

**U. S. DEPARTMENT OF THE INTERIOR**  
**FISH AND WILDLIFE SERVICE**  
**ENVIRONMENTAL ASSESSMENT**

Final (04/27/07)

For

**Activities on Portions of Big Oaks National Wildlife Refuge as Described in the Hunting  
and Fishing Plan  
Ripley, Jefferson, and Jennings Counties, Indiana**

Regional Director  
U. S. Fish and Wildlife Service  
Bishop Henry Whipple Federal Building  
1 Federal Drive  
Fort Snelling, Minnesota 55111-4056  
(612) 725-3507

For Further Information, Contact:  
Refuge Manager  
U.S. Fish and Wildlife Service  
Big Oaks National Wildlife Refuge  
1661 West JPG Niblo Road  
Madison, IN 47250

Prepared by:  
U.S. Department of Interior  
Madison, Indiana  
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Summary:

The U. S. Fish and Wildlife Service (Service) was directed to rewrite the environmental assessment to analyze cumulative impacts of deer, turkey and squirrel hunting, and recreational fishing on Big Oaks National Wildlife (NWR). This Environmental Assessment is submitted to comply with the National Environmental Policy Act, major National Wildlife Refuge System goals regarding outdoor recreation opportunities, and Refuge objectives for providing compatible fish and wildlife-dependent recreation. Alternatives considered in this proposal include: A) proposed action: Hunting and Fishing activities as described in the Hunting and Fishing Plan), B) No action: refuge closed to hunting and fishing, and C) amend the Hunting and Fishing and Public Access Plans to exclude hunting activities in the Day-Use Area. Evaluation of the existing hunts indicate that harvest of white-tailed deer, wild turkey, and squirrel are sustainable and biological impacts to habitat and other wildlife populations are minor.

For further information contact:

Dr. Joseph Robb  
Refuge Manager, Big Oaks NWR  
1661 W JPG Niblo Road  
Madison, IN 47250  
Phone: 812-273-0783  
E-mail: [joe\\_robbs@fws.gov](mailto:joe_robbs@fws.gov)

## **CHAPTER 1 PURPOSE AND NEED FOR ACTION**

The federally legislated purposes for which Big Oaks National Wildlife Refuge (NWR) was established on June 1, 2000 are "... for the development, advancement, management, conservation, and protection of fish and wildlife resources ..." 16 U.S.C. § 742f(a)(4) "... for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude ..." 16 U.S.C. § 742f(b)(1) (Fish and Wildlife Act of 1956); and "... to conserve (A) fish or wildlife which are listed as endangered species or threatened species .... or (B) plants ..." 16 U.S.C. § 1534 (Endangered Species Act of 1973).

The National Wildlife Refuge System Administration Act of 1966 as amended by the National Wildlife Refuge System Improvement Act of 1997 (16 U.S.C. 668dd et seq.) provides authority for the Service to manage the Refuge and its wildlife populations. In addition it declares that compatible wildlife-dependent public uses are legitimate and appropriate uses of the Refuge System that are to receive priority consideration in planning and management. There are 6 wildlife-dependent public uses: hunting, fishing, wildlife observation, wildlife photography, environmental education and interpretation. It directs managers to increase recreational opportunities including hunting and fishing on National Wildlife Refuges when compatible with the purposes for which the refuge was established and the mission of the National Wildlife Refuge System.

In response to a 2003 lawsuit filed by the Fund for Animals, the U.S. Fish and Wildlife Service (Service) will amend or rewrite environmental assessments that describe hunting programs at various national wildlife refuges located throughout the United States. These new environmental assessments will address the cumulative impacts of hunting at all refuges which were named in or otherwise affected by the lawsuit. Previous environmental assessments have dealt with hunting and fishing at Big Oaks NWR; in 2000 the environmental assessment that evaluated establishing Big Oaks NWR also analyzed opening the refuge to public use activities that included hunting and fishing. In 2004 an environmental assessment evaluated amending the Hunting and Fishing Plan to include squirrel hunting and other public use activities at Big Oaks NWR. This document evaluates and addresses the hunting and fishing program at Big Oaks National Wildlife Refuge in Indiana as described by the amended 2004 Hunting and Fishing Plan.

The purpose of this environmental assessment is to evaluate the feasibility of hunting and fishing activities within hunting areas and the Day-Use area; the hunting and fishing regulations would be as described under the Hunting and Fishing Plan for Big Oaks NWR. This Environmental Assessment is being completed to evaluate the impacts to the natural resources on Big Oaks NWR caused by these activities and to evaluate the cumulative impacts from these regulations as outlined in the amended 2004 Hunting and Fishing Plan.

The proposed action is needed to provide compatible wildlife-dependent recreation on Big Oaks

NWR. In fact, one of the goals of the National Wildlife Refuge System is to provide refuge visitors with high quality, safe, wholesome, and enjoyable recreational experiences oriented toward wildlife to the extent these activities are compatible with the purposes for which the refuge was established.

In addition, the National Wildlife Refuge Administration Act of 1966 as amended in The Refuge Improvement Act of 1997 finds in Section 2, “When managed in accordance with principles of sound fish and wildlife management and administration, fishing, hunting, wildlife observation, and environmental education in national wildlife refuges have been and are expected to continue to be generally compatible uses.”

In summary, the wildlife dependent activities, as herein proposed, are intended to: A) fulfill the Service’s commitment to provide the public opportunities for outdoor recreation; B) provide valid fish and wildlife management techniques to influence the distribution and abundance of these animals to aid Big Oaks NWR habitat restoration and management activities; C) help insure healthy wildlife populations in balance with available habitat.

## **1.1 DECISIONS THAT NEED TO BE MADE**

The Regional Director, U. S. Fish and Wildlife Service, Twin Cities, Minnesota, is the official responsible for determining the action to be taken in the proposal by choosing a proposed action (preferred alternative). The Service Director must also determine whether the selected alternative has a significant impact on the quality of the human environment, thus requiring the preparation of an Environmental Impact Statement (EIS).

## **CHAPTER 2 ALTERNATIVES INCLUDING THE PROPOSED ACTION**

Alternatives were developed that would be consistent with restrictions imposed on the Service under the Army MOA and related safety and environmental concerns and would complement future management programs of the refuge.

### **2.1 ALTERNATIVES ELIMINATED FROM DETAILED STUDY**

An alternative was considered and dismissed from the study due to UXO safety issues related to the use of restricted access areas for public recreation. Specific areas on Big Oaks NWR have been designated by Service as closed, under consultation with the U. S. Army, to all public entry due to the presence of unexploded ordnance (UXO). Under this alternative these areas would have been used for recreation, therefore this alternative was dismissed because it failed to consider safety considerations specific to Big Oaks NWR.

Another alternate was considered and dismissed from the study due to regulations preventing the U.S. Fish and Wildlife Service from catering to special interest groups, which would subsequently reduce recreation opportunities to the general public. This alternative would have

allowed hunting and fishing on designated areas of Big Oaks NWR after determining that: 1) such activity is consistent with resource objectives, and 2) biological monitoring programs on Big Oaks NWR or local Indiana Department of Natural Resources (IDNR) properties provide adequate assurances that target species support a harvestable surplus and would have provided former JPG sponsors special use privileges to access Big Oaks NWR for recreation opportunities. This alternative would have required a grandfather clause inserted into the Hunting and Fishing Plan delegating these special recreation privileges.

## **2.2 DESCRIPTION OF ALTERNATIVES CARRIED FORWARD FOR DETAILED ANALYSIS**

Alternative A: Proposed action- Hunting and Fishing and Public Access Plans would permit deer, turkey, and squirrel hunting and fishing in areas as described in the existing plans.

This alternative would allow fishing, and deer, turkey, and squirrel hunting on designated areas of Big Oaks NWR after determining that: 1) such activity is consistent with resource objectives and 2) biological monitoring programs on Big Oaks NWR or local IDNR properties provide adequate assurances the target species supports a harvestable surplus. Existing areas of Big Oaks NWR currently proposed under this alternative include the numbered areas within the day-use and hunting areas (Fig.1).

Hunting of squirrel, deer, and turkey would be conducted in accordance with all applicable state and federal regulations. Coordination with IDNR biologists will promote continuity and understanding of Service and state resource goals and objectives, and will help assure that the decision-making process takes into account all interests.

Fishing interests will concentrate on large and smallmouth bass, bluegill, and catfish at Old Timber's Lake and special event fishing on refuge ponds and streams. The number of boats on Old Timbers Lake would remain 25.

Alternative B: No Action – Hunting and Fishing would be closed and the Hunting and Fishing Plan and Public Access Plan would be revised to prohibit these activities.

Under this alternative, the refuge would become closed to hunting and fishing. Other uses would continue, such as wildlife viewing, photography, environmental education and interpretation.

Alternative C: The existing Hunting and Fishing and Public Access Plans would be amended to exclude hunting activities in the Day-Use Area.

The Day-Use Area would become closed to hunting under this alternative. This would allow other activities such as fishing, wildlife viewing, photography, environmental education, and interpretation to be unimpeded during refuge hunts in the Day-Use Area.

## **CHAPTER 3 AFFECTED ENVIRONMENT**

### **3.1 BACKGROUND**

The Service, U. S. Army (Army) and Air National Guard (ANG) negotiated a Memorandum of Agreement (MOA) under which much of the former Jefferson Proving Ground (JPG) in southern Indiana became Big Oaks NWR in June, 2000. The refuge is managed using an “overlay” concept. Under the MOA, the Service is granted exclusive rights to manage approximately 50,000 acres as wildlife habitat. However, the Army retains fee title ownership and all the authority, responsibility, and liability for environmental remediation of contamination resulting from past Army activities including UXO, depleted uranium (DU) and other contamination. ANG continues bombing operations, which involve training munitions (i.e., inert munition with a spotting charge), on two inholdings within the refuge’s boundary. These parcels and the small parcel containing Old Timbers Lodge are not part of the refuge (Fig. 1).

