U.S. Fish & Wildlife Service

Grand Kankakee Marsh National Wildlife Refuge

Environmental Assessment

RESPONSIBLE AGENCY: **United States Department**

[redacted]

rvice
Federal Building g
rive
g, Minnesota, 55111

Bishop Henry Wh
1 Fede
Fort S

United States Department of the Interior

[redacted]

IN REPLY REFER TO:

FWS/ARW/RE-AP

Dear Reviewer:

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

[redacted]

Selection of Alternative
and
Finding of No Significant Impact

[redacted]

An Environmental Assessment (EA) has been prepared to publicly disclose the possible environmental consequences that development of the Grand Kankakee Marsh National Wildlife

Grand Kankakee Marsh National Wildlife Refuge

[redacted]

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

[redacted]

Director

[redacted]

U.S.
FISH & WILDLIFE
SERVICE

TABLE OF CONTENTS

CHAPTER 1. PURPOSE AND NEED FOR ACTION

CHAPTER 4 - ENVIRONMENTAL CONSEQUENCES

CHAPTER 5 - LIST OF PREPARERS

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 ensuring

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 with

- Foster improved communication and collaboration between Service programs, the states, non-

- 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

Successful Refuge development will rely on partnerships formed with landowners in the Basin,

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

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

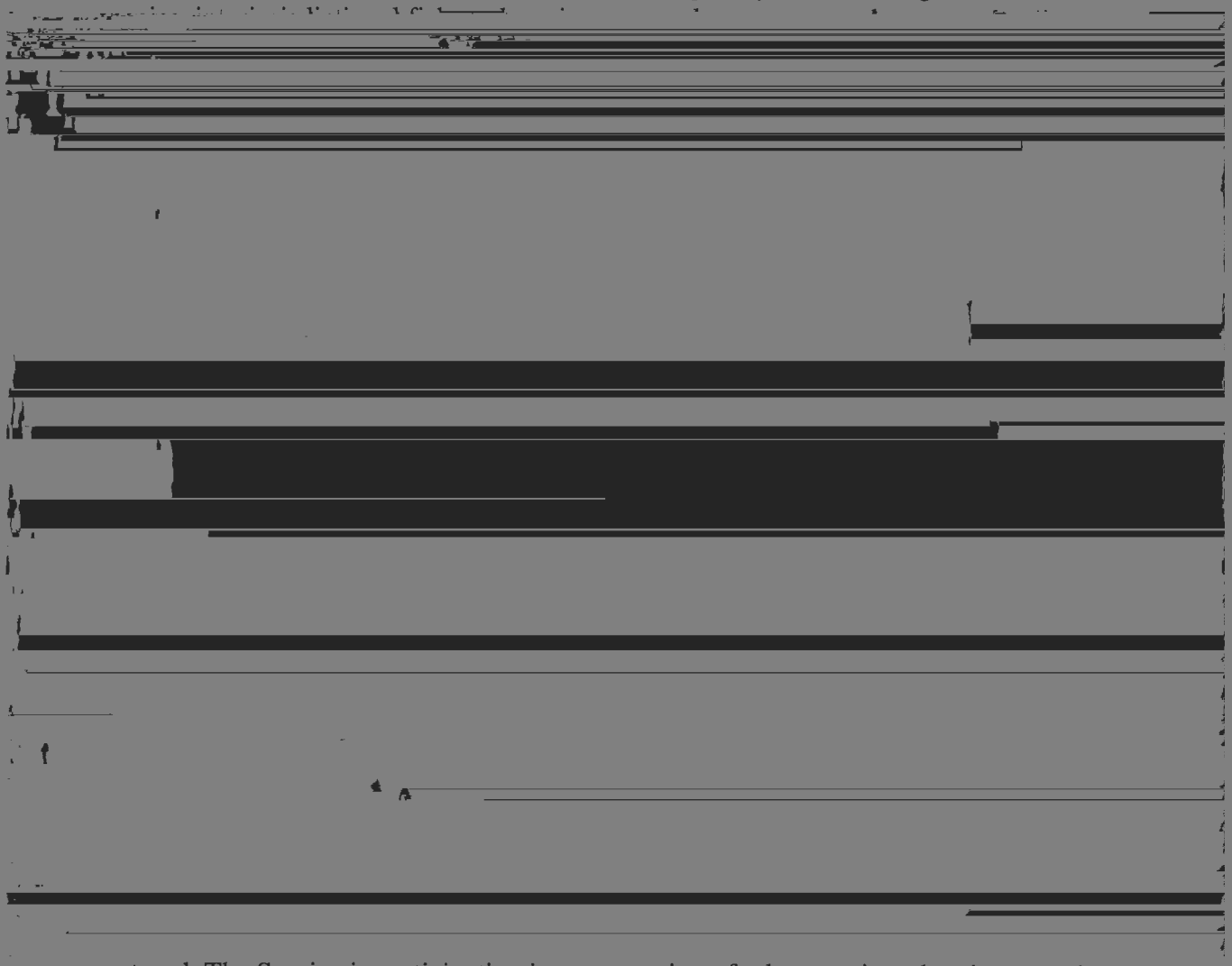
Kankakee River Basin in northwestern Indiana and northeastern Illinois (Figure 1).

State Boundaries
Illinois And Indiana Counties

Using the authorities of the Fish and Wildlife Act

Goals of the Service

- *Sustainability of Fish and Wildlife Populations*: Migratory birds, endangered fish and wildlife



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.

[redacted]

