experiences as well. National wildlife refuges enrich people in a great variety of ways and these benefits should be equitably distributed among all segments of society.

Although many social or experiential benefits of refuges are not easily quantified, it can be demonstrated that recreational visits to national wildlife refuges generate substantial economic activity. In 1997, the Service initiated a multi-phase study to determine the impact of national wildlife refuges on their surrounding local economies. Eco-tourism refers to the relatively recent phenomenon where approximately 30,000,000 people visit refuges annually. Eco-tourism is one way to derive economic benefits from the conservation of fish and wildlife habitat. Non-resident refuge visitors pay for food, lodging, fuel, and other purchases from local businesses to pursue their recreational experience, thereby generating substantial local economic activity.

Can the Service and the U.S. Army Corps of Engineers work together on flood control and ecosystem restoration?
Yes. Over the past six months the Service and the Corps have been working together developing a cooperative partnership agreement. The agreement will help the agencies consolidate resources focused on finding ways to reduce flood damage to property and natural resources, preserve ecosystem structure and function, and the protect prime farmland soils in the Basin. The Corps and the Service agree that sharing staff and information will better serve the needs of local communities and agricultural interests. Besides being fiscally smart, the combined resources of both agencies will help eliminate the duplication of effort in each agencies respective planning processes. The Refuge Comprehensive Conservation Plan and the Corps feasibility study should begin this spring and proceed on a parallel track with numerous public meetings to help identify appropriate management strategies.

What happens next if a national wildlife refuge is ultimately approved? Once a refuge is approved, a management team (which includes local citizens) will develop a Comprehensive Conservation Plan, or CCP. The CCP will determine specific management direction necessary to meet Service objectives for the Basin. With community input, the CCP will establish refuge goals and objectives, and specific management strategies for achieving those goals and objectives. Specific issues, such as cleaning up a contaminated area, the presence of an endangered species, where and how much land would the Service acquire, or managing an overabundant deer herd, would be addressed in the CCP.

If the refuge is developed, is the planning process the only opportunity I will have to provide input into what goes on at the refuge?
No. Community involvement is important in refuge planning and refuge management. The Service encourages public participation in developing new refuges as well as detailed management plans for individual refuge units. Many refuges have citizen or "friends" groups that support the refuge through actively participating in refuge activities and operations.

How can I find out more about the National Wildlife Refuge System?
You can request information by writing to us at: U.S. Fish and Wildlife Service, Ascertainment and Planning, 1 Federal Drive, Ft. Snelling, MN 55111. You can call us at 1- 800-247-1247. If you have access to the Internet, you can read about us at: http://bluegoose.arw.rq.fws.gov
or at: http://www.fws.gov

AMERICA'S NATIONAL WILDLIFE REFUGES...
where wildlife comes naturally!