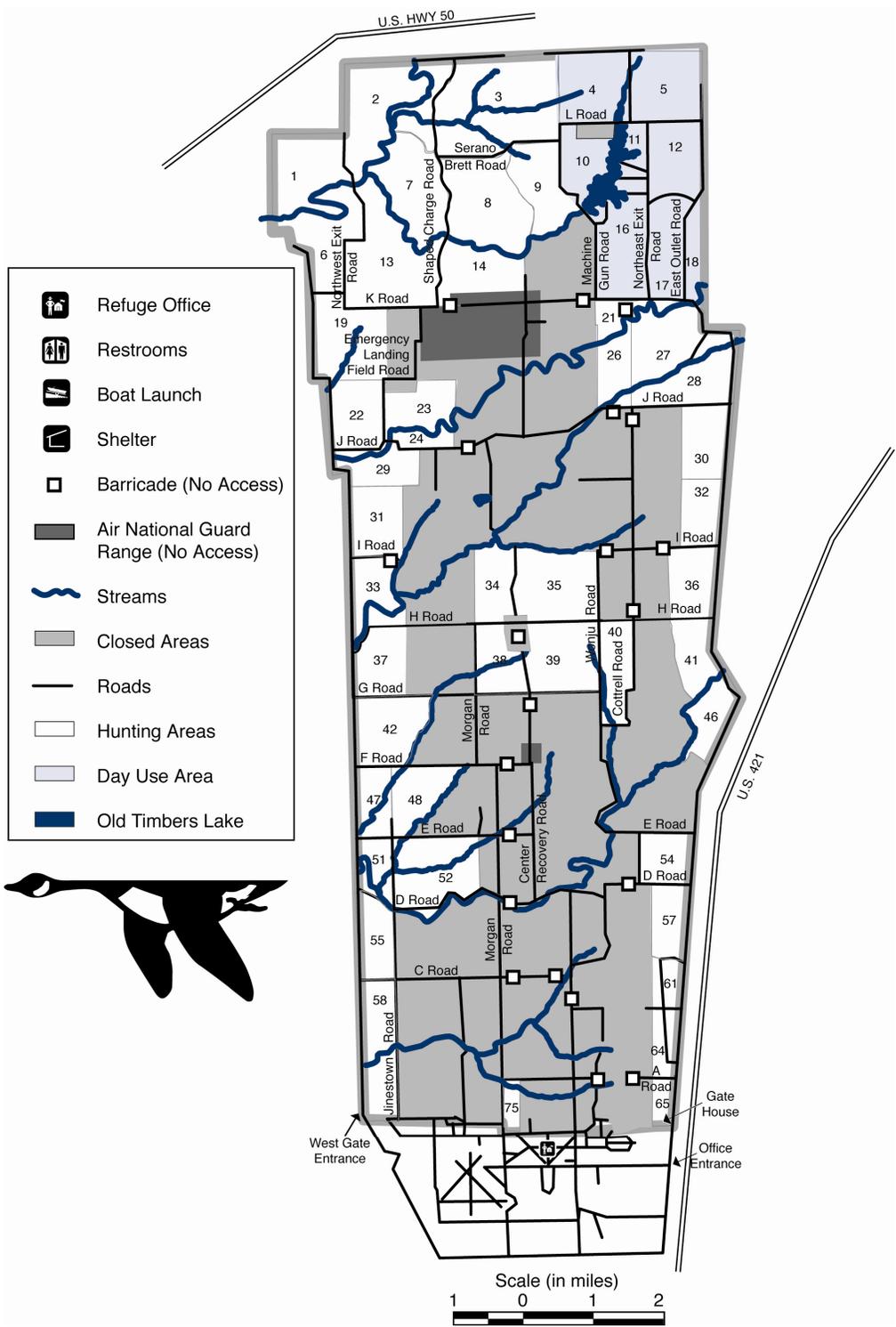
Detailed descriptions of the physical, biological, land use, cultural, local socio-economic conditions of JPG/study area can be found within the 1995 FEIS and the 2000 Interim Comprehensive Conservation Plan for Big Oaks NWR. A short description of the affected environment is detailed below.

### **3.2 PHYSICAL ENVIRONMENT**

Big Oaks NWR is situated on over 50,000 acres in southeastern Indiana within Jefferson, Ripley, and Jennings Counties (Fig. 2). The refuge is about 55 miles north/northeast of Louisville, Kentucky and just north of the Ohio River. The nearest communities are Madison, Indiana, about 5 miles south of the southern boundary of the refuge, and Nebraska and Holton, Indiana, just north of the northern site boundary. The refuge is rectangular with the approximate dimensions of 15 miles in the north-south direction by about 6 miles in the east-west direction. The refuge occupies land north of the firing line of the former JPG.

The area has a typical midwestern continental climate and the weather is quite variable, because of the influx of high and low pressure systems and warm moist air from the Gulf of Mexico. Summers are generally quite warm, while the winters are moderately cold. Precipitation is fairly uniform throughout the year, averaging 7.5-10 centimeters (cm) per month. Spring and summer thunderstorms push the monthly average over 10 cm for the March-June period, while the fall of the year sees monthly rainfalls close to 7.5 cm. Measurable snowfall can be experienced throughout the November to March period, and averages about 40.5 cm annually.

Approximately 39 days per year see temperatures exceeding 32° Celsius (C), with occasional



**Fig. 1. Areas open (Hunting Areas and Day Use Area) to hunting and closed to entry on Big Oaks National Wildlife Refuge**

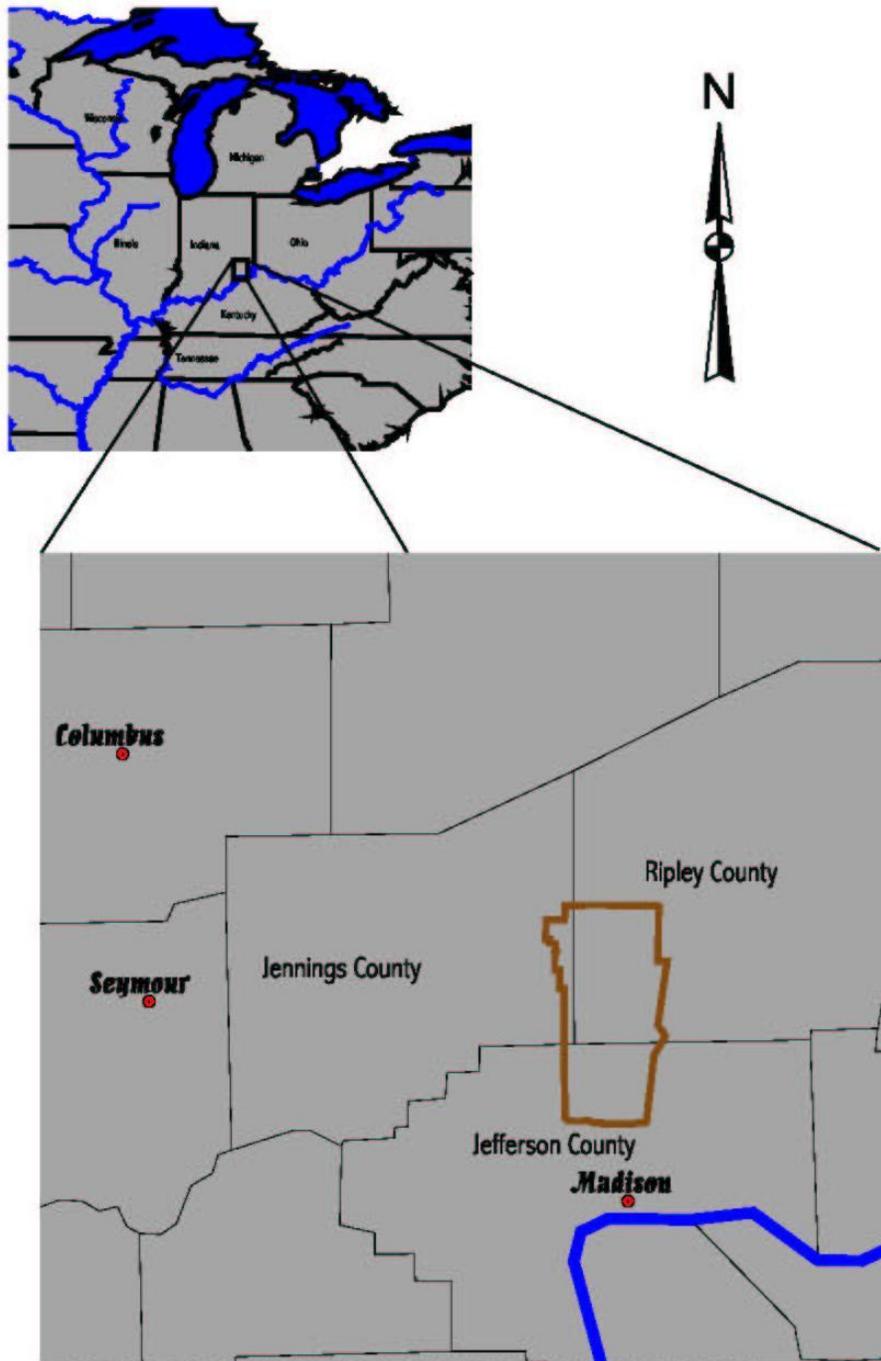


Fig 2. Location of Big Oaks National Wildlife Refuge

occurrences in excess of 38°C. The record high of 40.5°C occurred in July 1954. Winter temperatures are mild, with occasional periods of very cold temperatures. Although temperatures less than zero are uncommon, the record low temperature in the area is -32°C occurring in January 1994. Southerly winds vary from about 9.5-16 km per hour throughout the year, except for the months of February, March and August when the direction is from the north-northwest. Wind gusts up to 125 km per hour have been recorded at the Louisville Station, the nearest source of long term climatologic data. The strongest gusts are normally associated with thunderstorms. The area can experience occasional severe weather, including tornadoes. Several deaths from tornadoes occurred in Madison during 1974.

Ground elevations at Big Oaks NWR are generally between 260-275 meters (m) Net Geodetic Vertical Datum, with elevations along the numerous streams flowing through the area being about 9-15 m lower. Site drainage is generally to the west and southwest. The area is in the headwaters of the White and Muscatatuck River Basin, a major tributary of the Wabash River, which in turn is a major tributary of the Ohio River. Small to moderate size streams flowing through the refuge include: Otter, Graham, Little Graham, Big and Middle Fork Creeks.

Big Oaks NWR is located in the Till Plains section of the Central Lowlands physiographic province. The topography is dominated by gently rolling hills as a result of glacial processes. The bedrock exposed in Jefferson and Ripley counties belongs to the Ordovician, Silurian, and Devonian Systems of the Paleozoic era. These rocks were deposited about 450 to 350 million years ago as fine grained sediments in shallow marine waters. The strata dip 3.7 to 4.7 m per km to the west. In the site area the rocks at the surface are the Silurian rocks. The Devonian bedrock is composed predominantly of limestones that exhibit karst features in some areas.

Big Oaks NWR is underlain by deep, nearly level and gently sloping, poorly drained and somewhat poorly drained soils formed in a thin mantle of loess and in the underlying glacial drift. The surface layer of the soil is generally dark grayish brown or grayish brown, mottled, silty sandy clay, to a depth of 30.5 cm. The subsoil layer is composed of silty sandy clay that is light gray, yellowish brown, mottled, and friable. The subsoil layer extends below a depth of 2 m. The available water capacity of the soil is very high and the permeability is slow. There is a perched, seasonal high water table at or near the surface during the winter and spring months.