Ecosystems - Region 3

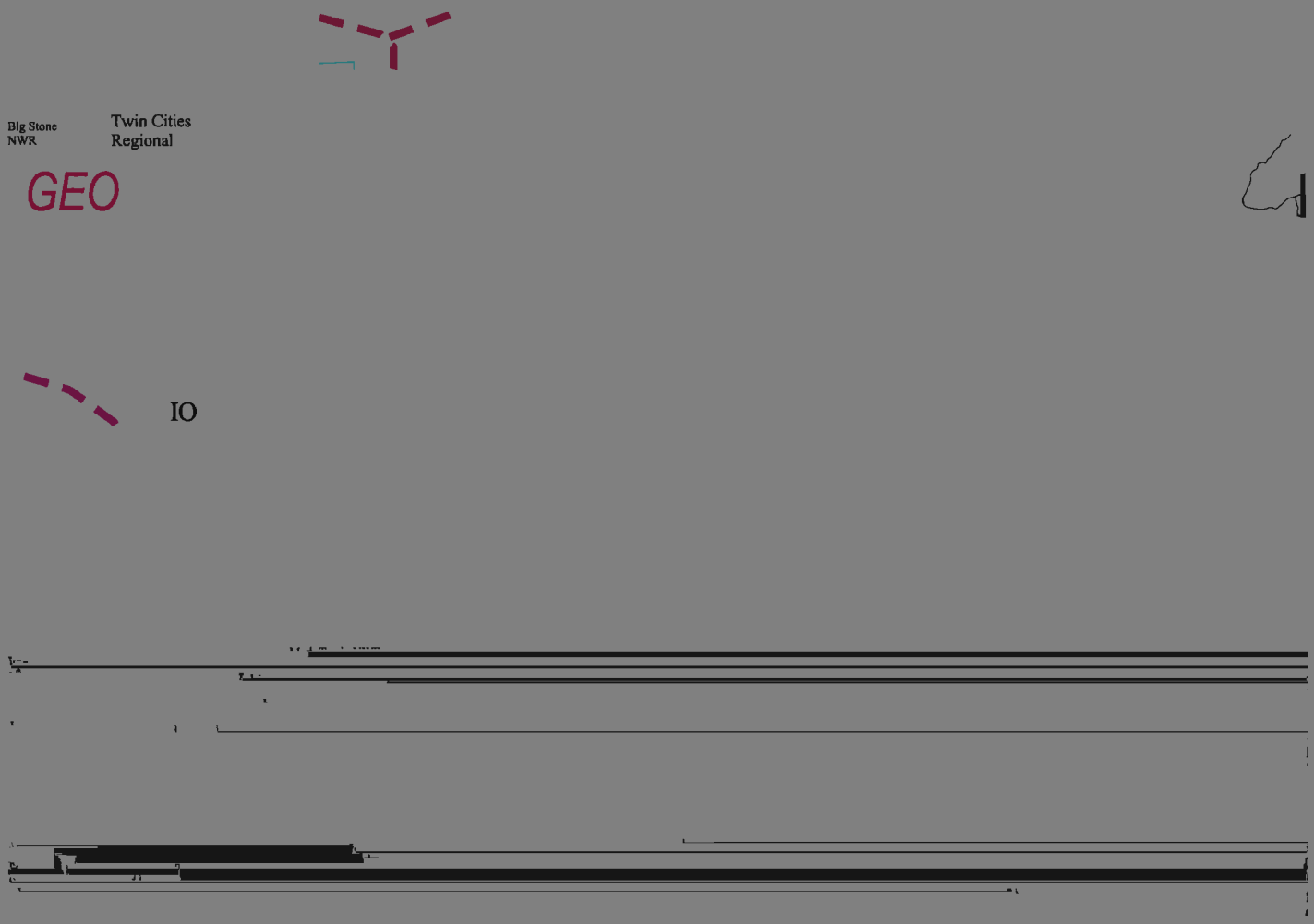


FIGURE 2

Ecosystems of USFWS Region 3
- Great Lakes
- Upper Mississippi River / Tallgrass Prairie
- Mississippi Headwaters / Tallgrass Prairie
- Ohio River Valley

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

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 [redacted] 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).

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 [redacted]

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.

Figure 3 - The National Wildlife Refuge System

[redacted]

Mission of the National Wildlife Refuge System

[redacted]

waters for the conservation, management, and where appropriate, restoration of fish, wildlife, and plant

III. NEED FOR ACTION

The need for fish and wildlife restoration, preservation, and management in the Basin by the Service has [redacted] 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

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

2 Oak Savanna and Associated Species Declines

Prior to European settlement, oak savanna

Midwest (Nuzzo 1985). This same author

indicates that in 1985, only 113 sites (2,607

Selected Prairie Division Ecological Units within and near the Kankakee Watershed

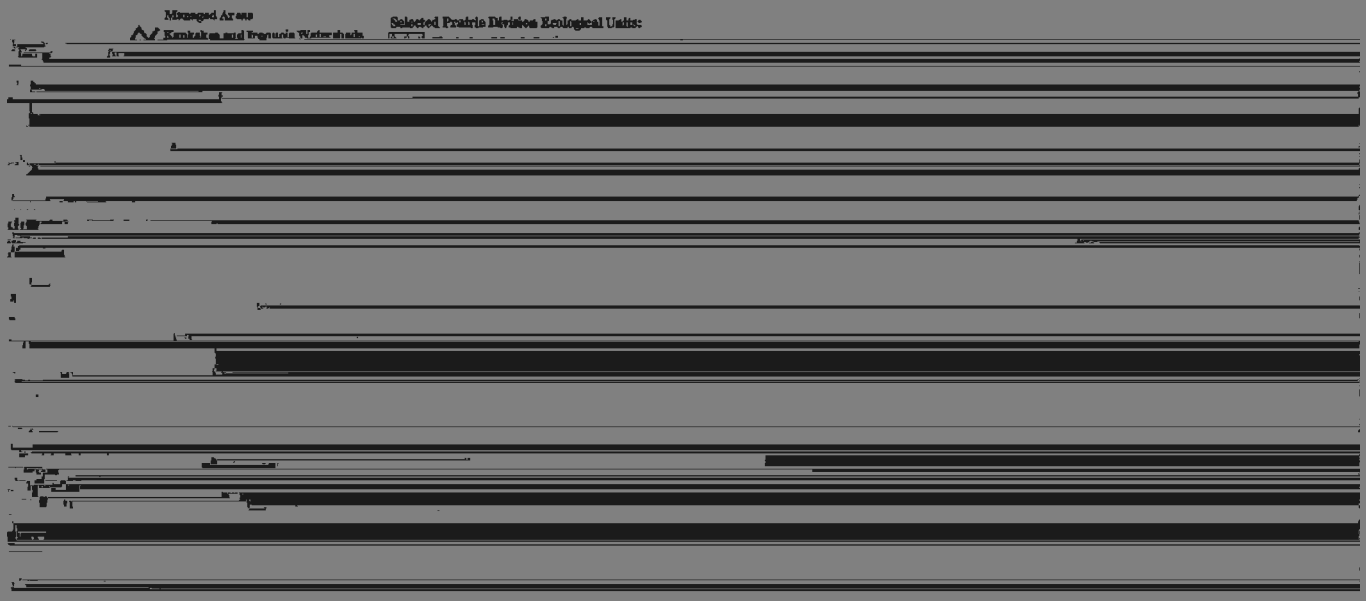


Figure 5. The occurrence of the Grand Marsh within the eastern peninsula of the tallgrass prairie juxtaposed wetlands, tall

[redacted]

