

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 (*Euphrydas 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 discusses 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 quadrimaculatus* 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.