### **3.3 BIOLOGICAL ENVIRONMENT**

Upland forests comprise 27,384 acres (54%) of the approximate 50,000 acre refuge. The upland forest classification includes both evergreen and deciduous species ranging in age from young (~15-30 years) to mature ( $\geq 50$  years). The primary evergreen species at the refuge is eastern red cedar (*Juniperus virginiana*). Dominant deciduous trees include sweetgum (*Liquidambar styraciflua*), red maple (*Acer rubrum*) and black gum (*Nyssa sylvatica*) on poorly drained upland depression sites. Tulip poplar (*Liriodendron tulipifera*) and white ash (*Fraxinus americana*) are the species making up the young upland forests on well drained sites. White oak (*Quercus alba*), red oak (*Quercus rubra*) and shagbark hickory (*Carya ovata*) are the dominant species on

intermediate sites and within some mature upland forests. American beech (*Fagus grandifolia*) and sugar maple (*Acer saccharum*) dominate the remainder of the mature upland forests.

Grasslands are the second most abundant habitat at Big Oaks NWR. This habitat type makes up 8,443 acres (17%) of the refuge. The dominant grass species within this habitat appears to be broomsedge (*Andropogon* sp.).

Other habitat types at the refuge include 5,241 acres (10%) palustrine wetland, 3,113 acres (6%) woodland, 6,093 acres (12%) early successional, 156 acres (0.5%) of open water, and 173 acres (0.5%) of bare soil and paved areas. Woodland species composition is comparable to that of upland forest. The palustrine wetland category includes all growth stages of palustrine vegetation including early successional and forested wetland.

The value of the habitat within Big Oaks NWR has been recognized at both the state and national levels. Big Oaks NWR has been named a Globally Important Bird Area by the National Audubon Society due to large Henslow's sparrow populations within the refuge's grassland areas. The Indiana Department of Natural Resources states that, "JPG is indeed a natural treasure that contains a full array of the region's natural communities and species assemblages."

Big Oaks NWR provides habitats for, and subsequently attracts, an abundance of wildlife species. Twenty-five species of amphibians, 18 species of reptiles, 48 species of mammals, and 200 species of birds have either been recorded or can reasonably be expected to be present on the refuge for a portion of the year.

Federal and State regulations permit hunting of species to maximize utilization of harvestable surpluses of resident game and to tailor harvest opportunities to local needs. These regulations permit harvests that are consistent with the well being of migratory and resident animal populations that use the area. Permit drawn hunts for the general public have been conducted for deer (since the 1960's) and turkey hunting (since 1984) on some areas of JPG. Squirrel hunting had occurred on the area since the 1960's but was curtailed in 2000 due to the limited number of refuge staff. Squirrel hunting was opened again in the fall of 2004. The general public hunts were coordinated with the Indiana Department of Natural Resources, Division of Fish and Wildlife (IDNR).

Gray and fox squirrels are present throughout the wooded areas of the refuge. Squirrel hunting occurs on a portion of the refuge and a limited number of hunters are given access to each area due to safety concerns associated with unexploded ordnance and monitoring visitor access. The harvest of squirrels should occur at a sustainable level if hunting is conducted in accordance with State seasons and bag limits. In 2006, 46 squirrels were harvested by 53 hunters (0.9 squirrel harvested per hunter) during the refuge squirrel season. This low level of harvest was typical of the past 3 years and predicted decline of small game hunters should continue this harvest level in future years.

Turkeys are present throughout the refuge and their population is still increasing due to the maturation of forested areas on the refuge. While no standard survey has been done, the turkey population at Big Oaks NWR is estimated near 1,000. Several flocks of birds numbering in the hundreds have been observed during the winter flocking period. Turkey harvests at JPG/Big Oaks NWR have been approximately 60 toms per 800 hunter use-days (Fig. 3). Harvest has varied from a low of 44 in 1997 to a high of 95 birds in 2001 (Fig. 3). The harvest of tom turkeys should continue at sustainable levels if hunting is conducted in accordance with State seasons and bag limits. The Indiana DNR has a conservative harvest strategy with 1 bird bag with "gobblers" only in spring and 1 bird bag for fall; Indiana's spring harvest is estimated at about 10% of the breeding population (Steve Backs. Pers. Comm.). Big Oaks NWR currently does not propose a fall season for turkeys.

Deer populations at JPG were extremely high in the 1960's and 1970's. Habitat became degraded and a browse line developed before adjustments in harvest brought the population to lower levels (Ken Knouf, Pers. Comm.). Prehunt densities were estimated at approximately 30 deer/sq. mi. by the IDNR in the mid-1990's. A past goal stated by IDNR biologists was to stabilize success rates during the gun season to 15 - 20 % (Fig. 4); high harvests in the 1960's and 1970's reduced and stabilized the herd (Fig. 5). Current harvests at the refuge vary from 400 to 800 deer per year (Fig. 5). Dressed weights of known-age deer or antler beam diameters of known-age bucks can monitor the nutritional health of the herd; these dressed weights increased in the 1990's and in recent hunts, indicating that the quality of the habitat on JPG has improved since the 1970's (Fig. 4). Harvest ratios of bucks and does should be roughly equivalent, and management protocols in recent years have increased the percentage of does in the harvest (Fig. 5). Biological data from harvested deer should be collected periodically to reconstruct basic information on the deer herd. Presently, the deer herd appears to be stable as indicated by similar success rates (Fig. 4). Hunter use days are slightly less than the mid-1980's when the Army managed the hunt (Fig. 6). Refuge staff will consult with IDNR biologists to adjust harvest recommendations for future hunts and sample deer for Chronic Wasting Disease (CWD) and other diseases in conjunction with the state.

Fishery populations present on the Big Oaks NWR are considered healthy enough to support recreational fishing at a higher level than what occurred prior to refuge establishment. The 1997 Fishing Report (Sims and Suprenant 1998) indicated insufficient recruitment of bass and recommended the implementation of a 12 to 15-inch slot limit combined with increased fishing pressure; a similar survey in 2001 had similar recommendations (Suprenant, Pers. Comm.).

Species of concern on a national basis include 2 federally threatened or endangered species on the refuge. Federally listed bald eagles are observed onsite during migration. Potential nesting habitat does exist on the refuge but nesting has not been documented for the area. The site also contains summer breeding and foraging habitat for the Federally endangered Indiana bat. No hibernacula are known to exist on the property.

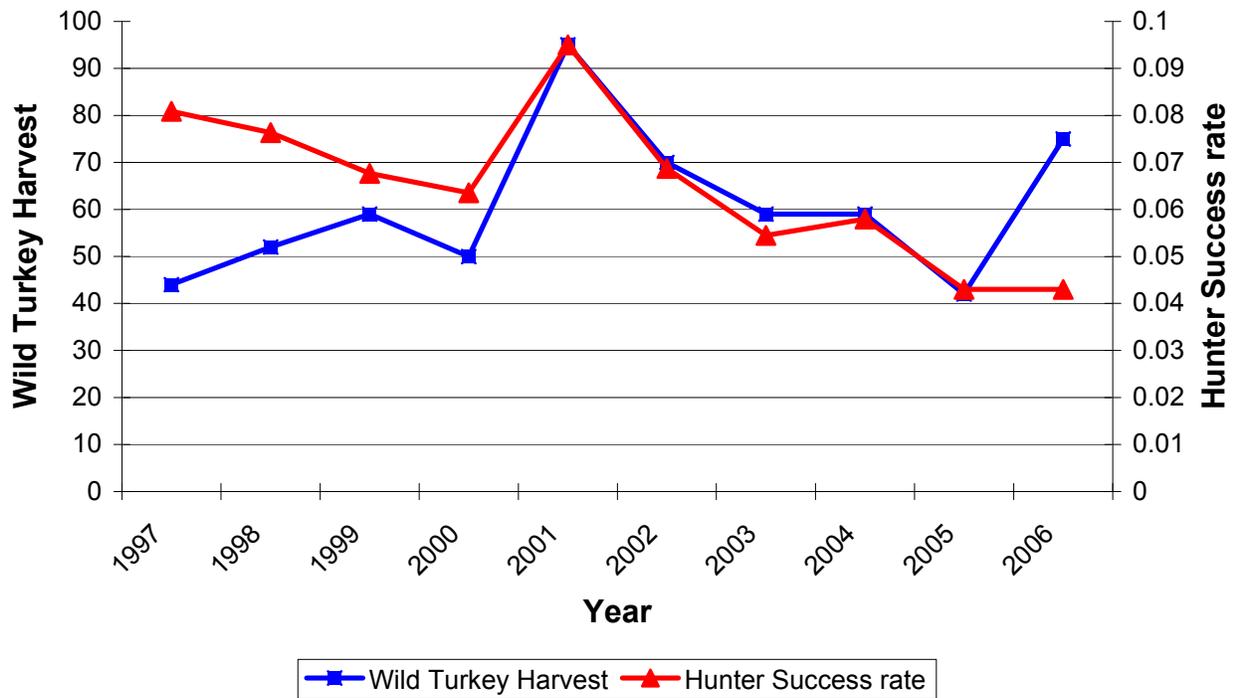


Fig. 3. Turkey harvest and hunter success rates at Jefferson Proving Ground/Big Oaks National Wildlife Refuge, 1997-2006.

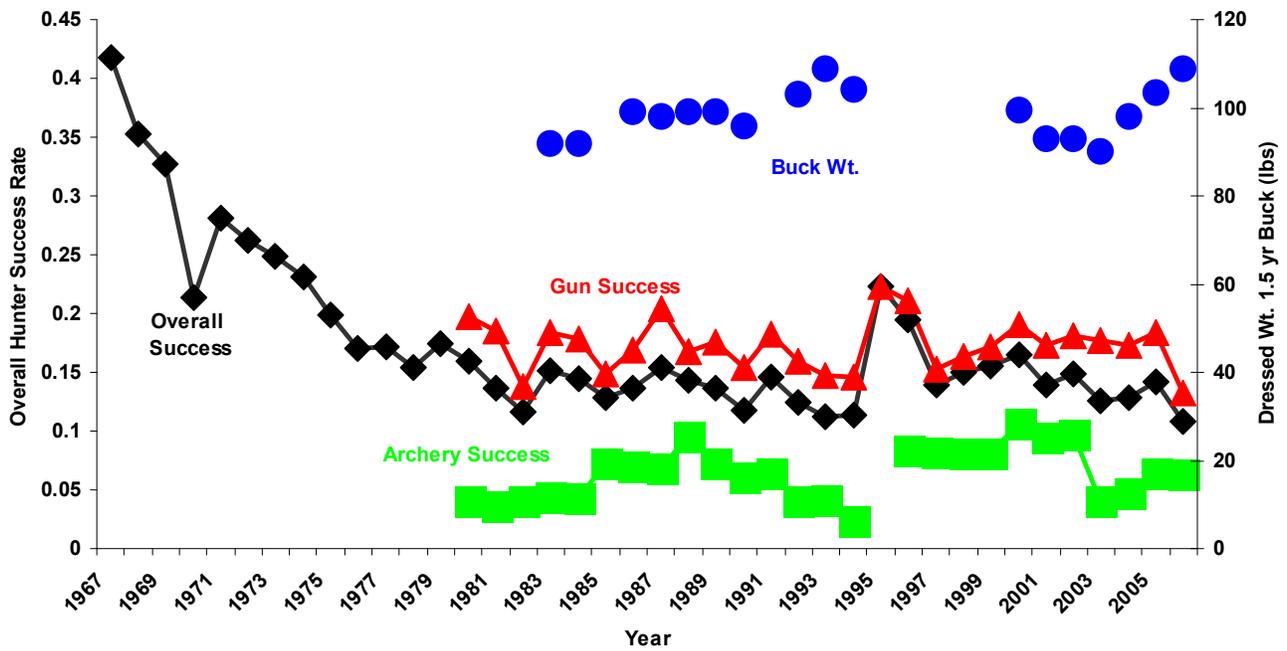


Fig. 4. Hunter success rates during each annual hunt at Jefferson Proving Ground/Big Oaks National Wildlife Refuge (1967-2006). Average field dressed weights of known age (1.5 year) bucks are used as an index for herd condition.