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

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-

6. High Restoration Potential

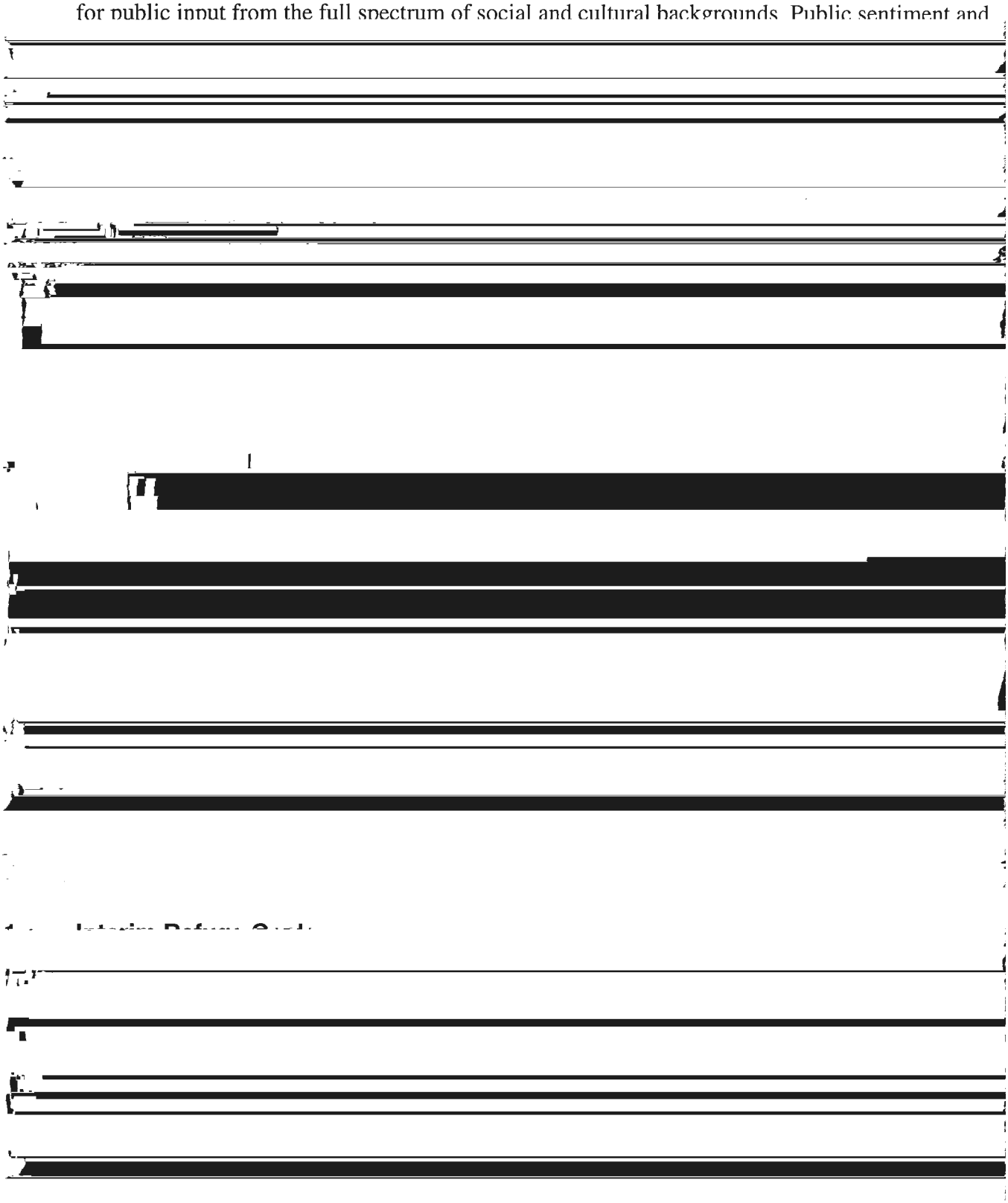
The Kankakee River Basin has the biological foundation necessary for a highly significant contribution to the conservation of fish and wildlife resources of continental importance.

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

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

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



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

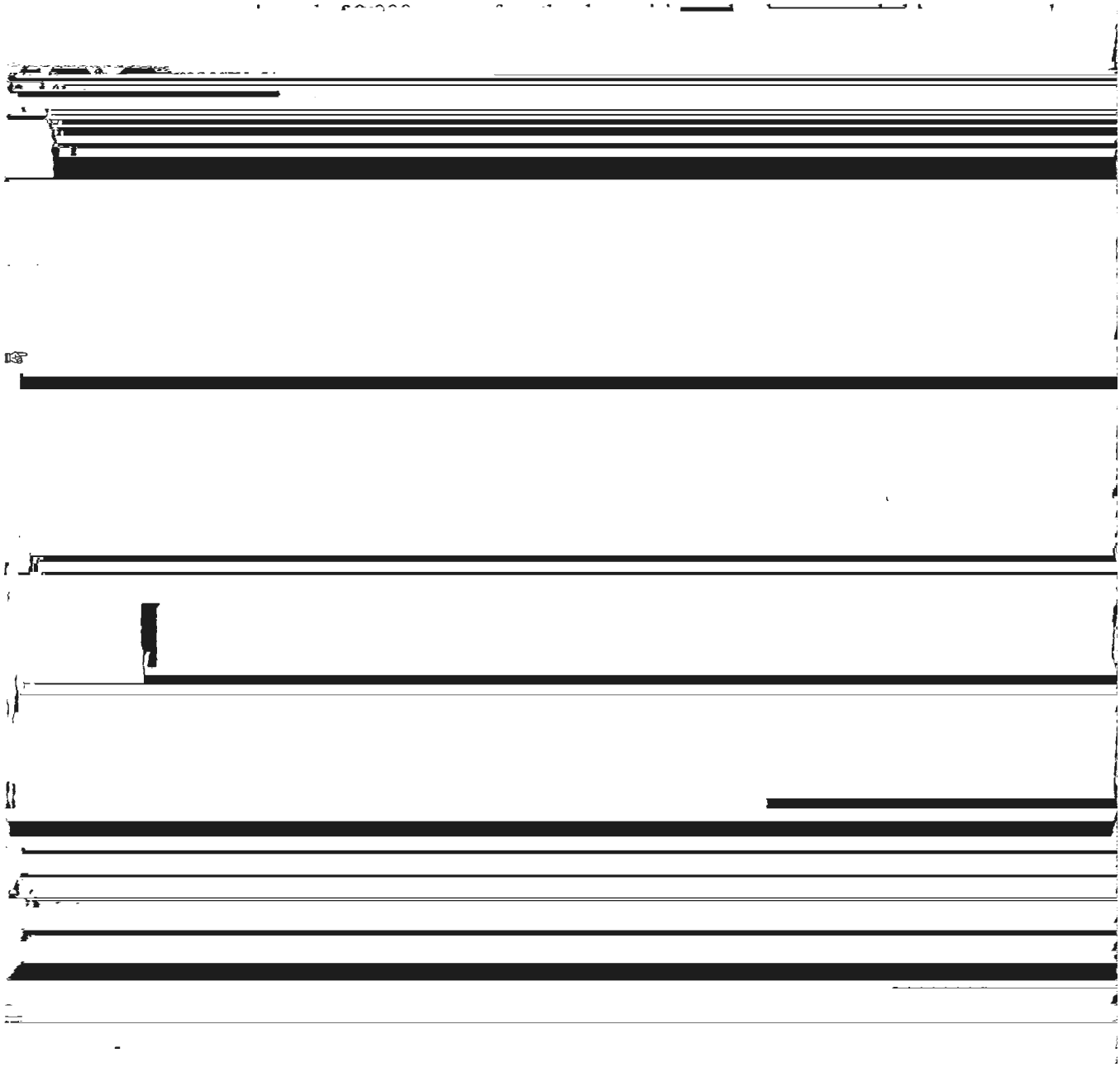
- Preserve, restore, and enhance in their natural ecosystems (where practical) all species of animals