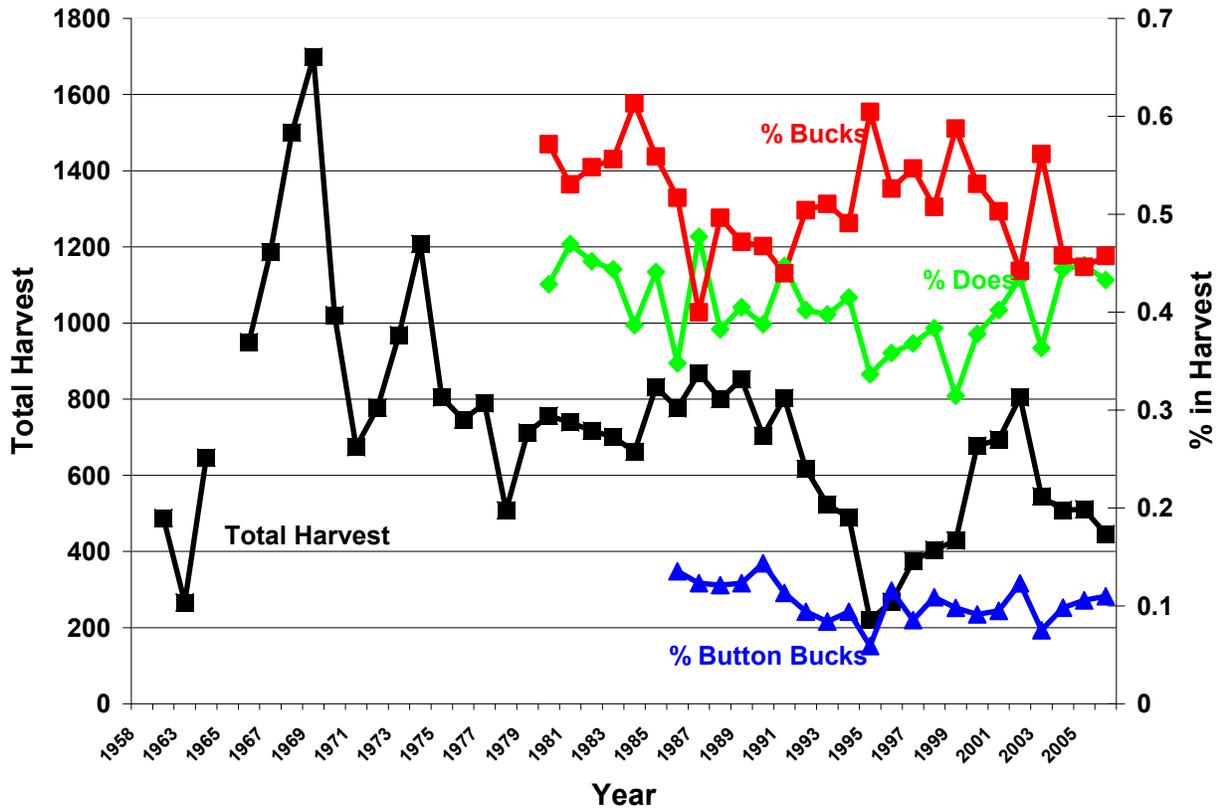


Fig. 5. The number of deer harvested annually and the percentage of bucks, does, and button bucks comprising each harvest at Jefferson Proving Ground/Big Oaks National Wildlife Refuge (1967-2006).

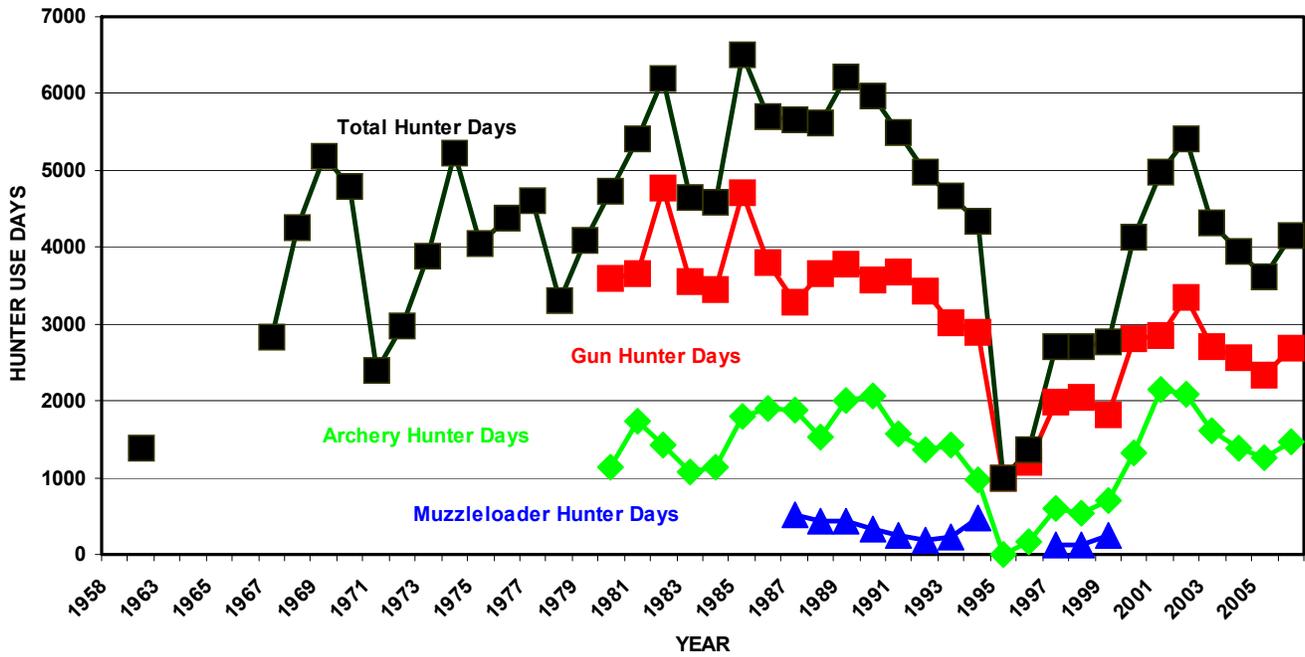


Fig. 6. Hunter Use-Days at Jefferson Proving Ground/Big Oaks National Wildlife Refuge (1967-2006).

### **3.4 CULTURAL/PALEONTOLOGICAL RESOURCES**

The aboriginal cultural history of the region may be subdivided into five broad temporal periods: Paleo-Indian (10,500 - 8000 B.C.), Archaic (8000 - 1500 B.C.), Woodland (1500 B.C. - A.D. 1050), Upper Mississippian/Fort Ancient (A.D. 1000 - 1700), and Historic Native American (A.D. 1675 - 1773) (Mbutu et. al. 1996). Several sedentary Native American groups lived in the Ohio River valley until they were driven out in the late seventeenth century by the Beaver Wars, fought among Native Americans over access to the European fur trade (Hunter 1978).

Beginning in the seventeenth century, other Native American groups migrated or were forced west and southward into what is now Indiana (Brasser 1978:84; Hunter 1978:590; Peckham 1978:1).

By the eighteenth century several Native American groups including the Miami, Wea, Piankawahaw, and Shawnee inhabited eastern Indiana, where they lived in summer agricultural villages and winter temporary hunting/trapping camps. Later arrivals in the area included the Delaware, Potawatomi, and Kickapoo groups (Stafford 1985:2-15). The Delaware and the Potawatomi are reported to have occupied the land east of Butlerville in Jennings County (Leland et al. 1956:89) that is today part of JPG (Mbutu et. al. 1996). Indiana Territory was created by an Act of Congress on May 7, 1800 (Muncie 1932:2). When Indiana Territory was established, there were no Euro-American settlements on the land that later became Jefferson, Jennings, and Ripley counties. The land on which JPG is situated today was acquired from Native Americans as part of the Grouseland Purchase of 1811 (Hawkins and Walley 1995:III-12).

Euro-American settlement of JPG and its vicinity can be traced back to about 1811 (Baker 1991:7). The earliest Euro-American families in Jefferson, Jennings, and Ripley counties were subsistence farmers. Subsistence farming remained the principal occupation during the early half of the nineteenth century. By 1940, the portions of Jefferson, Jennings, and Ripley counties on which the refuge is located consisted of an area of dispersed farmsteads, schools, churches, cemeteries, and small crossroad communities. JPG was established in 1941.

In 1996, Army contractors completed a Cultural Resources Management Plan (Mbutu et. al. 1996) for the former Jefferson Proving Ground. The plan identified 153 recorded archeological sites on the facility. Of these, the Oakdale School built in 1869, the 1932 Old Timbers Lodge (located on IANG Jefferson Range) and 4 bridges are currently listed on the National Register of Historic Places. In addition, 8 bridges are considered eligible or potentially eligible.

### **3.5 LOCAL SOCIO-ECONOMIC CONDITIONS**

The population within the three counties totaled 78,074 based on the 1990 census. From 1990 to 1999, population increased an estimated 12% to 87,394 within the 3 county area. Land use within the 3 county's 758,914 acre area is predominantly agriculture (67%). In 1989, the primary employment sector was manufacturing followed by government, retail trade and services sectors.

The number of visitors (approximately 8,000/year) attracted to Big Oaks NWR has a positive impact on the local economy. Bird watching, and wildlife observation in general, provides recreation as well as a source of income for surrounding communities. Local sporting goods stores, gas stations and hotels are among the businesses that benefit from the refuge, especially during refuge deer and turkey hunting seasons. The National Wildlife Refuge System, with over 545 units nationwide, is increasingly recognized by wildlife enthusiasts for providing quality destinations to enjoy their pursuits.

## **CHAPTER 4 ENVIRONMENTAL CONSEQUENCES**

This chapter describes the foreseeable environmental consequences of implementing the 3 management alternatives in Chapter 2. When detailed information is available, a scientific and analytical comparison between alternatives and their anticipated consequences is presented, which is described as “impacts” or “effects.” When detailed information is not available, those comparisons are based on the professional judgment and experience of refuge staff and Service and State biologists.

### **4.1 Effects Common to all Alternatives**

#### **4.1.1 Environmental Justice**

Executive Order 12898 “Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations” was signed by President Bill Clinton on February 11, 1994, to focus federal attention on the environmental and human health conditions of minority and low-income populations with the goal of achieving environmental protection for all communities. The Order directed federal agencies to develop environmental justice strategies to aid in identifying and addressing disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority and low-income populations. The Order is also intended to promote nondiscrimination in federal programs substantially affecting human health and the environment, and to provide minority and low-income communities’ access to public information and participation in matters relating to human health or the environment. This assessment has not identified any adverse or beneficial effects for either alternative unique to minority or low-income populations in the affected area. None of the alternatives will disproportionately place any adverse environmental, economic, social, nor health impacts on minority or low-income populations.

#### **4.1.2 Public Health and Safety**

Each alternative would have similar effects or minimal to negligible effects on human health and safety.

#### **4.1.3 Refuge Physical Environment**

Impacts of each alternative on the refuge physical environment would have similar minimal to

negligible effects. Some disturbance to surface soils, topography, and vegetation would occur in areas selected for hunting; however effects would be minimal. Hunting would benefit vegetation as it is used to keep deer in balance with the habitat's carrying capacity. The refuge would also control access to minimize habitat degradation in sensitive areas.

Impacts to the natural hydrology would have negligible effects. The refuge expects impacts to air and water quality to be minimal and only due to automobile emissions and run-off from road sides. The effect of these refuge-related activities on overall air and water quality in the region are anticipated to be relatively negligible. Existing State water quality criteria and use classifications are adequate to achieve desired on-refuge conditions; thus, implementation of the proposed action would not impact adjacent landowners or users beyond the constraints already implemented under existing State standards and laws.

Impacts associated with visitor use (noise, trash, etc.) are expected to be minimal given time and space management techniques, such as seasonal access and area closures, used to avoid conflicts among user groups.

#### **4.1.4. Cultural Resources**

Under each alternative, hunting, regardless of method or species targeted, is a consumptive activity that does not pose any threat to historic properties on and/or near the refuge. Historic Old Timbers Lodge is on Jefferson Range, and unauthorized entry is prohibited by ANG. If refuge visitors are allowed to visit Old Timbers Lodge, they are escorted by Army, ANG or refuge staff. Oakdale School is not within a hunting area; visitors to Oakdale School are escorted by Army, ANG or refuge staff. Annually refuge personnel will coordinate with the Army and ANG on monitoring historic bridges from vandalism (e.g., shooting by hunters, vandalism by visitors) and other impacts. Refuge personnel will check the known archeological sites within the hunting and day-use areas for vandalism, compaction, artifact exposure, and erosion.

#### **4.1.5. Facilities**

Maintenance or improvement of existing facilities (i.e. shelter houses, parking areas, roads, and boat ramps) will cause minimal short term impacts to localized soils and waters and may cause some wildlife disturbances and damage to vegetation.

## **4.2 Summary of Effects**

### **4.2.1 Impacts to Habitat**

#### *Alternative A (Proposed Action)*

The biological integrity of the refuge would be protected under this alternative, and the refuge purpose of conserving habitat for wildlife would be achieved. The hunting of deer would positively impact wildlife habitat by promoting plant health and diversity, reducing vegetation browse, and increasing tree seedling survival. Deer populations in the 1960's and 1970's (Figs.

4 and 5) degraded vegetation and reduced deer weights, and potentially negatively impacted biodiversity on the refuge (Ken Knouf, U.S. Army, Pers.Comm). Hunting squirrel and turkey have minimal impacts on habitat.

#### *Alternative B (No Action)*

Under this alternative, the refuge would not be opened to hunting or fishing. When deer are overpopulated, they overbrowse their habitat, which can change the structure and composition of plant communities. The refuge has recovered from severe overbrowsing that occurred during the 1970's. The refuge is currently allowing successional forest to mature outside of grassland focus areas to improve conditions for neotropical migrants, Indiana bats, and bald eagles. Tree seedling (1-9 years old) survival is negatively influenced by overbrowsing by deer. Failure to establish unfragmented interior forest would have negative impacts on regional species of special concern such as cerulean warblers (*Dendroica cerulea*).

Although hunters would not be accessing approximately 25,000 acres currently open to hunting, which could damage plants by trampling vegetation, non-consumptive users would be able to access 4,100 acres in the Day-Use Area. Non-consumptive users affect vegetation (e.g., trampling) in similar ways; overall less visitor use would result in fewer impacts.

#### *Alternative C*

Under this alternative hunting would be closed in the Day-Use Area to minimize adverse impacts to non-hunting users. The absence of hunting would cause deer densities to increase in this area and subsequent habitat degradation would result from these deer population levels. Eventually deer numbers would decrease floral and faunal biodiversity due to severe browse.

### **4.2.2 Impacts to Hunted Wildlife**

#### *Alternative A (Proposed Action)*

The Refuge Recreation Act of 1962 (16 U. S. C. 460K) and the National Wildlife Refuge System Administration Act of 1966 (16 U. S. C. 668-ddee) provide authorization for hunting and fishing on National Wildlife Refuges. The effects of hunting and fishing on refuges have been examined in several environmental review documents, including the Final Environmental Impact Statement on the Operation of the National Wildlife Refuge System (1976), Recommendations on the Management of the National Wildlife Refuge System (1978), and the Draft Environmental Impact Statement on the Management of the National Wildlife Refuges (1988). Nothing in the establishing authorities for the Big Oaks National Wildlife Refuge precludes hunting and fishing on the refuge. Alternative A would allow traditional public use opportunities, hunting and fishing, to be provided on Service lands. Providing these additional public use opportunities would have a positive impact on public perception of the refuge, since demand for these activities has been expressed by the public. Youth turkey/deer hunts coincide with no other hunt season and would provide youth the opportunity to hunt without having to compete with adults. The refuge also holds special youth fishing events in partnership with other organizations.

Mortality/harvest of hunted animals would occur under this alternative. Harvest would be similar

to past refuge hunts. Hunting causes some disturbance to non-target species; time and space zoning established by refuge regulations should minimize this incidental disturbance. The hunting of deer, turkeys, and squirrels will result in the seasonal removal of animals from each respective population. However, the loss of individuals from the population, in accordance with specified seasons and regulations, is expected to be compensatory. By compensatory, this means removing part of the population at the level that is lost naturally from predation, injury, disease, weather, competition, and other factors. Annual analysis of the population, using available harvest data and consultation with IDNR, will help determine any necessary annual adjustments in the hunting program. The disturbance of non-targeted wildlife under Alternatives A could result in additional stress on these animals, but the impacts are not expected to be significant. Squirrel hunting would be limited to only a portion (mid-August thru November on public use days) of the regular state hunting season (mid-August thru January) and number of persons per area would be limited as well. The use of squirrel hunting dogs would take place in the day-use area only. Lead shot would not be allowed for squirrel hunting, but lead shot would be allowed for turkey hunting due to the limited number of gun discharges per animal. Deer hunting is limited to 15 days in October and November, and turkey hunting is limited to 12 days in April and May; the limited number of days is caused by a lack of staff to oversee the rigorous check-in/out procedures mandated by the Army under the existing Public Access Plan. The numbers of visitors allowed within each specific unit are also limited by unit size. With these constraints on the number of visitors, visitor use, impacts to wildlife habitat and plant communities are expected to be minor.

Hunting would maintain deer populations at or below carrying-capacity. The likelihood of starvation and diseases, such as Hemorrhagic Disease in deer would decrease as would deer-vehicle collisions. Fewer deer would decrease competition for food and decrease impacts on native vegetation and wildlife.

Alternatives A would also allow for fishing opportunities and holding special fishing events (i.e., take a kid fishing day) at Old Timbers Lake and on refuge ponds and streams. Fishing activities would cause minimal disturbance to wildlife, given the limited duration (April thru November) of the activity, boat limits, and restrictions imposed on boats (e.g., no gas powered motors).

*Alternative B (No Action)* Additional mortality of individual hunted animals would not occur under this alternative. Disturbance by hunters to hunted wildlife would not occur; however, other public uses that cause disturbance, such as wildlife observation and photography, would still be permitted. Under Alternative B, Big Oaks NWR would essentially represent a sanctuary unavailable to the public for the harvest of fish and wildlife. The public desire for this public use opportunity would not be met. In addition, the National Wildlife Refuge System goals, the President's Executive Order, and refuge objectives for public use opportunities would not be met.

Deer populations could increase above the habitat's carrying capacity in the refuge. The likelihood of starvation and diseases, such as Hemorrhagic Disease in deer would increase as would vehicle-deer collisions. Additionally, larger deer populations would increase browse and

cause negative impacts on habitat and decrease biodiversity of flora and fauna. The refuge would receive complaints from neighboring farmers due to crop depredation caused by the increased deer herd (and a lesser extent from turkeys) that would emigrate from the refuge.

#### *Alternative C*

Alternative C would not allow hunting in the Day-Use Area and it is expected that increased fishing opportunities, wildlife viewing, environmental education, and interpretation would occur. Closed areas that comprise half of the refuge acreage would be strictly off limits to all visitors. Impacts in the Day-Use Area would be similar to Alternative B. Animal harvest would not occur under this alternative in the Day-Use Area. Disturbance by hunters to wildlife would not occur in the Day-Use Area; however, other public uses that cause disturbance, such as wildlife observation and photography, would be permitted in the Day-Use Area.

Deer populations within the Day Use Area could increase above the habitat's carrying capacity. The likelihood of starvation and diseases, such as Hemorrhagic Disease in deer would increase as would vehicle-deer collisions. Additionally, increased deer populations would cause negative impacts on habitat and decrease biodiversity.

Alternatives C would allow for fishing opportunities and special fishing events (i.e., take a kid fishing day) at Old Timbers Lake and on refuge ponds and streams. Fishing activities would cause minimal disturbance to wildlife given the limited duration (April thru November) of the activity, boat limits, and restrictions imposed on boats.