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



needs of migratory birds, threatened and endangered species, and aquatic resources in the Basin (willing buyer/willing seller only).

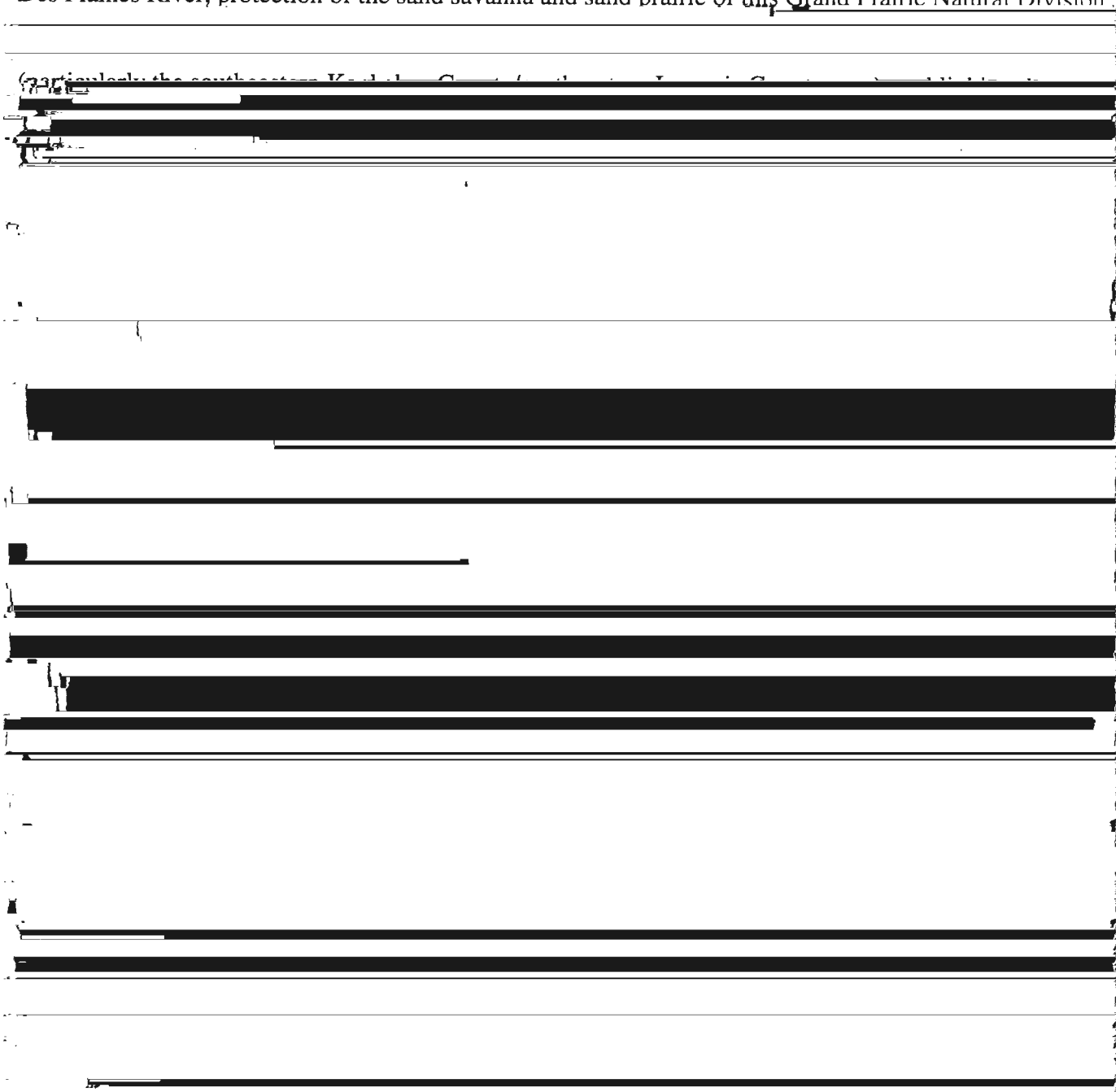
provide background and a framework for the Service's proposed action. Appendix V contains an outline

[redacted]

In 1986, to address the declining status of North American waterfowl populations, the United States and

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.

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



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

Management and administration of the Refuge will be mandated by a number of laws (Acts) and

✓ *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

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

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

[redacted]

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

[redacted]

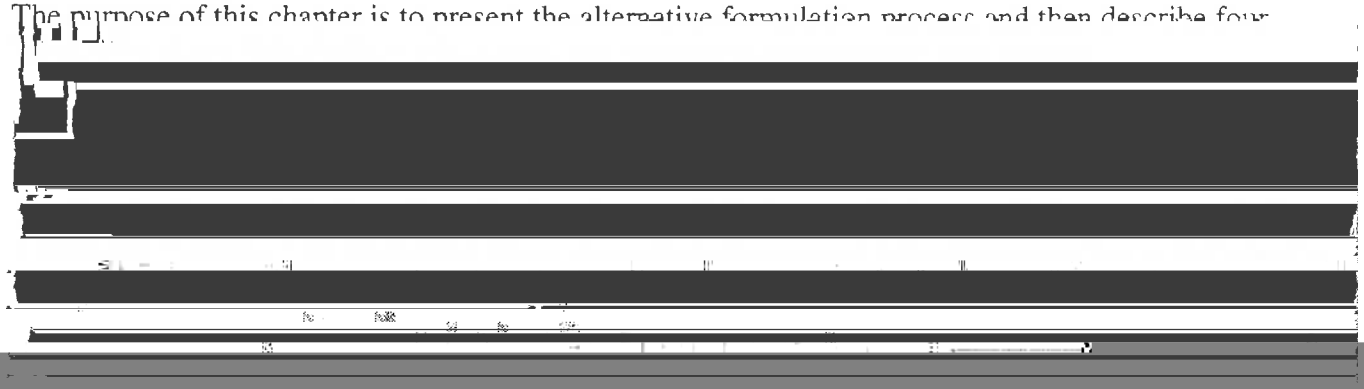
✓ *Rivers and Harbor Act (Section 10 of 1899).* Section 10 of this Act regulates the placement of fill in navigable waters of the United States.