### **4.2.3 Impacts to Non-hunted Wildlife**

#### *Alternative A (Proposed Action)*

Deer populations would decrease through controlled hunts under this alternative. Habitat quality for many species of mammals and birds would be increased. Disturbance to non-hunted wildlife would increase slightly. However, significant disturbance would be unlikely. Some disturbance of early nesting birds (e.g., eastern meadowlark, woodcock, etc.) could occur during turkey hunting. Small mammals, including bats, are usually inactive during fall when most of the deer hunting impacts would occur, and these species are also nocturnal. Similarly during the spring turkey hunt, nocturnal mammals would not be impacted. Both of these qualities make hunter interactions with small mammals unlikely. Hibernation or torpor by reptiles and amphibians also limits their activity during the hunting season when temperatures are low. Hunters would rarely encounter reptiles and amphibians during most of the hunting season; they would become active and be vulnerable during the latter portion of turkey season and early squirrel season. Invertebrates are also not active during cold weather and would have few interactions with hunters during the deer hunting season. The refuge has estimated current hunter density on peak days to be no more than 1 hunter per 62 acres of hunted area (considering the entire refuge 1 hunter per 125 acres). During the vast majority of the hunting season, hunter density is lower than during peak periods. Refuge regulations further mitigate possible disturbance by hunters to non-hunted wildlife. Vehicles are restricted to roads and the harassment or taking of any wildlife other than game species legal for the season is not permitted. Disturbance to the daily activities,

such as feeding and resting, of birds and other non-target species might occur, but would be transitory as hunters traverse habitat. Disturbance to non-target wildlife by hunters would probably be commensurate with that caused by non-consumptive users in the Day-Use Area.

*Alternative B (No Action)*

Deer will become overpopulated, and reduce habitat quality for non-game wildlife. The scenario would be similar to the habitat degradation that occurred in the 1960's and 1970's on the site; biodiversity of rare plants was reduced. Degradation of habitat for non-game wildlife was apparent in this time period from browse lines and loss of habitat structure.

*Alternative C*

Increased disturbance to non-hunted wildlife would not occur in the 4,100-acre Day Use Area; however, non-consumptive users would still be permitted to access the Day Use Area, which might cause disturbance to wildlife. Deer will become overpopulated in the Day Use Area, and reduce habitat quality for non-game wildlife. The scenario in the Day Use Area would be similar to the habitat degradation that occurred in the 1960's and 1970's; biodiversity of rare plants was probably. Degradation of habitat for non-game wildlife was apparent in this time period from browse lines and loss of habitat structure.

#### **4.2.4 Impacts to Endangered and Threatened Species**

*Alternative A (Proposed Action)*

Because current public use levels on the refuge would remain the same, there would be no increased chance of adversely affecting threatened and endangered species.

*Alternative B (No Action)*

Because current public use levels on the refuge would decrease, there would be a decreased chance of adversely affecting threatened and endangered species. Since there is no evidence of current adverse impacts, impacts under this alternative will be minor. Changes in habitat conditions due to increased browsing could impact Indiana bats foraging if invertebrate densities are reduced from vegetation degradation.

*Alternative C*

Because current public use levels on the refuge would decrease slightly due to the absence of hunting in the Day-Use Area, there would be no increased chance of adversely affecting threatened and endangered species.

#### **4.2.5 Impacts to Refuge Facilities**

*Alternative A (Proposed Action)*

Additional damage to roads due to hunter use during wet weather periods might occur. The current refuge hunt program over the past 7 years has shown these impacts to be minimal. There would be some costs associated with a hunting program in the form of road maintenance,

instructional sign needs, and law enforcement. These costs should be minimal relative to total refuge operations and maintenance costs and would not diminish resources dedicated to other refuge management programs. Currently, the user-fee program helps defray these costs. Hunters pay a \$10 hunt user fee and anglers pay a \$3 daily or \$15 annual access fee that the refuge uses to maintain these public use programs.

*Action Alternative B (No Action)*

Damage to roads due to hunter use during wet weather and frequent use would not occur; however, these facilities would still be used by staff and visitors thereby necessitating regular maintenance. Additionally, costs associated with an expanded hunting program in the form of road maintenance, instructional sign needs, and law enforcement would not be applicable.

*Action Alternative C*

Additional damage to roads due to hunter use during wet weather and frequent use would not occur in the Day-Use Area; however, these facilities would still be used by staff and visitors thereby necessitating regular maintenance. Additionally, costs associated with an expanded hunting program in the form of road maintenance, instructional sign needs, and law enforcement would not be applicable.

#### **4.2.6 Impacts to Wildlife Dependant Recreation**

*Alternative A (Proposed Action)*

As public use levels expand through time, unanticipated conflicts between user groups may occur. Experience has proven that conflicts can be mitigated between user groups by managing the timing and location of conflicting public uses (e.g., establishment of separate use areas, use periods, and restrictions on the number of users). This would limit disturbance to wildlife during the spring and summer when most species reproduce. The refuge would also provide youth turkey/deer hunts that coincide with no other hunt season and would provide youth the opportunity to hunt without having to compete with adults. Special fishing events for youth are also popular with the local community and provide partnership opportunities for the refuge with other organizations. Conflicts between anglers, hunters and non-consumptive users might occur but would be mitigated by time (non-hunting season) and space management. The refuge would focus non-consumptive use (mainly bird-watching and other wildlife viewing) in the 4,100-acre Day Use Area.

The public would be allowed to harvest a renewable resource, and the refuge would be promoting a wildlife-dependent oriented recreational opportunity that is compatible with the purpose for which the refuge was established. The public would have an increased awareness of Big Oaks NWR and the National Wildlife Refuge System and public demand for more hunting would be met. The public would also have the opportunity to harvest a renewable resource in a traditional manner, which is culturally important to the local community. This alternative would also allow the public to enjoy hunting at no or little cost in a region where private land is leased for hunting, often costing a person \$300-\$2500/year for membership. This alternative would allow youth the opportunity to experience a wildlife-dependant recreation, instill an appreciation

for and understanding of wildlife, the natural world and the environment and promote a land ethic and environmental awareness.

#### *Alternative B (No Action)*

The public would not have the opportunity to harvest a renewable resource, participate in wildlife-oriented recreation that is compatible with the purposes for which the refuge was established, have an increased awareness of Big Oaks NWR and the National Wildlife Refuge System; nor would the Service be meeting public use demand. Public relations would not be enhanced with the local community. Under this alternative, youth would be unable to experience hunting with an experienced outdoor mentor. This would be a missed opportunity to participate in a partnership program with the Indiana Deer Hunters Association and National Wild Turkey Federation to promote and recruit youth participation in compatible wildlife-dependant recreation.

#### *Alternative C*

The public would have a decreased opportunity in the Day-Use Area to harvest a renewable resource and participate in wildlife-oriented recreation that is compatible with the purposes for which the refuge was established. Awareness of Big Oaks NWR and the National Wildlife Refuge System would be slightly decreased. The Service would not be meeting public use demand of the local community. Public relations would not be enhanced with the local community.

### **4.3 Cumulative Impacts Analysis**

#### **4.3.1 Anticipated Direct and Indirect Impacts of Proposed Action on Wildlife Species.**

##### 4.3.1.1 Resident Big Game

###### 4.3.1.1.1 Deer

Deer hunting does not have regional population impacts due to restricted home ranges. The average radius of home ranges of white-tailed deer varies depending on habitat, but usually does not exceed 1.6 km (1 mile)(Severinghaus and Cheatum 1956). Therefore, only local impacts occur. The IDNR recorded deer harvest rates on counties which include portions of the refuge; the harvest in these counties in 2006, not including the refuge portion of the counties, were: 2052 (Jefferson), 1574 (Jennings), and 1233 (Ripley). These harvests have remained fairly stable over a 10-year period (J. Mitchell, Pers. Comm). Refuge deer harvests range from 400 to 800 per year divided among these 3 counties; these harvests have been sustainable for the last 15 years (Fig. 5). Average weights of known age deer (1.5 year bucks) remained stable on the refuge (Fig. 4).

IDNR biologists and refuge biologists meet each year to consult and plan each year's hunt. Deer herd health checks are conducted by refuge staff and IDNR biologists at the refuge check station. In the past 4 years samples of tissues were examined for Chronic Wasting Disease

(CWD) and tuberculosis. Although deer did show signs of other common diseases (e.g., hemorrhagic disease), no signs of CWD or tuberculosis were found.

Harvest and survey data confirm that decades of deer hunting on surrounding private lands (with longer seasons than the refuge) have not had a local cumulative adverse effect on the deer population. IDNR estimate 125,381 deer were harvested throughout the state in 2006. The average annual statewide harvest since 1995 is 234,000 deer, and this harvest was < 1 % lower than the 125,526 deer harvested in 2005 (J. Mitchell, Pers. Comm). Deer harvest on the refuge (400 – 800 deer/year) has been consistent and sustainable.

#### 4.3.1.2.2 Wild Turkey

Turkeys are non-migratory and therefore hunting only impacts the local population. Turkey harvest has been consistently increasing within the state; spring harvest in 2006 was 13,193 which was an 18 % increase from 2005. State roadside gobbling indices have consistently increased through time since 1987 (S. Backs, Pers. Comm.) These data indicate that the local turkey population has withstood hunting on surrounding private lands for several years without negative cumulative effects on turkeys. Therefore the refuge should not cumulatively adversely impact the population by providing an 11 day hunt under the current state guidelines. Harvest has varied from a low of 44 in 1997 to a high of 95 birds in 2001 (Fig. 3); this harvest varies due to weather conditions, number of hunters, and previous brood production.

#### 4.3.1.3 Small Game (Squirrel)

Squirrels could not be affected regionally by refuge hunting because of their limited home ranges. Only local effects will be discussed. Cumulative adverse impacts to squirrel are unlikely considering they reproduce quickly, are difficult to hunt due to their arboreal habits, and are not as popular for hunting as other game species.

Studies have been conducted within and outside of Indiana to determine the effects of hunting on the population dynamics of small game. Results from studies have consistently shown that small game, such as squirrels, are not affected by hunting, but rather are limited by food resources. The refuge consulted with biologists at the IDNR in association with this assessment on the cumulative impacts of hunting on squirrel. The statewide Indiana harvest of squirrels for 2003 was estimated at 113,802. On Big Oaks NWR, from 2004-2006, hunter harvest data indicated a peak of 46 squirrels/season, representing a very small fraction of the state's harvest. Gray squirrels and fox squirrels are prolific breeders and their populations have never been threatened by hunting in Indiana even prior to the passing of hunting regulations as we know them today.

#### 4.3.1.4 Non-hunted Wildlife

Non-hunted wildlife would include non-hunted migratory birds such as songbirds, wading birds, raptors, and woodpeckers; small mammals such as voles, moles, mice, shrews, and bats; reptiles and amphibians such as snakes, skinks, turtles, lizards, salamanders, frogs and toads; and

invertebrates such as butterflies, moths, other insects and spiders. Except for migratory birds and some species of migratory bats, butterflies and moths, these species have very limited home ranges and hunting could not affect their populations regionally; thus, only local effects will be discussed.