✓ *Executive Order 11988.* E.O. 11988 directs Federal agencies to (1) avoid development in the

CHAPTER 2 - DESCRIPTION OF ALTERNATIVES

I. INTRODUCTION

The purpose of this chapter is to present the alternative formulation process and then describe four



The process of developing the Action alternatives involved

Information System (GIS) technology provided in part
through the Indiana Gas Analysis project, the Illinois Natural

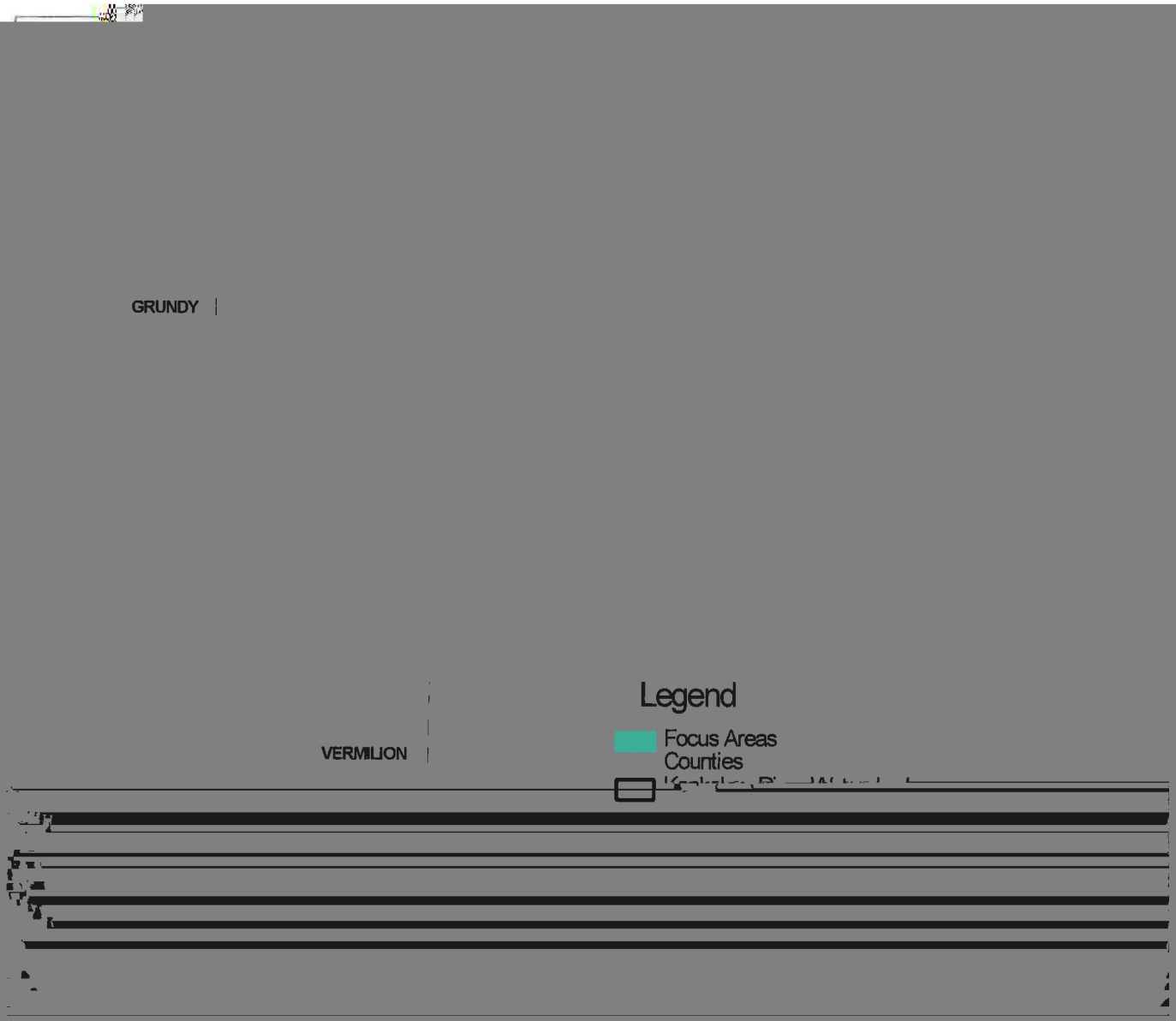


Figure 8 - Focus Areas for the four Action alternatives (alternatives 2-5). Note: focus areas are not Refuge boundaries. Refuge boundaries would conform to individual land tracts as they are purchased from willing sellers within the focus areas.

Management of the proposed Refuge would be consistent with Service policies governing units of the National

1. Identification of Focus Areas

resources in the Basin, the Service formulated focus areas using an Expert Workshop approach (Johns

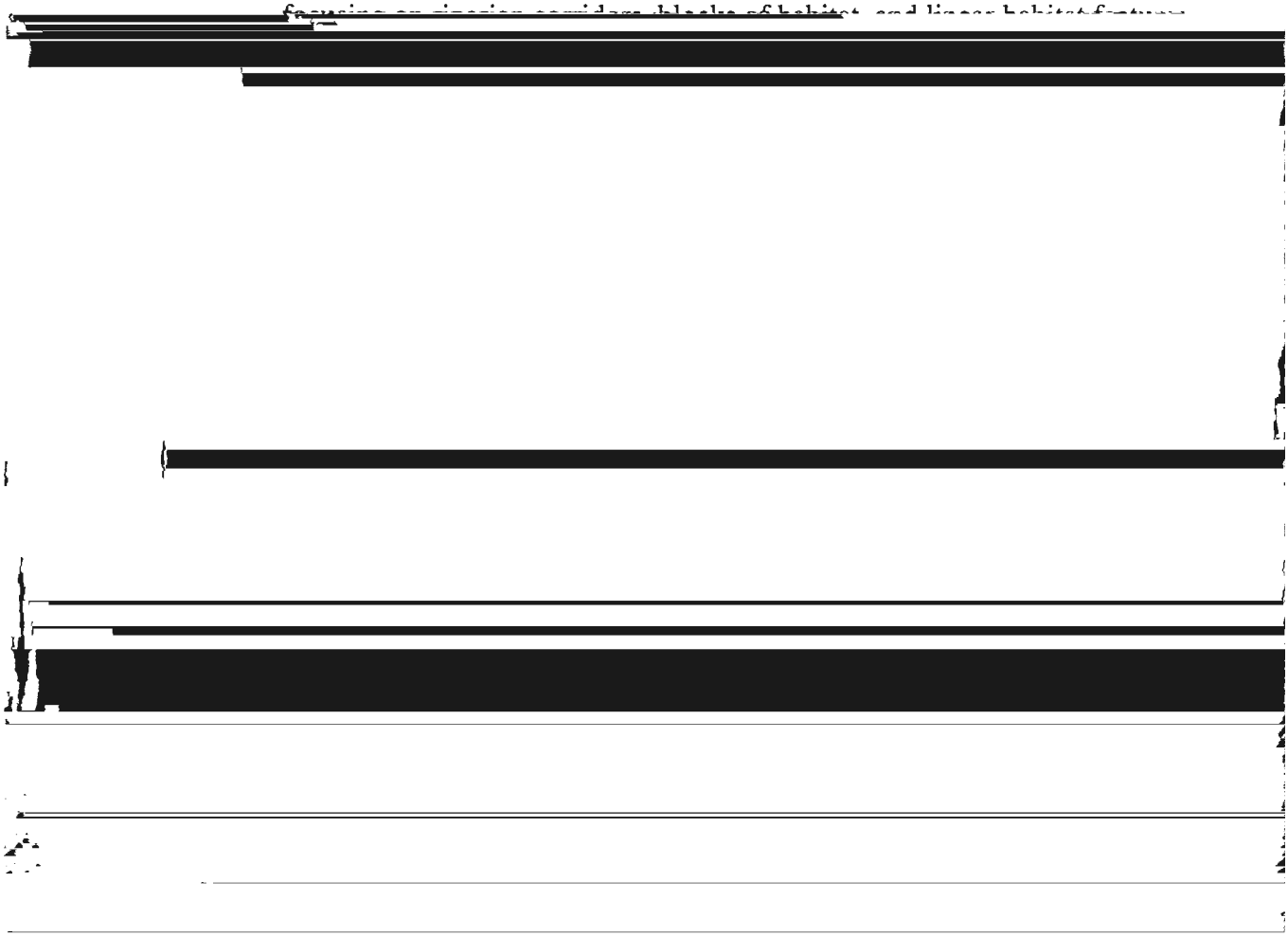
B. Concentrations of Primary Ecosystems

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



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

It should be noted that development of this Refuge is controlled by a number of factors. They include:

water rights, potential for competitive water use, soil - chemistry, permeability, compaction, texture,

IV. DESCRIPTION OF ALTERNATIVES

Alternative 1 "No Action"

[redacted]

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	[illegible]	[illegible]	[illegible]	708	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	31,288	[illegible]
16	11856	969	387	2937	7498	65
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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	[illegible]	203

Alternative 3 - Grassland

The grassland scenario focuses on the protection and restoration of [illegible]

TABLE 2.2

Existing Land Use by Focus Area (in acres) in the Grass and Alternative

FOCUS AREA #	TOTAL	WETLAND	GRASSLANDS/ PASTURE	UPLAND FOREST	AGRICULTURE	URBAN
7	2504	15	228	708	1550	3
9	16545	65	2393	4206	9540	341
10	4368	52	495	1092	2724	5
13	10053	56	4903	1412	3572	110
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
15	6736	71	2172	217	4137	139
TOTAL	44,559	302	12,491	7,879	23,226	

continue to use the riparian corridor of the Kankakee River and tributary streams. The federally

21,503 151

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 [redacted]

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

TOTAL

TABLE 2.4

Existing Land Use Focus Area (in acres) in the id Alternat ve

AREA #		PASTURE	FOREST		
	1434	186		710	0
	988	10	30		
5	431	108	20	22	281	0
6	2027	727	172	230	867	31
7	2504		228	708	1550	3
	5807		897		1995	35
10	4368					5
	10053				3572	110
15	6736		2172	217	4137	139
		497				
4		40			889	19
18	4121	939	127		2401	14
19	7129	1491	291	609	4724	14
20	1420	379	20	191	830	0
22	421	2752	16	738	169	0
TOTAL		7,544		6,564	26,780	397