Disturbance to non-hunted migratory birds could have regional, local, and flyway effects. Regional and flyway effects would not be applicable to species that do not migrate such as most woodpeckers, and some songbirds including cardinals, titmice, wrens, chickadees, etc. The cumulative effects of disturbance to non-hunted migratory birds under the proposed action are expected to be negligible for the following reasons. Turkey hunting season coincides with early nesting birds (e.g., woodcock, eastern meadowlark, wrens), but impacts are low due to low densities of hunters. Long-term future impacts that could occur if reproduction was reduced by hunting are not relevant for this reason. Disturbance to the daily migration/wintering activities, such as feeding and resting, of birds might also occur. Disturbance to birds by hunters would probably be commensurate with that caused by non-consumptive users. The control of hunted deer populations, considered collectively with similar wildlife management efforts on numerous refuges throughout the National Wildlife Refuge System, conserves the cumulative health of the habitat of the flyway in which the refuge is located and the migratory birds that utilize that flyway. The prevention of browse lines and other habitat degradation is beneficial for ground nesting and lower arboreal nesting birds. Similarly, the benefits that hunting brings to each refuge improves the entire refuge system's available habitat and native wildlife populations and also provides the public generally with more valuable and diverse refuge recreational opportunities of all kinds.

The cumulative effects of disturbance to other non-hunted wildlife under the proposed action are expected to be negligible. Small mammals, including bats, are inactive during fall/winter when hunting season occurs, and these species are also nocturnal. Both of these qualities make hunter interactions with small mammals very rare. Hibernation or torpor by reptiles and amphibians also limits their activity during the hunting season when temperatures are low. Hunters would rarely encounter reptiles and amphibians during most of the cooler fall hunting season. Encounters with reptiles and amphibians in the early fall are few and should not have cumulative negative effects on reptile and amphibian populations; they would become active and be vulnerable during the latter portion of turkey season and early squirrel season. Invertebrates are also not active during cold weather and would have few interactions with hunters during the deer hunting season. The refuge has estimated current hunter density on peak days to be no more than 1 hunter per 62 acres of hunted area (considering the entire refuge including the closed areas, 1 hunter per 125 acres). During the vast majority of the hunting season, hunter density is lower. Refuge regulations further mitigate possible disturbance by hunters to non-hunted wildlife. Vehicles are restricted to roads and the harassment or taking of any wildlife other than the legal game species is not permitted.

Although ingestion of lead-shot by non-hunted wildlife could be a cumulative impact, it is only relevant to Big Oaks NWR during turkey season, because the use of lead shot would not be permitted on the refuge for squirrel hunting. Since turkey hunters typically do not shoot

frequently, it is thought that this impact is minor.

Some species of bats, butterflies and moths are migratory. Cumulative effects to these species at the “flyway” level should be negligible. These species are in torpor or have completely passed through Indiana by peak hunting season in late Oct-Nov. Some hunting occurs during August and September (squirrel season) when these species are migrating; however, hunter interaction would be commensurate with that of non-consumptive users.

IDNR emphasized during coordination that hunting of deer according to state regulations, help protect the biological integrity of the refuge by promoting plant health and diversity, reducing vegetation browse, and increasing tree seedling survival.

#### 4.3.1.5 Endangered Species

Endangered and threatened species that utilize the refuge are Indiana bats and bald eagle. A Section 7 Evaluation was conducted in association with this assessment for establishing the refuge (2000) and amending the hunt to include squirrels (2004). It was determined that the proposed action would not likely adversely affect these endangered species.

Indiana bats use of much of the refuge during May through September. The turkey hunt which would occur in April and early May would not be during the Indiana bat maternity season. Many refuges and national forests which manage habitat for Indiana bats also offer turkey hunting throughout the entire turkey season without adverse effects on the Indiana bat population. Therefore, 12 days of turkey hunting on Big Oaks NWR would not have adverse impact on Indiana bats.

Bald eagles currently migrate through the refuge and sometimes winter in areas that are open to fishing, deer, turkey, and squirrel hunting without noticeable adverse effects. In the past few years, the number of bald eagles on the refuge has varied; no bald eagle nesting has occurred on the refuge, but this could happen in the near future

Refer to the Section 7 Evaluation for the 2004 Hunting and Fishing Plan on Big Oaks NWR for more information.

### **4.3.2 Anticipated Direct and Indirect Impacts of Proposed Action on Refuge Programs, Facilities, and Cultural Resources.**

#### 4.3.2.1 Wildlife-Dependant Recreation

Public hunting opportunities (Alternative A and C) have decreased with suburban sprawl and the recent local trend of private leases on hunting lands and other types of access restrictions. Local fishing opportunities (Alternative A and C) are also limited, and subsequently demand will probably exceed what the refuge could supply. Recent negative trends nationally and regionally for wildlife dependent and other outdoor opportunities are similar to these local

decreases due to suburban development and limits to public access on private land. Recent proposed national initiatives to increase opportunities for hunting and fishing include private landowner incentives to encourage public access on private land.

The proposed action (Alternative A) provides opportunities for public use, hunting, and fishing. Alternative B does not alleviate decreasing opportunities for hunting and fishing for the general public, but both Alternatives A and C provide additional opportunities for these activities on the refuge.

As public use levels expand across time, unanticipated conflicts between user groups may occur. The refuge's visitor use programs would be adjusted as needed to eliminate or minimize each problem and provide quality wildlife-dependent recreational opportunities. Experience has proven that time and space zoning (e.g., establishment of separate use areas, use periods, and restrictions on the number of users) is an effective tool in eliminating conflicts between user groups.

The level of recreation use and ground-based disturbance from visitors would be largely concentrated at the Refuge's office and parking areas. This should reduce any negative effects on nesting bird populations. The hunting season (except for the turkey and early portion of the squirrel season) is during the fall and not during the nesting period of most birds. It is unlikely that bald eagles would establish nests near developed facilities or during the hunting season.

High deer numbers are recognized as a problem causing car accidents, reducing forest understory species, and reducing reforestation seedling survival. Hunting would be used to keep the deer herd in balance with the habitat's carrying capacity, resulting in long-term positive impacts on wildlife habitat.

The refuge would control access under this alternative to minimize wildlife disturbance and habitat degradation, while allowing current and proposed compatible wildlife-dependent recreation. The closed areas on the refuge (approximately 25,000 acres) would remain as sanctuary for waterfowl and other sensitive wildlife species to minimize disturbance to wintering waterfowl and other adverse impacts caused by human disturbance.

The cumulative effect of closing refuges to hunting might result in decline in social and financial support for wildlife conservation that hunters have provided, through purchases of hunting licenses and migratory bird conservation stamps, and taxes levied on purchases of hunting equipment. The cumulative effect on closing refuges to hunting might be reduce conservation of wildlife habitats if the above revenues are not replaced by another source.

#### 4.3.2.2 Refuge Facilities

The Service defines facilities as: "Real property that serves a particular function(s) such as buildings, roads, utilities, water control structures, raceways, etc." Under the proposed action those facilities most utilized by anglers and hunters are: roads, parking lots, and boat launching

ramps. Maintenance or improvement of existing facilities (i.e. parking areas, roads, and boat ramps) will cause minimal short term impacts to localized soils and waters and may cause some wildlife disturbances and damage to vegetation. The facility maintenance and improvement activities described are periodically conducted to accommodate daily refuge management operations and general public uses such as wildlife observation and photography. These activities will be conducted at times (seasonal and/or daily) to cause the least amount of disturbance to wildlife. Silt barriers will be used to minimize soil erosion, and all disturbed sites will be restored to as natural a condition as possible. During times when roads are impassible due to flood events or other natural causes those roads, parking lots, and boat ramps impacted by the event will be closed to vehicular use.

#### 4.3.2.3 Cultural Resources

Hunting, regardless of method or species targeted, is a consumptive activity that does not pose any threat to historic properties on and/or near the Refuge. In fact, hunting meets only one of the two criteria used to identify an “undertaking” that triggers a federal agency’s need to comply with Section 106 of the National Historic Preservation Act. These criteria, which are delineated in 36 CFR Part 800, state:

- 1- an undertaking is any project, activity, or program that can alter the character or use of an archaeological or historic site located within the “area of potential effect;” and
- 2- the project, activity, or program must also be either funded, sponsored, performed, licenses, or have received assistance from the agency.

Consultation with the pertinent State Historic Preservation Office and federally recognized Tribes are, therefore, not required.

#### 4.3.2.4 Anticipated Impacts of Proposed Hunt on Refuge Environment and Community.

The refuge expects no sizeable adverse impacts of the proposed action on the refuge environment which consists of soils, vegetation, air quality, water quality and solitude. Some disturbance to surface soils and vegetation would occur in areas selected for hunting; however impacts would be minimal. Hunting would benefit vegetation as it is used to keep deer populations in balance with the habitat’s carrying capacity. The refuge would also control access to minimize habitat degradation.

The refuge expects impacts to air and water quality to be minimal and only due to automobile emissions of visitor vehicles and run-off on road sides. The effect of these refuge-related activities, as well as other management activities, on overall air and water quality in the region are anticipated to be relatively negligible, compared to the contributions of industrial centers, power plants, and non-refuge vehicle traffic. Existing State water quality criteria and use classifications are adequate to achieve desired on-refuge conditions; thus, implementation of the proposed action would not impact adjacent landowners or users beyond the constraints already

implemented under existing State standards and laws.

Impacts associated with visitor experience are expected to be minimal given time and space zone management techniques, such as seasonal access and area closures, used to avoid conflicts among user groups.

The refuge would work closely with State, Federal, and private partners to minimize impacts to adjacent lands and its associated natural resources; however, no indirect or direct impacts are anticipated. The hunts would result in a net gain of public hunting opportunities positively impacting the general public, nearby residents, and refuge visitors. The refuge expects increased visitation and tourism to bring additional revenues to local communities but not a significant increase in overall revenue in any area.

There is an increased risk of inadvertent or illegal entry from public use areas into closed areas under Alternative A and C. By allowing the aforementioned additional uses, the refuge may have to be monitored and patrolled to a greater extent than under Alternative B. This increased risk can be minimized through the use of law enforcement, signage and brochures made available to the public. However, allowing these uses could also have the opposite effect since the availability of these recreational opportunities may remove part of the incentive for trespassing on the refuge. There is anecdotal information that since the refuge opened special hunts, fewer incidences of illegal entry into the refuge for deer hunting have been noted. Existing refuge regulations include a prohibition for searching for or removal/possession of objects of antiquity or historical significance or unexploded ordnance, munitions and any other item associated with the Army's historical mission. Every refuge visitor attends a briefing where they are given copies of refuge regulations and informed not to conduct any ground disturbing activities.

#### 4.3.2.5 Other Past, Present, Proposed, and Reasonably Foreseeable Hunts and Anticipated Impacts

Cumulative effects on the environment result from incremental effects of a proposed action when these are added to other past, present, and reasonably foreseeable future actions. While cumulative effects may result from individually minor actions, they may, viewed as a whole, become substantial over time. The proposed hunt plan has been designed so as to be sustainable through time given relatively stable conditions. Changes in refuge conditions, such as sizeable increases in refuge acreage or public use, are likely to change the anticipated impacts of the current plan and would trigger a new hunt planning and assessment process.