Figure 9 - Alternative 2

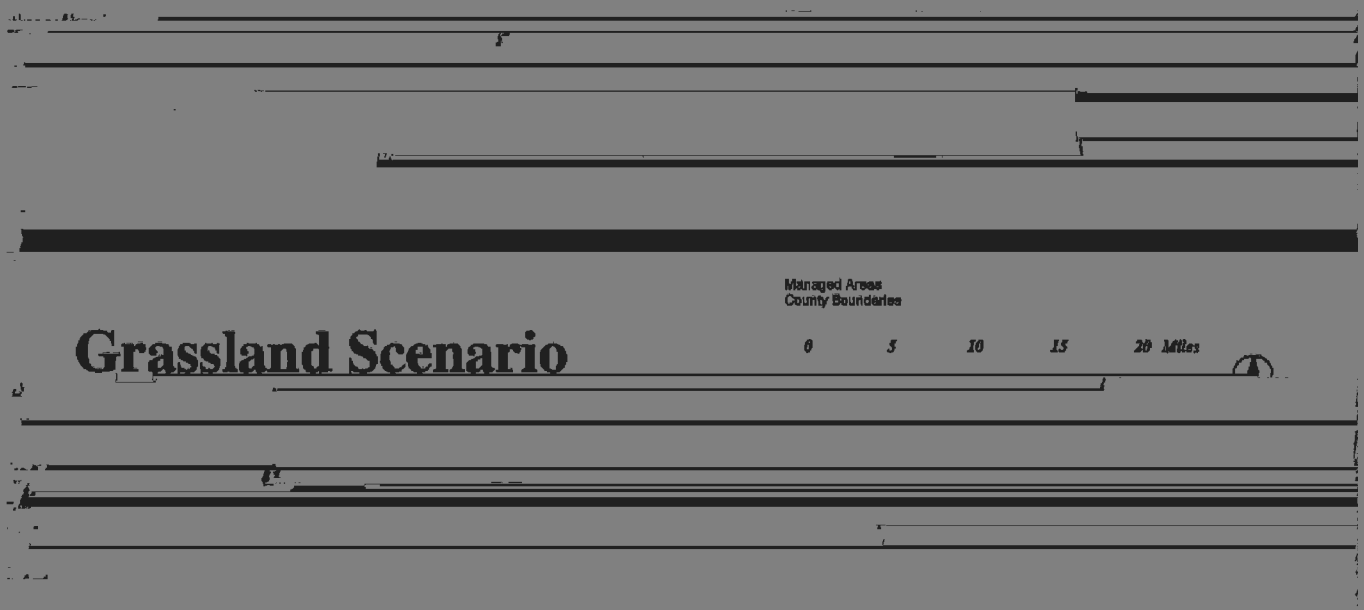


Figure 10 - Alternative 3

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

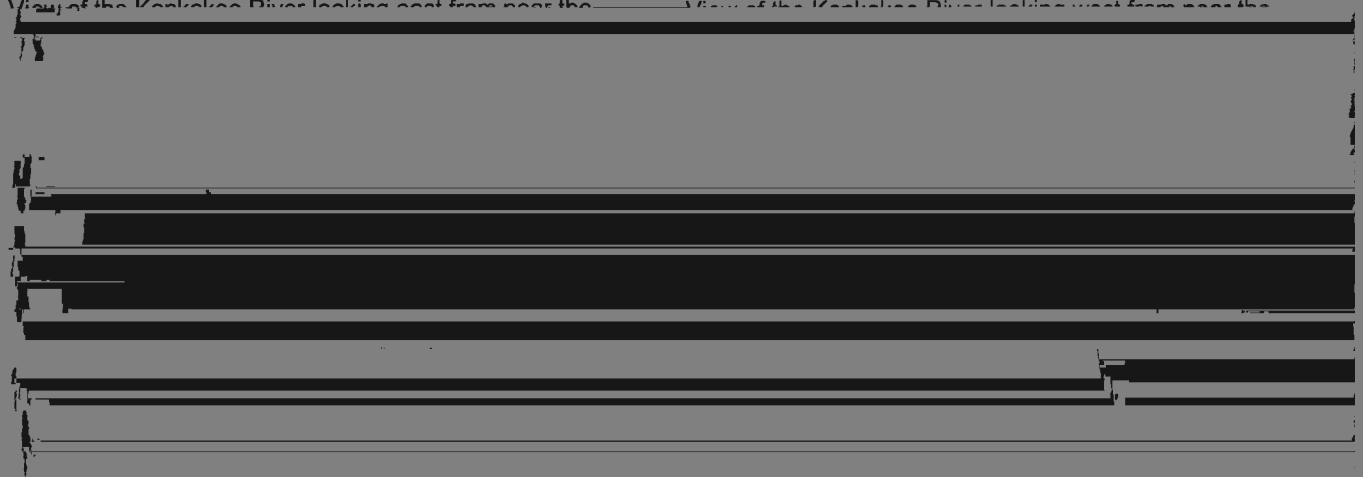
The Kankakee River Basin covers an area about 3.3 million acres (Figure 1) including all or portions of Ford, Grundy, Iroquois, Kankakee, Vermillion, and Will counties in Illinois and Benton, Elkhart, Jasper, Kosciusko, Lake, LaPorte, Marshall, Newton, Porter, Pulaski, St. Joseph, Starke, and White counties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

[redacted]

seven artificial channels until it reaches the Illinois-Indiana border. For the next 9.5 miles the river

[redacted]



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

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

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

[redacted]

beginning in 1926 show that annual flood peaks are increasing due to intensified agricultural practices

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

ditching and pumping, and urban growth (Kankakee River Basin Commission, 1980).

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

1. Species Level Biological Diversity

A. Plant Species

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

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).

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

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 [redacted] 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,

many remaining savannas are severely degraded primarily because of the absence of fire critical to the

[redacted]

The northeastern Kankakee County/northeastern Iroquois County area in Illinois has the potential for

[redacted]

3. Landscape Level Biological Diversity

Landscape is defined as a number of interacting stands or ecosystems repeated in similar form over a

CHAPTER 4 - ENVIRONMENTAL CONSEQUENCES

This chapter evaluates the potential environmental [redacted]

[redacted]

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

[redacted]

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.

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

withdrawing flood-prone, prior-converted and farmed wetlands from production. For example, in Kankakee and Iroquois Counties in Illinois, farmland dropped from 380,185 acres to 358,020 acres and [redacted]

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 [redacted]

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

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, [illegible]

Restoration and preservation of Federally and state-listed species would continue under existing laws

habitat management activities to benefit both Federally and state-listed species.

of the Federally endangered or other species selected for more intensive management. We feel that

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

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

[redacted]

- 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

[redacted]

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 having 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.

[redacted]

the refuge revenue [redacted]

[redacted]

3 where refuge revenue sharing payments are made on National Wildlife Refuge System lands. The [redacted]

counties were asked to estimate the real estate taxes on these lands had they remained in private [redacted]

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,

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

K Environmental Justice

Environmental justice refers to the principle that all citizens and communities are entitled to: (a) equal

The upcoming Refuge Comprehensive Conservation Plan and the Comp Feasibility Study will proceed