The implementation of any of the proposed actions described in this assessment includes actions relating to the refuge hunt program (see 2004 Hunting and Fishing Plan for Big Oaks NWR). These actions would have both direct and indirect effects (e.g., new site inclusion would result in increased public use, thus increasing vehicular traffic, disturbance, etc); however, the cumulative effects of these actions are not expected to be substantial.

#### 4.3.2.6 Anticipated Impacts if Individual Hunts are Allowed to Accumulate

The public uses described in Alternatives A and C on the refuge could cause adverse impacts (i.e., synergistically) that each individual use would not. These additional uses in conjunction with existing uses could potentially add higher levels of adverse impacts such as wildlife disturbance, lowering the quality of habitat, and increase erosion and compaction of archaeological sites. The refuge currently controls the number of public use participants by limiting the number of users per recreational area. The numbers designated per area are conservative for safety reasons (e.g., hunting), to reduce adverse impacts (e.g., habitat degradation), and to keep recreational experience/quality high. The resulting influence of such controls should minimize the potential for cumulative adverse impacts, but diversify the types of high quality, mostly wildlife-dependent uses available on the refuge.

National Wildlife Refuges, including Big Oaks NWR, conduct hunting programs within the framework of State and Federal regulations. Big Oaks NWR is at least as restrictive as the State of Indiana (squirrel and deer) and in many cases more restrictive (turkey). By maintaining hunting regulations that are as, or more, restrictive than the State, individual refuges ensure that they are maintaining seasons which are supportive of management on a more regional basis. The proposed hunt plan has been reviewed and is supported by the IDNR. Additionally, Big Oaks NWR and other refuges in Indiana coordinate with IDNR annually to maintain regulations and programs that are consistent with the State management program.

### **CHAPTER 5 CONSULTATION AND COORDINATION WITH OTHERS**

Indiana Department of Natural Resources, Division of Fish and Wildlife, concurs and fully supports the regulated hunting and fishing activities associated with Big Oaks NWR. Letters of Concurrence have also been sent to the refuge for the past Hunting and Fishing Plans evaluation which include all activities evaluated by this Environmental Assessment.

The Fish and Wildlife Service also provided an in-depth review by the Regional Office personnel and staff biologists. Numerous contacts were made throughout the area of the refuge soliciting comments, views, and ideas into the development of the accompanying hunting plan.

### **CHAPTER 6 REGULATORY COMPLIANCE**

Permits: No federal, state or local permits or licenses are required to institute Big Oaks NWR public hunting and fishing programs, or other public use activities.

Endangered species: The Big Oaks NWR is within the known range of federally listed endangered or threatened species. Those species in jeopardy on a national basis include 1- Federally threatened and 1- Federally endangered listed species in areas in which the Service will be managing the natural resources.

A consultation pursuant to Section 7 of the Endangered Species Act was conducted during the initial Environmental Assessment for the establishment of Big Oak NWR in 2000 and in 2004 when the Hunting and Fishing Plan was amended. Since no new activities are planned, an additional consultation was not conducted. No impacts are anticipated.

Historic preservation: Public use on National Wildlife Refuges, including hunting and fishing activities, can sometimes result in adverse effects to known and unknown historic properties including damage to historic structures, illegal collecting on archeological sites, and soil compaction and erosion of archeological sites.

The body of federal historic preservation laws has grown dramatically since the enactment of the Antiquities Act of 1906. Several themes recur in these laws, their promulgating regulations, and more recent Executive Orders. They include: 1) each agency is to systematically inventory the “historic properties” on their holdings and to scientifically assess each property’s eligibility for the National Register of Historic Places; 2) federal agencies are to consider the impacts to cultural resources during the agencies’ management activities and seek to avoid or mitigate adverse impacts; 3) the protection of cultural resources from looting and vandalism are to be accomplished through a mix of informed management, law enforcement efforts, and public education; and 4) the increasing role of consultation with groups, such as Native American tribes, in addressing how a project or management activity may impact specific archaeological sites and landscapes deemed important to those groups. The Service, like other federal agencies, are legally mandated to inventory, assess, and protect cultural resources located on those lands that the agency owns, manages, or controls. The Service’s cultural resource policy is delineated in 614 FW 1-5 and 126 FW 1-3.

In the FWS’s Midwest Region, the cultural resource review and compliance process is initiated by contacting the Regional Historic Preservation Officer/Regional Archaeologist (RHPO/RA). The RHPO/RA will determine whether the proposed undertaking has the potential to impact cultural resources, identify the “area of potential effect,” determine the appropriate level of scientific investigation necessary to ensure legal compliance, and initiates consultation with the pertinent State Historic Preservation Office (SHPO) and federally recognized Tribes.

The Service is responsible for adverse impacts from its activities (i.e., including public use activities of hunting, fishing, and gathering) on historic and cultural resources located on the overlay refuge (Army maintains fee title to the property). The Army retains full rights and responsibility for maintaining historic and cultural resources on the former JPG on which Big Oaks NWR is overlaid. The Air National Guard has been given responsibility for maintenance of these structures (4 bridges and Oakdale School and Old Timbers Lodge) under a permit from the Army. The Service regulates public use activities that could disturb to historic and cultural resources that are adjacent or contiguous with Big Oaks NWR. Existing refuge regulations include a prohibition for searching for or removal/possession of objects of antiquity or historical significance or unexploded ordnance, munitions and any other item associated with the Army’s historical mission.

Compatibility and Funding Certification: In compliance with the National Wildlife Refuge System Administrative Act and the Refuge Recreation Act, public uses must be compatible with the purpose(s) of a refuge and funding for administration of the use must be available. Compatibility and funding certifications have been completed and are available at the refuge office.

## **LIST OF PREPARERS AND REVIEWERS**

Dobrovolny, John, USFWS, Minneapolis, MN

Fasbender, Peter, USFWS, Minneapolis, MN

Kauffeld, Jon, USFWS, Minneapolis, MN

Lewis, Jason, USFWS, Big Oaks National Wildlife Refuge, Madison, IN

Matiatos, Dan, USFWS, Big Oaks National Wildlife Refuge, Madison, IN

Robb, Joe, USFWS, Big Oaks National Wildlife Refuge, Madison, IN

Stanek, Donna, USFWS, Minneapolis, MN

## **PUBLIC REVIEW AND COMMENT**

The public was notified by newspaper and other media regarding the draft Environmental Assessment. The public had the opportunity to review and make comments on the draft EA; copies of this document were available at the refuge office during the comment period. The comment period for the EA lasted from March 17, 2007 to April 17, 2007. Copies of the document were placed on the refuge website, and news releases announcing its availability for comment were placed in at least three local/regional newspapers.

A total of 105 comments by the public were received (one comment which was received after the comment period was also included in the analysis), 102 of which were in favor of the Proposed Action or suggested a program of hunting and fishing without choosing Alternative A or C. One comment stated that they did not support Alternative A (without naming another alternative), and another comment preferred Alternative C. An additional comment supported Alternative B.

We received a letter from the Humane Society of the United States that contained comments related to hunting on the National Wildlife Refuge System as a whole and containing elements related to litigation filed in 2003 by the Fund for Animals against the Service. Some of these comments were not specific to this draft EA and are noted but not responded to here.

The HSUS objected to the inadequate notice and amount of time for commenting on the document. The Service solicited comments during the 30-day review period from March 17 through April 17, 2007. Announcements of the public review period were placed in at least 3 newspapers and a copy of the document was placed on the refuge website.

The HSUS states that the Service must ensure the availability of sufficient funds before approving hunting on the refuge. This comment refers to the Refuge Recreation Act. Sufficient funds are available to implement the Proposed Action for Big Oaks NWR as stated in the most recent Hunting and Fishing Plan.

The HSUS states that the Service must complete a Section 7 evaluation. Big Oaks NWR completed an Intra-Service Section 7 Biological Evaluation as part of the last approved hunt plan.

The HSUS states that the Service has compromised the biological integrity of refuges by allowing hunting and that the Service does not consider impacts of hunters on non-consumptive users. The HSUS also claims that hunting and the number of hunters is decreasing and the Service has not capitalized on potential economic gain that would come from non-consumptive users. The Service notes these comments.

The HSUS states that the environmental assessment did not adequately address the cumulative impacts of hunting across the entire Refuge system. The comment is noted for the entire refuge system. The Service disagrees that cumulative impacts were not adequately addressed at the state level. The refuge coordinates its hunting program within the State of Indiana's regulations

which take into consideration the cumulative impacts of hunting across the state.

The HSUS states that the environmental assessment does not consider temporal or monetary investments necessary to isolate consumptive and non-consumptive users on the refuge. The Service notes the comment.

The Safari Club International (SCI) recommends that the FWS add to its cumulative analysis an explanation of how the control and/or reduction of hunted populations, considered collectively with similar wildlife management efforts on numerous refuges throughout the National Wildlife Refuge System, conserves the cumulative health of the habitat of the flyway in which the refuge is located and the migratory birds that utilize that flyway. In addition, the benefits that hunting brings to each refuge improves the entire refuge system's available habitat and native wildlife populations and thus provides the public generally with more valuable and diverse refuge recreational opportunities of all kinds. SCI specifically noted how deer hunting would reduce vegetation loss and prevent harm to sensitive species. SCI also suggested that the draft Hunt Plan and EA feature more prominently the refuge's consultation with the state fish and game agency. The Service notes these comments and revised the draft to incorporate this information. The SCI also commented that squirrels sometimes prey on the nests of some bird species and that turkeys compete for food with other species of wildlife and that hunting of these 2 species could be beneficial to other refuge species. The Service also notes these comments.

The U.S. Army, owner of the land where the refuge resides, supported the proposed action for the refuge hunting and fishing program, and noted that hunting and fishing has occurred at the site historically and at sustainable levels. The Service notes these comments.

The Service received letters supporting the proposed action from organizations that support the proposed action from Indiana Wildlife Federation, Indiana Pheasants Forever, Indiana Sportsman's Roundtable, Association of Indiana Taxidermists, Indiana Deer Hunters Association, and Minnesota Deer Hunters Association.

One comment referred to our draft stating that temperatures of 0° C being uncommon and that it was frequently below 0° C. The Service notes this comment.

Several comments referred to the high deer populations in the 1970's and 1980's when the Army operated Jefferson Proving Ground, and the observable deer browse line and small size of deer. The Service notes these comments.

Minnesota Deer Hunters Association noted that the draft underestimated the detrimental effects of not allowing hunting (e.g., increase in deer diseases such as chronic wasting disease, bovine tuberculosis and hemorrhagic disease and loss of sensitive plant species and fauna). The Service notes this comment.

A disabled hunter commented that Big Oaks NWR was one of the few places that he could access and the closing of this facility would decrease their hunting opportunities. The Service

notes this comment.

There were also several comments (e.g., reestablishing elk, reopening of closed areas on the refuge, initiating fur trapping and other associated changes in the hunting, fishing and trapping regulations for the refuge) that were not specific to the alternatives listed in the EA. The Service notes these varied comments on the hunting and fishing program.

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