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

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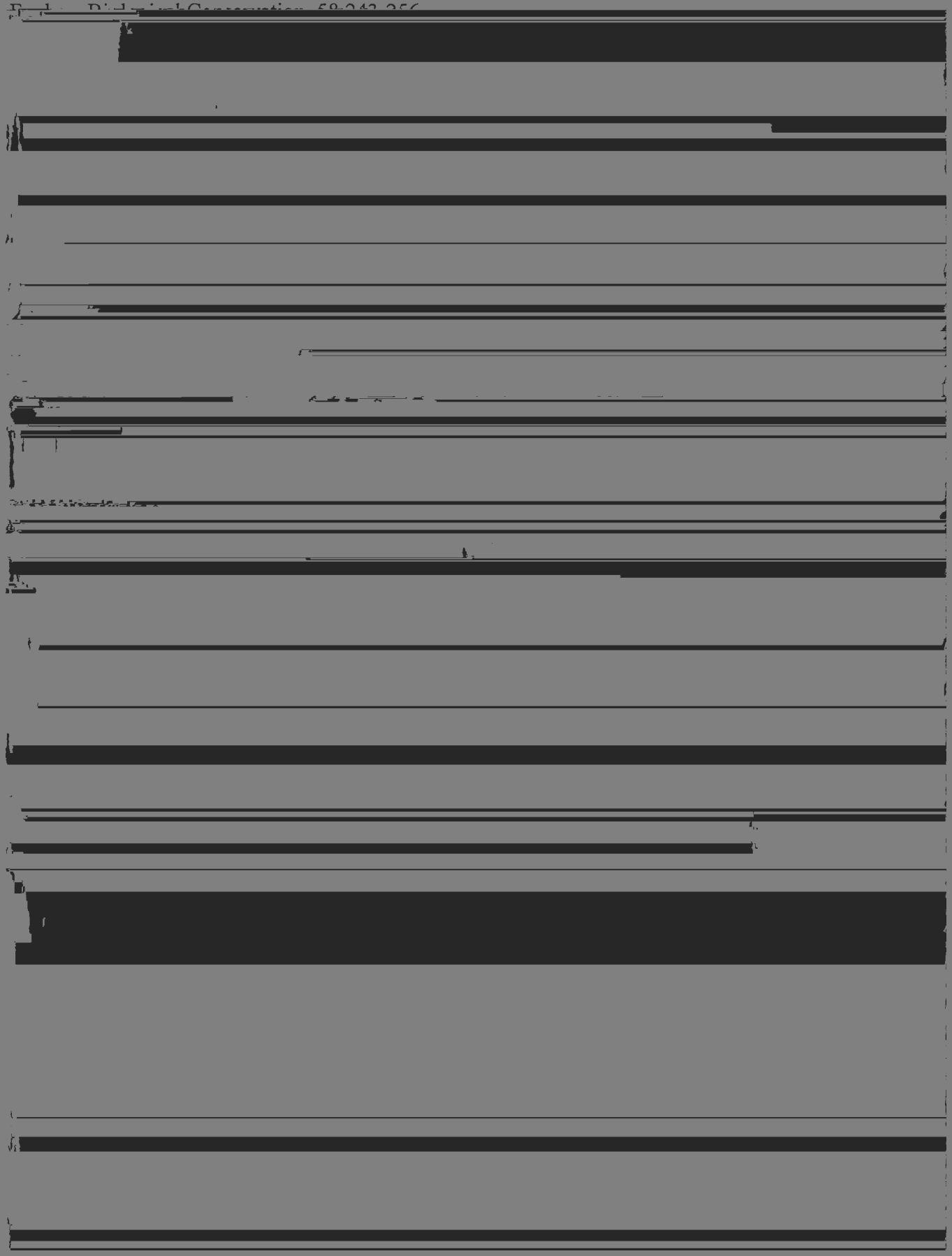

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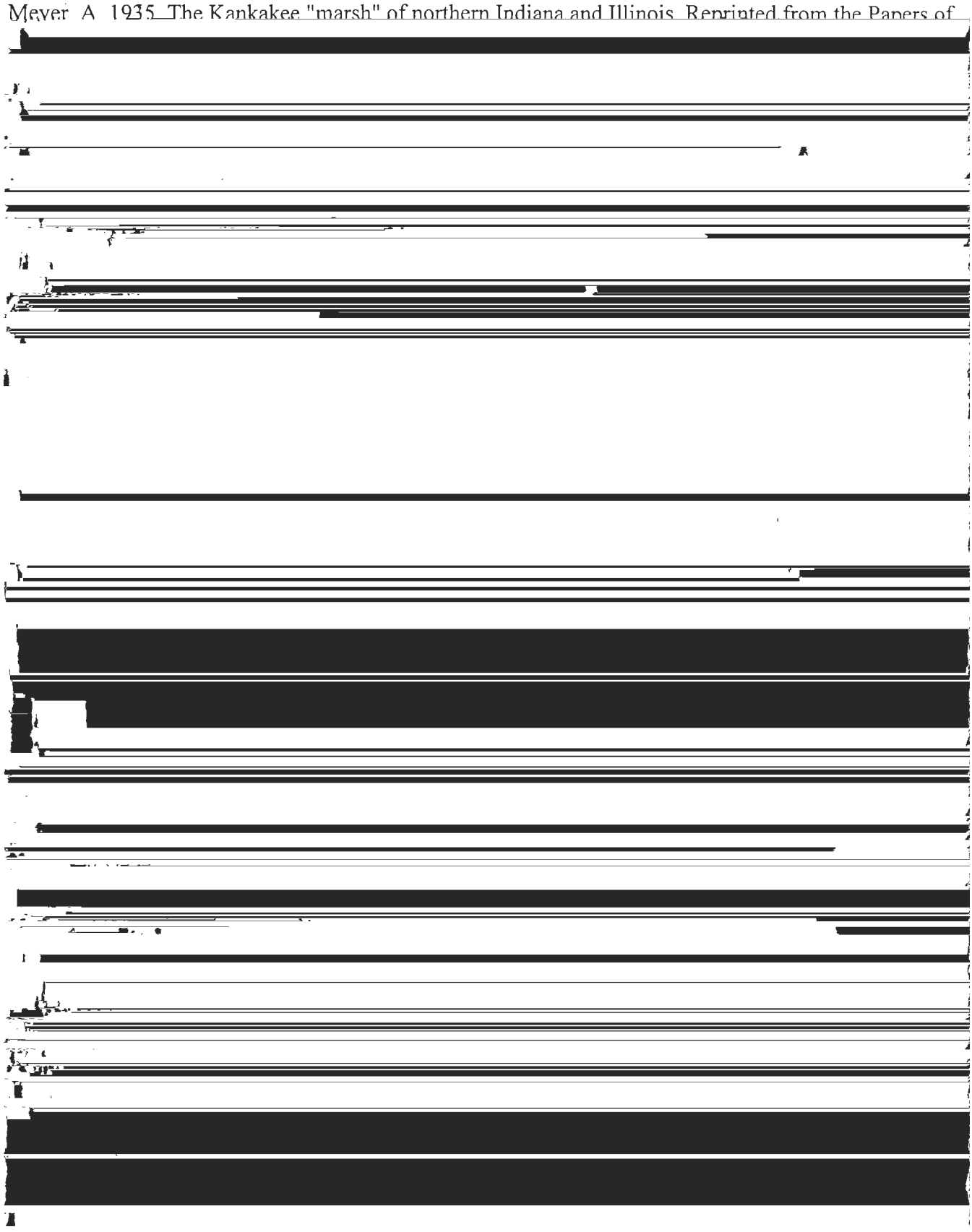

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GLOSSARY OF TERMS

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 -

Comprehensive Conservation

Cumulative Effects -

Dissolved Oxygen -

Drainage Basin -

Ecology - 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,

Ecosystem Management - Management of an ecosystem that includes all ecological, social,

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

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

Riparian Zones -

Sedimentation -

Succession -

Strategies -

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